جامعة المجمعة
Majmaah University

MAJMAAH JOURNAL OF HEALTH SCIENCES

MJHS

Volume (8) Issue (3) September - 2020, Muharam- 1442 P ISSN: 1658-645X E ISSN: 1658-8223

Publishing and Translation Center - Majmaah University

A JOURNAL PUBLISHED BY THE CENTER OF PUBLISHING AND TRANSLATION AT MAJMAAH UNIVERSITY

IN THE NAME OF ALLAH,
THE MOST GRACIOUS,
THE MOST MERCIFUL

Kingdom of Saudi Arabia
Ministry of Education
Majmaah University

جامعة المجمعة
Majmaah University

MJHS

Majmaah Journal of Health Sciences

A Refereed Academic Journal Published Biannually by the Publishing and Translation Center at Majmaah Universtiy

Vol. 8, Issue 3, September - 2020, Muharam- 1442 P ISSN: 1658 - 645X E ISSN: 1658 - 8223

Publishing & Translation Center - MU

About the Journal

Majmaah Journal of Health Sciences

Vision

The Majmaah Journal of Health Sciences shall be an international peer reviewed journal, which intends to serve researchers through prompt publication of significant advances, and to provide a forum for the reporting and discussion of news and issues concerning health sciences.

Mission

To lead the debate on health and to engage, inform, and stimulate the academicians, researchers, and other health professionals in ways that will improve outcomes for patients.

Objectives

To promote research & evidence based practice in health sciences, so that a firm scientific knowledge base is developed, from which more effective practice may be evolved.

To ensure that the results of the research are rapidly disseminated to the practicing clinicians and educators, in a fashion that conveys their significance for knowledge, culture and daily life.

Correspondence and Subscription

Majmaah University, Post Box 66, AlMajmaah 11952, KSA
email: info@mjhs-mu.org website: mjhs-mu.org

Majmaah Journal of Health Sciences

Editorial Board

Majmaah Journal of Health Sciences

Editorial Board

Members

Majmaah Journal of Health Sciences

Editorial Board

Members

Professor. Dr. B.P. Shelley
Professor and Head – Dept. of Neurology,
Yenepoya Medical College,
Mangalore, India

Majmaah Journal of Health Sciences

Editorial

From Editor's Desk…..

At the outset let me express my gratitude to our beloved Rector Dr.Khalid Bin Saad Al Meqrin and Vice Rector for Graduate Studies and Scientific Research Prof.Dr.Mohammad Bin Abdullah Al-Shaaya for the trust endowed upon me.

MJHS is proud to present its third issue of this year in Volume 8: 2020 under trying global circumstances. The editorial team is working hard to publish on time. However, we also understand the problems endured by the researchers during this time of crisis, due to the ever-evolving Corona pandemic. The research pertaining to COVID-19 are given prime importance, with vigorous peer- reviewing and minimalizing the publication time as much as possible.

As a famous quote says, "research is creating new knowledge", MJHS and its editorial team is primarily focussed on creating new knowledge with strong scientific reasoning and methods implicated. Authors are requested to enrich their scientific contribution by plagiarism check and language editing, if needed. However, language editing does not guarantee publication and any cost incurred in this process are sole responsibility of the author.

The editorial team would like to extend warm thanks to its associate editors, reviewers, authors and of course its valuable readers for their valuable contribution to the success of MJHS.

.

Dr.Khalid Mohammed Alabdulwahhab

Editor in Chief

Contents

Contents

Letter to editor:

Twelve tips on the importance of medical humanities in medical schools

Awad Mohamed Ahmed[1], Nada Hassan Ahmed Abdel-Rahman [2], Hatem Mohamed [3]

1. Professor of Internal Medicine, College of Medicine, Najran University, Kingdom of Saudi Arabia
2. Associate Professor of Internal Medicine, Sulaiman AlRajhi University, Bukayriyah, Qassim, Kingdom of Saudi Arabia
3. Assistant Professor of Public Health, College of Medicine, Najran University, Najran, Kingdom of Saudi Arabia

Received on 08.08.2019, accepted for publication on 26.06.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.002)

Corresponding Author:
Dr. Hatem Mohamed. Assistant Professor of Public Health, College of Medicine, Najran University, Najran, Kingdom of Saudi Arabia. Tel: 00966556173495. E mail: hatem.mhamed@hotmail.com

Abstract

Medical humanities are a set of interdisciplinary fields that embrace social and human sciences. The future doctors are expected to benefit from medical humanities in providing health care that address patients as whole human beings and as 'cases'. Medical humanities can be expected to be beneficial for other health fields programs such as nursing and public health.

الملخص

الانسانيات الطبية هي مجموعة علوم في حقول معرفية متداخلة تشمل العلوم الاجتماعية والعلوم الانسانية والفنون بأنواعها المختلفة. يتوقع ان يستفيد اطباء المستقبل من الانسانيات الطبية في بذل رعاية طبية تخاطب المريض كانسان متكامل وليس كحالة مرضية. الانسانيات الطبية يمكن ان تفيد كل الدارسين للعلوم الصحية مثل التمريض والصحة العامة.

Tip 1

What are the medical humanities?

Medical humanities are divided into three categories, pure humanities (e.g. philosophy, psychology, history), social sciences (e.g. sociology, cultural studies) and arts.

Tip 2

What is the scope of medical humanities?

Medical humanities are a set of interdisciplinary fields, applied to achieve some of the goals of medical education and practice. They aim at understanding health, illness, sufferings, disabilities, recovery and health care issues from a non- biomedical sciences approach, using 'tools' like culture, feelings, expression, and experience of patients to appreciate their needs and humanity. [1]

Tip 3

Why are humanities important in medical practice?

The future doctor is expected to integrate humanities in the process of health care of his patients [1]. It will be a 'shift 'from the traditional biomedical sciences approaches which used history, physical examination and investigations to solve the pathophysiological problems of patients. In sum, the major theme of medical humanities is 'caring medicine' in contrast to the 'curative medicine' theme of biomedical sciences.

Tip 4

Who should teach humanities?

Interested physicians of different specialties, offered relevant training (not necessarily postgraduate degrees, thought better if obtained), and interested non-physician academicians of human and social sciences can both teach the humanities. The non-medical staff may benefit from a programme of professional development to get initiation to the clinical milieu of medical study.

Tip 5

When humanities are taught (in which part of the teaching curriculum?)

For the schools that want to introduce humanities in their curricula, they better start with a debate among staff on their rationale and relevance to accept integration of humanities in schools' programmes. The debate may focus on how humanities can benefit medical study, how and when appear in curricula.

Tip 6

Teaching of humanities: getting use of innovate teaching methods

Where there is a resistance to include the humanities, a start with elective (voluntary) courses can be initiated. Another option is to `insert` humanity topics in courses of the community medicine or family medicine or incorporated as learning objectives in the problem-based learning.

Tip 7

What better teaching methods to be adopted to teach humanities?

The medical schools can use both traditional and innovative teaching methods in medical humanities courses, e.g. small group teaching, problem-based learning, seminars, film and theatre shows, art exhibitions, essay assignment, and guest lectures

Tip 8

Examples of teaching methods for humanities

Philosophy: is better taught as integrated concepts in the relevant items in the cur-

riculum, rather than lectures on classical philosophical questions such as metaphysics or epistemology.

Biomedical ethics: biomedical ethics can be taught by using ethical issues and dilemmas in clinical presentations, literature and drama as teaching points.

Tip 9

Assessment of humanities courses

The assessment of medical humanities courses may need methods such as essays on selected topics, analytic exercises, critics of drama works. These methods seem better than the multiple or single choice tests, as humanities issues require in-depth opinions rather than yes/no answers.

Tip 10

Barriers to teaching humanities

There is a lack of qualified and interested teachers in humanities. Some students see humanities as irrelevant, and not useful for their future career and may take them away from the 'real' medicine that requires only clinical competence (as they believe). Even more, some of the teachers with old-fashioned minds bear negative views toward the humanities.

Tip 11

Overcoming barrier to teach medical humanities

Teachers should be initiated to the relevance of medial humanities to the medical practice. The same applies to the students so that they should not consider humanities teaching as irrelevant or time wasting.

Tip 12

The place of medical humanities in vhealth-allied colleges

Humanities can be beneficial in other health programmes. For example, the nursing students who intimately deal in the future with patients from different ethnic, socio-cultural and religious groups may need to be culturally sensitive to these aspects.

References

[1] Brian Hurwitz B, Paul Dakin P. Welcome developments in UK medical humanities. J R Soc Med. 2009; 102(3):84-5.

[2] Dogra N, Giordano J, France N. Cultural diversity teaching and issues of uncertainty: the findings of a qualitative study. BMC Med Educ. 2007; 7:8-13.

Original article

Association between Oxygen Saturation level, Cognitive Function, and the Academic Performance of Medical Students, Jouf University

Kholoud H. Alruwaili [1], Ibtihaj A. Alruwaili [1], Marwa A. El Naggar [2],
Amjaad S. Alshammery [1], Saber M. Obaid Baseem [1], Qusai A. A. Alsaqabi [1]

1. Medical Student, College of Medicine, Jouf University,
2. PhD in Medical Education, Medical Education Unit, College of Medicine, Jouf University,
Skaka, Kingdom of Saudi Arabia (KSA).
lecturer Medical Education Department, Faculty of Medicine, Suez Canal University, Ismailia, Egypt.

Received on 20.07.2019, accepted for publication on 01.03.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.003)

Corresponding Author:
Marwa A. El Naggar Telephone: +00966598668032. fax: 0146244592.
email:Marwanagar@yahoo.com, Managgar@ju.edu.sa

Abstract

Background and Aims:
Many factors have an impact on academic performance, cognitive function one of the most important factor which affect the academic performance, cognitive means conscious mental activity as thinking, remembering, learning or using language. The objective of the study was to assess association between the oxygen saturation level, cognitive function and academic performance of medical students.

Methods:
descriptive cross-sectional study conducted between October 2016 to April 2017. Simple random sampling of 88 medical students were included in the study. A self-administrated questionnaire including factors affect the oxygen saturation levels, measurement of the oxygen saturation by pulse oximeter, and digital span test which include forward and backward test. The data from this research were analyzed using mean descriptive and inferential statistical tests, standard deviation, and t-test and ANOVA with a significance

الملخص

خلفية :
هناك العديد من العوامل التي تؤثر على الأداء الأكاديمي لطلاب كلية الطب البشري، منها الوظيفة المعرفية ومستوي تشبع الاكسجينبالدم. الوظيفة المعرفية تعني النشاط العقلي الواعي مثل التفكير او التذكر التعلم او استخدام اللغة

الهدف :
تقييم الارتباط بين مستوى تشبع الدم بالأكسجين، الوظيفة المعرفية والأداء الأكاديمي لطلاب الطب البشري بجامعة الجوف بالمملكة العربية السعودية.

طريقة البحث :
دراسة مقطعية اجريت في الفترة ما بين أكتوبر٢٠١٦ الى أبريل٢٠١٧، تمثلت عينه الدراسة والتي تم أخذها بطريقة عشوائية من ٨٨ طالب وطالبة من طلاب كلية الطب بجامعة الجوف، باستخدام استبيان صمم من قبل الباحثين، يبحث في العوامل المؤثرة على مستويات تشبع الدم بالأكسجين. تم قياس تشبع الاكسجين بمقياس التأكسج الذي يقيس نسبة الهيموغلوبين المؤكسج في الدم في الأوعية النابضة، وخاصة الشعيرات الدموية للإصبع. تم تقييم الوظيفة المعرفية للطلاب باستخدام اختبار الامتداد الرقمي الذي يشمل الاختبار الامامي والخلفي، تم تحليل البيانات باستخدام الاختبارات

level of $p < 0.05$.

Results:

Results showed that academic performance of the students had the highest correlation with the cognitive functions ($p < .05$). Mean± SD of cognitive function test in male and female was (14.46±3.14, 16.75±3.22 respectively), there is statistically significance difference between male and female students ($p = .002$).

Conclusion:

Results of the study concluded that the O2 saturation level are within normal range for sample population. There is a difference between male and female students in cognitive function scores; better for female students. O2 saturation level and cognitive function have a good impact on the academic performance. Also, there is no association between the cognitive function scores and the academic performance.

Keywords:

Medical students, Cognitive function, O2 saturation, Academic performance, Jouf.

الاحصائية الوصفية والاستنتاجية، الانحراف المعياري واختبار -تي - وأنوفا مع مستوى دلاله ($p < 0.05$).

اظهرت النتائج أن الأداء الأكاديمي للطلاب كان له أعلى ارتباط مع الوظائف المعرفية ($p < 0.05$).

الخلاصة :

خلصت الدراسة الى ان مستوى تشبع الدم بالأوكسجين ضمن المعدل الطبيعي للعينة المستهدفة. كان هناك فرق بين الطلاب والطالبات في درجات الوظيفة المعرفية، أفضل لصالح للطالبات، مستوى تشبع الدم بالأوكسجين والوظيفة المعرفية لها تأثير جيد على الأداء الأكاديمي. لا يوجد ارتباط بين درجات الوظيفة المعرفية والأداء الأكاديمي.

كلمات مفتاحية :

طلاب الطب، الوظيفة المعرفية، تشبع الدم بالأوكسجين، الأداء الأكاديمي، الجوف

Introduction

Education is a facility of training and learning to improve knowledge and develop skills. The ultimate purpose of medical education is to empower an individual to be an excellent physician and thus responsible for the country's social and economic development. [1]. So, the quality of students' performance now remains at top priority for educators. It is meant for making a difference locally and nationally. Defining and measuring the educational quality is not a simple issue. The complexity of the educational process still increasing. The increasing complexity is due to many reasons like change the value of the attribute which associated with academic performance. Medical student academic performance measurement has received significant attention. Academic performance is a skill that students obtain from school, college, and university through the time spent in the classroom, the lab, or the library [2]. Also, it is challenging aspects of academic literature Science, student performance is affected due to social, economic, psychological, physiological,

environmental factors. These factors that have a strong impact on the student performance. They different from country to country and from student to students [3]. In the Kingdom of Saudi Arabia, the weather is favorable especially in the inner area such as Sakaka in Al-Jouf region, where the dryness, soil, storms and the intensity of the heat in the summer, which matched the intensity of the cold in the winter. These results in silicon dust suspended in the air, causing subsidized the citizens of silicosis, which reduces the efficiency of the respiratory system to extract atmospheric oxygen[4]. Because of that we suppose there is an effect of these changes of weather and less oxygen extraction on the cognitive structure which responsible for the learning. Cognitive function refers to mental abilities used to engage in several aspects of daily life [5] Oxygen is an essential component required for normal brain function, the brain is the most metabolically active organ in the human body, and accounts for up to 30% of basal energy consumption [6]. Moss et al, confirm the relationship between oxygen administration and the memory formation in healthy young adults. The results approve that the O2 administration significantly enhances cognitive achievement more that seen in the control group. The subjects who received O2 had faster reaction times and recalled more words than the control group[7]. Physical activity shows an important role in determining the academic achievement. In which simple physical activity such as walking for 20 minutes before academic exam will improved the cognitive control and resulted in better academic scores between the students [8]. In 2013, Chandra P et al, emphasized the important of the regular exercise on the cognitive function and their positive impact on the academic performance through assess the academic performance and the physical fitness in relation to daily physical activity levels, this study also assess the association of physical fitness and academic achievement with age, the net result of this study revealed that the amounts of regular physical activity must be incorporated in lifestyle of all adolescents in order to appear its positive effects on cognitive functions, physical fitness and academic performance [9]. Alternative hypothesis is students' daily habits can affect the O2 saturation level that may affect their cognitive function and therefore their academic performance. At the end of this study we expect to find a relationship between the oxygen saturation level and student performance, and cognitive function.

The objectives of the study were to assess cognitive function of medical students, measure O2 saturation, determine academ-

ic performance, to determine the relation between the oxygen saturation and cognitive function, cognitive function and academic performance, oxygen saturation level and academic performance of medical students and to determine the difference between male and female students regarding, cognitive function test, O2, and academic performance in the selected block.

Methodology

This was a cross-sectional study. Study was approved by Jouf university Ethics Committee and the subjects were recruited in the study after obtaining the verbal consent. This study included 88 second and third-year MBBS students of both sex in a medical college, Jouf University along the Endocrine & reproductive block 2nd year and Gastrointestinal block 3rd year. We excluded any male or female students with a history of head trauma, epilepsy, encephalitis, cerebrovascular diseases, any central nervous system diseases or mental disorders students with asthma, bronchitis, or other respiratory diseases, narcolepsy or day time hypersomnia, anemia, hypotension, and heart disease.

Data were Collected by a self-administered Questionnaire: The questions were done in Closed Format " Dichotomous Questions", designed by the researchers. The questionnaire consists of 2 parts. First part designed for demographic data like age, year, course. Second part designed to ask about the student's study habits medical condition, risk factors (smoking, lung and heart disease), and medication.

- Pulse oximetry to measure the oxygen saturation
- Measure the weight and height to calculate BMI
- Cognitive tests: (Digital Span Test) There are two variants of the test, forward digit span (FDS) and backward digit span (BDS). In FDS, the digits are repeated in the order of their presentation, while in BDS they must be repeated in the reverse order. The largest number of digits that a person can repeat without error is his or her forward or backward digit span. It is well-established that the black-white gap is substantially larger on BDS than FSD. [10,11]

Procedure:

During 2016-2017, researchers distributed the questionnaire to the 2nd and 3rd year medical students male and female and measured the O2 saturation level from the 3rd week to the 9th week of the gastrointestinal and endocrine and reproductive blocks, before the time of PBL, Objective structured practical exam (OSPE), End of

block exam (EOB). Then cognitive function was done to assess the students' short memory through the Digital Span Test, which consisted of forward and backward part. Forward test composed of 8 items and each item have A and B part while the backward test composed of 7items and each item have A and B part. After giving clear instructions to the participant about how to do it. The test discontinuous only when the participant has failed in both trials of the same span length
(e.g., 5a and 5 b).

Data were analyzed using SPSS 21 software Independent t –test to was done the association between the O2 saturation and cognitive function, O2 and scores of the final block grade, cognitive function test and scores of the final block grade. In addition, we used the chi- Square test for the all remaining assertion we found in our research.

The percentage of satisfaction of all students was calculated by combining frequency of levels of satisfaction (satisfied and very satisfied) for each item in the questionnaire. Differences between pre-clinical and clinical phase and between male and females' students were calculated. Inferential statistics using independent samples t-test and ANOVA were used to compare the difference between the satisfaction and challenges scores by phase of study and gender. $P < .05$ was considered statistically significant.

Results

Out of 100 questionnaires were distributed, 88 were completed and return, the response rate was 88%. 48 (54.5 %) male and 40 (45.5%) female 38 (43.2%) from second year and 50 (56.8 %) from third year. Mean age of students was 21.7±2 years.

Table (1) Shows range, minimum, maximum and means± SD for O2saturation, cognitive function and academic performance (96.38±1.997, 15.50 ± 3.36, 76.25± 15.72 respectively)

Figure 1 show students' scores of cognitive function test, the range of score from 8-23. Mean± SD was 15.50±3.36. Majority of students scored 15, while there was 1

Table 1: Range, mean, minimum, maximum and standard deviation of study sample O2 saturation level, Cognitive function test and academic achievement

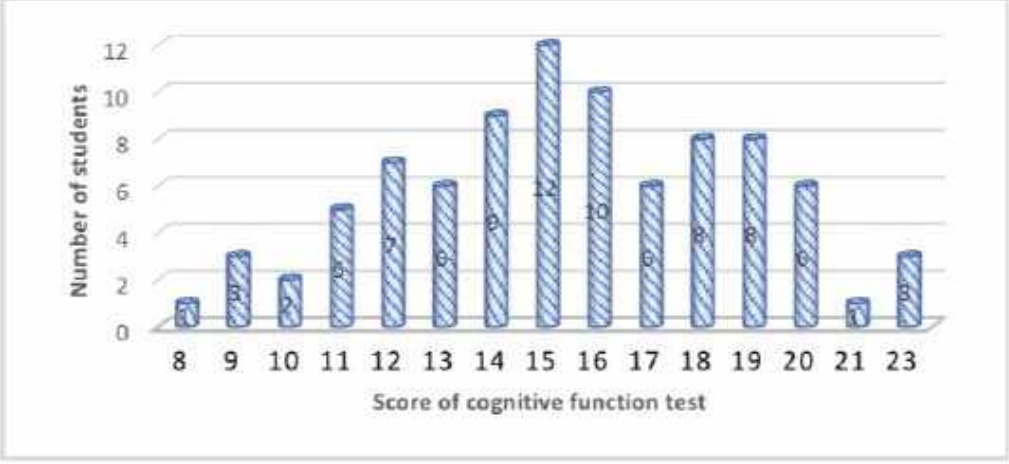
	O2 Saturation level	Cognitive Function	Academic Performance 100
Range	10.6	15.00	70.00
Minimum	88	8	29
Maximum	98	23	99
Mean	96.38	15.50	76.25
Std. Deviation	1.997	3.36	15.72

student take lowest score and two students take highest score.8 students from the third year who scored 15 while 4 students from second year. Mean± SD of cognitive test in male was 14.46±3.14 while in female 16.75±3.22.

Table 2 show the significant association between the O2 and academic performance, O2 and Cognitive Function, while there wasn't association between the Cognitive Function and academic performance.

Table 2 show the significant association between the O2 and academic performance, O2 and Cognitive Function, while there wasn't association between the Cognitive

Figure (1) Frequancy of distribution of cognitive function test among students



Function and academic performance.

Table 3 show the significant difference between male and female regarding O2 saturation, cognitive functions and academic performance.

Table 2: Mean± SD and the association between the O2 and academic performance, O2 and Cognitive Function, Cognitive Function and academic performance.

	Mean ±SD	P-value
O2 saturation level	96.38± 1.997	042*
Academic performance	76.25±15.72	
O2 saturation level	96.38± 1.997	.002 *
Cognitive function test	15.50±3.36	
Cognitive function test	15.50±3.36	.087
Academic performance	76.25±15.72	

Discussion

Defining and measuring the educational quality is not a simple issue. The complexity of the educational process still increasing. The increasing complexity is due to many reasons like change the value of the attribute which associated with academic performance. The main premise of this study focuses on the association between

Table 3: Comparing mean and standard deviation for the O2, cognitive Function, Academic performance to the male and female students

	Female **Mean± SD**	Male **Mean± SD**	**P- Value**
O2	99.27± 0.62	95.32± 2.52	.000*
Cognitive Function	14.46± 3.14	16.75± 3.22	.002*
Academic performance	70.67± 16.54	82.95± 11.17	.001*

the oxygen saturation level, cognitive function and the academic performance of the medical students. The brain activity consumes 20-30% of the energy usage for the total body; it requires approximately 200 liters of oxygen per day for normal functioning. a decrease of arterial oxygen partial pressure (PO2) can alter brain function such as attention and memory [6]. In the current study we hypothesized that the dusty weather in Sakaka Al Jouf northern area of Kingdom of Saudi Arabia may affect the O2 saturation level that may affect students' cognitive function and academic performance. Study results found that O2 saturation level for study sample was with normal level. Our study results found there was a significant association between the O2 saturation and academic performance (p=.042). In addition, significant association between cognitive function and the O2 saturation (p = 0.002) Results of the present study correspond with the study of Ho-Jun Seo et al 2007 they studied the effect of Oxygen Inhalation on Cognitive Function and found that administration of 35% oxygen to healthy young adults significantly improves verbal learning ability and affects physiological functions of the brain [6]. The normal physiological state the cognitive structure is the main part responsible for the whole learning and memory process and this part will affect by many factors maybe direct or indirect and at the end the academic performance will be effect, From this background there is an association between them, because O2 supply the whole structure in the brain include the most important part of the learning which is the hippocampus. Our result was in consistent with other research, in 2018 Lauren O et al, the effect of aerobic exercise on the cognitive structure was assessed. Generally, the aerobic exercise refers to the exercise that increase the maximum oxygen uptake enhance through the efficiency of aerobic energy producing systems and they found a positive impact on the cognitive structure [12]. Also, in 2008 Phillip D et al, the correlation of high levels of aerobic fitness with greater academic performance and IQ scores was approved [13]. The results are in contrary to a study conducted by Jan Anderson et al, 2002 they reported that inhalation of oxygen did not affect cognitive functioning[14]. Many researches promote the effect of the aerobic exercise and increase the oxygen intake had a strong positive impact on the enhance the hippocampus structure and the cognitive function, these researches support our hypothesis. Numerous studies have confirmed the authenticity of the relationship between cognitive functions and academic performance. Our results are in contrary a study conducted by Abd Khodaei and Ghaffari

(2011), they investigated the students' use of study skills and learning, and its relationship with their academic status , it was concluded that there is a direct and significant relationship between study skills and learning, and the average score of university, which is the index of academic performance [15] they found no association between the cognitive function and academic performance, also another research conducted by BooJari S et al, 2015 they found that Significant correlations were seen between attention (CAS) and academic performance and the other side between planning, simultaneous, successive functioning and academic performance P value of 0.05 and 0.01 respectively [16]. Results shows differences between male and their counterpart's cognitive function main score better for female student. We suggest this association may through indirect way such as we discussed before, the effect of physical exercise on the cognitive function, also the diet, the normal hemoglobin and good cerebral blood flow. Each of these factors has its own mechanism to enhance the all aspect of the cognitive function. In the whole researches there were definite difference between male and female in the academic performance as well as the cognitive functions, that' s what approved by Pontifex MB, et al in 2009 [8]. At the end of this study, there are many factors may affect this academic performance [17] and we can't neglect the importance of any one of them. However, each one of these factors may have a strong association with the academic performance in some research while in others research there wasn't any association.

Conclusion

Results of the study concluded that the O2 saturation level are within normal range for sample population. There is a difference between male and female students in cognitive function scores; better for female students. O2 saturation level and cognitive function have a good impact on the academic performance. Also, there is no association between the cognitive function scores and the academic performance. To improve students' academic performance, we need to improve the ventilation in the classes. Give a Health education message on the importance of physical exercise Moreover, further studies should be planned from different medical and non-medical institutions in order to gain a better insight into the matter, Also, assess different study skills like textbook reading, note taking, concentration, test preparation and time management.

Acknowledgment

Authors would like to thank all the students for being part of the study.

References

[1] Eladawi N, Abdelhady D, El-deek B. The relation between Medical Student Habits , and their Final Year grade : A Single Centre Study in Egypt. Bull High Insti Public Health .2013;43(2):185- 192.

[2] Khuyrshid D, Tanveer A, Qasmi F. Relationship between Study Habits and Academic Achievement among Hostel Living and Day Scholars' University Students. British Journal of Humanities and Social Sciences. 2012;3(2):34-42.

[3] Mushtaq I, Khan N. Factors Affecting Students Academic Performance. Global Journal of Management and Business Research 2012; 12 (9):17-22.

[4] General presidency of meteorology and protecting the environment, available on line at: www.pme.gov.sa/ [Last assessed 4 April 2016].

[5] Teri L, McCurry M, and Logsdon G. Memory, thinking, and aging. What we know about what we don't know. West J Med 1997.;167,4: 269–275.

[6] Ho-Jun S, Won B, Tae J, Jeong C. The Effect of Oxygen Inhalation on Cognitive Function and EEG in Healthy Adults, Clinical Psychopharmacology and Neuroscience 2007; 5(1): 25-30.

[7] Moss MC, Scholey AB, Neave N, and Wesnes K. Cognitive Performance, Hyperoxia, and Heart Rate Following Oxygen Administration in Healthy Young. Adults physiology & behavior 1999;67.5: 783-789.

[8] Pontifex MB, Hillman CH, Raine LB, Castelli DM, Hall EE, Kramer AF. The effect of acute treadmill walking on the cognitive control and Academic achievement in preadolescent children. Neuroscience 2009; 159, 3 : 1044-1054.

[9] Chandra P, and Mukherjee R. Daily physical activity: The link to physical fitness, cognition and academic performance in Bengali (india) Adolescent of rural and Urban. An International Journal of Life Sciences and Chemistry 2013; 30,.2 : 748-763.

[10] Jahanshahi M, Saleem, T. Aileen K. Ho, Fuller R, and Dirnberger G. (2009). A preliminary investigation of the running digit span as a test of working memory.

Behavioral Neurology. 20, No.1/2, 17-25

[11] Blackburn H, and Benton AL. (1957), Revised administration and scoring of the Digit Span Test. Journal of Consulting Psychology, Vol.21, No. 2, 139-143.

[12] Lauren O, Aaron K, Chao S, Joshua H, Ricardo J.S. Costab, Matthew J, et al The Influence of Aerobic Exercise on Hippocampal Integrity and Function: Preliminary Findings of a Multi-Modal Imaging Analysis. Brain Plasticity 2018; 4. 211–216.

[13] Phillip D. Tomporowski, Catherine L. Davis, Patricia H. Miller, Jack A. Naglieri Exercise and Children's Intelligence, Cognition, and Academic Achievement". Educ Psychol Rev 2008;20,2 : 111–131.

[14] Anderson A, Pergreen P, Gronkvist M, Nählinder S, Svensson E. Oxygen saturation and cognitive performance, Psychopharmacology 2002;162(2):119-128.

[15] Abd Khodaei M, and Ghaffari A. The students' use of study skills to assess students' reading skills and learning and its relationship with the state and their educational background", Studies of Education and Psychology of Ferdowsi University of Mashhad 2011; .11,2. 211-226.

[16] Boojari S , Haghgoo H , Rostami R , Ghanbari S, The Relationship between Cognitive Functions and Academic Performance in Children with Attention Deficit, Hyperactivity Disorder 2015;27-35.

[17] Hayede L, Seyede F, Shadman M, Minoo C, Ehsan L. The relationship between the Study habits and the Academic performance of Medical Sciences Students. Journal of Holistic Nursing and Midwifery. 2017; 27(2):65-73

Original article

Assessment of plasma ECP levels in Saudi patients with chronic asthma as a marker of asthma exacerbation during sandstorms

Wael H. Alturaiki[1]

1. Department of Medical Laboratory Sciences, College of Applied Medical Sciences, Majmaah University, Saudi Arabia

Received on 12.02.2020, accepted for publication on 13.04.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.004)

Correspondence author:

1. Wael H. Alturaiki1 Department of Medical Laboratory Sciences, College of Applied Medical Sciences, Majmaah University, Majmaah 11952, Saudi Arabia. E-mail: W.alturaiki@mu.edu.sa. Mobile: 0555122264

Abstract

Background and Aims

Eosinophils are a key player in allergic inflammation. ECP and IL-4 are essential mediators of allergic inflammation in the lungs and therefore can be used to help in the diagnosis and follow-up of allergic asthma. This study aimed to evaluate whether ECP and IL-4 levels in the plasma of asthmatic patients may reflect the clinical status of asthma exacerbations during sandstorms.

Methods

Thirty patients had allergic asthma, and sixteen normal controls were enrolled in this study. These subjects were divided into two groups. The first group included seventeen patients who had chronic symptoms of asthma but were controlled, and the second group included thirteen patients with chronic symptoms who developed exacerbations during sandstorms. Total IgE, ECP, and IL-4 levels were measured in the plasma of asthmatic patients and normal controls by using specific ELISAs.

الملخص

الخلفية:

تلعب خلايا الحمضات دور رئيسي في التهابات الحساسية، ويعد البروتين الحمضي الموجب ECP و IL-4 عاملان أساسيان للالتهاب التحسسي في الرئتين وبالتالي يمكن استخدامهما للمساعدة في تشخيص ومتابعة الربو التحسسي. تهدف هذه الدراسة إلى تقييم ما إذا كانت مستويات ECP و IL-4 في بلازما مرضى الربو قد تعكس الحالة السريرية للمرضى في تفاقم الربو أثناء العواصف الرملية.

طريقة البحث

في هذه الدراسة تم جمع ثلاثون عينة من مرضى يعانون من الربو التحسسي وستة عشر من المجموعة الضابطة من الأصحاء. تم تقسيم مرضى الربو إلى مجموعتين. المجموعة الأولى تحتوي على عدد سبعة عشر مريض يعانون من أعراض الربو المزمنة لكنهم تحت السيطرة، والمجموعة الثانية يبلغ عددها ثلاثة عشر مريض يعانون من أعراض الربو المزمنة وتفاقمت خلال العواصف الرملية. تم قياس إجمالي مستويات IgE، ECP و IL-4 في بلازما مرضى الربو من المجموعة الضابطة باستخدام طريقة المقايسة المناعية للأنزيم المرتبط الأليزا (ELISA) .

النتائج

أظهرت الدراسة مستويات EgI الكلية أعلى بكثير في المرضى الذين يعانون من الربو (متوسط = ٧٦٤ وحدة دولية/مل ، P= ٠،٠٠٠١) مقارنة بالمجموعة الضابطة (١١٣ وحدة دولية/مل) .

Results

Total IgE levels were significantly higher in patients with asthma (mean= 467 IU/ml, P = 0.0001) than in controls (113 IU/ml). IL-4 was not detected in patients with asthma or in controls. ECP levels were elevated significantly in patients with severe symptoms of asthma (mean= 3.28 ng/ml, P=0.0006) in comparison to those in normal controls or patients with controlled asthma (1.9 ng/ml, P=0.02). In addition, there was no significant increase in ECP levels in patients with controlled asthma relative to those in normal controls.

Conclusion

These findings suggest that ECP but not IL-4 may be a useful marker to evaluate the severity of asthma, follow and predict a response to steroid treatment.

Key words:

Asthma, IgE, ECP, IL-4, Eosinophils

لم يتم قياس الانترلوكين -٤ في المرضى الذين يعانون من الربو أو في المجموعة الضابطة . مستويات البروتين الحمضي الموجب ECP مرتفعة بشكل ملحوظ في المرضى الذين يعانون من اعرض الربو الحادة = ٣,٢٨ نانوجرام / مل ، P = 0.0006 (بالمقارنة مع المجموعة الضابطة أو المرضى الذين يعانون من الربو المتحكم به)٩.١ نانوجرام / مل 0.02 ، = P بالإضافة إلى ذلك، لم تكن هناك زيادة كبيرة من ECP في المرضى الذين يعانون من الربو تسيطر عليها نسبة إلى المجموعة الضابطة .

الخلاصة

تشير هذه النتائج إلى أمكانية استخدام PCE وليس LI-٤ كمؤشر لتقييم شدة الربو، متابعة والتنبؤ بالاستجابة للعلاج بالستيرويد

الكلمات المفتاحية:

الربو ، الجسم المضا -E البروتين الحمضي الموجب ، الأنترلوكين - ٤، خلايا الحمضات

Introduction

Allergic asthma is a chronic inflammatory disease of the lungs that is characterized by various symptoms, including coughing, wheezing, shortness of breath, and chest tightness. Asthma disease is considered one of the most common chronic diseases, with an increasing prevalence rate in Saudi Arabia[1]. Asthma exacerbations can be activated by several factors, such as respiratory tract infection, exercise, and exposure to allergens or irritants, such as detergents, smoke and dust [2]. During sandstorms, asthmatic patients are at high risk of developing severe symptoms [3].

Allergic asthma is known to be mediated by IgE, which can play an important role in allergic inflammation in the airways [4]. Asthma is a complex disease, and several immune and nonimmune cells and molecules contribute to the development of asthma. Along with other inflammatory

cells, eosinophils mediate a key role in asthma. Infiltration of eosinophils into the bronchial wall results in the release of inflammatory mediators, such as eosinophil cationic protein (ECP), and degranulation of this protein can cause injury to the airway epithelium, induce the production of histamine from mast cells, narrow the airway smooth muscle and enhance airway hyperresponsiveness[5]. Increased levels of ECP in serum, sputum and bronchoalveolar lavage fluid (BALF) have been observed in asthmatic patients relative to those in normal controls, and measuring this protein has been suggested for use as a marker to monitor and evaluate airway inflammation in asthma [6, 7].

Th2 cytokines, such as IL-4, have an essential role in the development of asthma. IL-4 is capable of inducing B cell class switching to IgE, and overproduction of this cytokine is linked with the development of asthma [8]. IL-4 exerts its biological function through binding to its receptor (IL-4R), which is expressed on the surface of various cell types [9]. Eosinophils express the receptor IL-4R, and their eosinophilic granulocytes have been shown to contain significant levels of IL-4[10]. Furthermore, IL-4 was shown to be important in facilitating infiltration of eosinophils into the airways, immunoglobulin E (IgE) production and increased airway responsiveness in a murine model of allergen-induced airway inflammation [11]. Targeting IL-4R with a humanized monoclonal antibody (dupilumab) in persistent eosinophilia patients is correlated with a reduction in exacerbations and enhancements in lung function and control of asthma [12, 13]

From the abovementioned results, factors that activate eosinophils may contribute to airway dysfunction and tissue remodeling in asthma and therefore are essential mediators in asthma pathology.

This study is designed to determine the airway inflammation in bronchial asthma through measurement of ECP and IL-4 in the plasma of asthmatic patients as possible markers for airway inflammation to evaluate clinical status during sandstorms.

Materials and Methods

Subjects:

Thirty patients with allergic asthma and sixteen normal controls were included in this study. Samples were collected from two groups of patients with asthma. The first group consisted of patients with chronic asthma that was controlled, and the second groups were asthmatic patients with chronic symptoms who developed severe exacerbations during sandstorms and were admitted to an emergency department at Alzulfi General Hospital in

the Kingdom of Saudi Arabia. All the patients were examined and diagnosed by a respiratory consultant at Al Zulfi General Hospital. The clinical characteristics of all subjects are shown in Table 1. Normal controls were recruited from healthy blood donors at the blood bank at Alzulfi General Hospital. Normal controls were selected and defined as those not having any of the following: asthma, wheezing, coughing, smoking, recent vaccination, respiratory tract infection, chronic diseases, history of allergy, allergic rhinitis, atopic dermatitis and usage of treatments, especially corticosteroids. All subjects in this study provided written informed consent, and the Majmaah University Institutional Review Board approved the study (MUREC-April.01/COM-206).

Table 1: Characteristics of asthmatic patients and clinical presentations

Categories	Normal control	Chronic asthma - controlled	Severe exacerbations
Number of subjects	16	17	13
Sex (male/female)	10/6	8/9	10/3
Mean age	35.05	34.17	39.66
Treatment usage			
LABA	-	17	12
SABA	-	17	6
ICS	-	15	8
Oral steroid	-	2	4
Disease duration	-	6 – 20 years	1 – 4 days
Clinical presentations			
Shortness of breath	No	No	Increased
Cough	No	Asymptomatic coughing	Continuous
Wheezing	No	Asymptomatic wheezing	Frequent and loud
Chest tightness	No	No	Present
Mucus production	Not present	Present	Increased
Respiratory tract infection	Not present	Not present	Not present
Speaking	Normal	Normal	Difficult
Mean heart rate per minute	96.04	95.07	110.03
Mean O2 saturation %	95.06	92.02	90.1

.ICS: inhaled corticosteroid; LABA: long-acting beta agonist; SABA: short-acting beta agonist.O2; oxygen

Isolation of Plasma from blood:

Vein puncture was conducted in the subjects of the study, including the normal controls and patients with asthma. Following collection, peripheral blood was transmitted directly to tubes containing the anticoagulant EDTA. After that, the blood was centrifuged at 1800 rpm for 5 minutes at room temperature. After centrifugation, plasma at the top layer was collected and then placed into aliquots in small tubes and frozen at -20°C.

Detection of total IgE, ECP and IL-4 protein levels:

A specific ELISA technique was used to measure protein concentration in the plasma obtained from normal controls and patients with asthma. Total IgE levels were measured using quantikine ELISA assays [Abcam, UK, cat# ab108650]. Human interleukin 4 (IL-4) cytokine [R&D, UK, and cat# DY204] and RNASE3 (ECP) [Abbexa, UK, cat# abx055137] were measured using quantikine ELISAs. ELISAs were carried out as described in the manufacturer's instructions for each assay. The lower detection limit for the IL-4 ELISA was 31 pg/ml and for ECP (1.5 ng/ml). The optical density (OD) was measured using a microplate reader (BioTek ELx800) at 450 nm. Software (KC Junior) was used to calculate the protein concentration for each protein of interest.

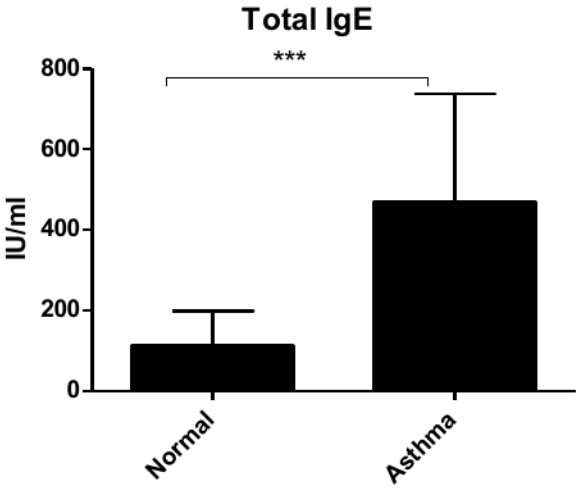
Statistics:

Data from the study are expressed as the mean ± standard deviation (SD), and an independent nonparametric sample test (Mann-Whitney U test) was used to calculate statistical significance using GraphPad Prism 6 software. P-values indicate significance (* for $p<0.05$, ** for $p<0.001$ and *** for $p<0.0001$).

Results

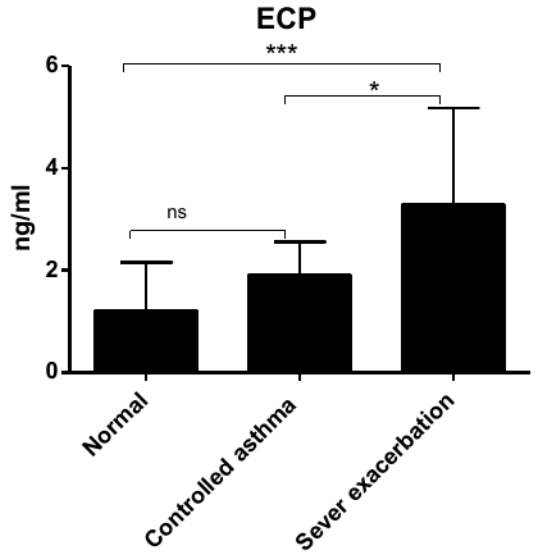
Total IgE levels were elevated significantly in all asthmatic patients [mean 467 IU/ml, P=0.0001] compared to those in normal controls [113 IU/ml] (figure 1).

Figure 1: Plasma levels of total IgE. Total IgE levels were measured by using a specific ELISA. Total IgE levels were elevated significantly in asthmatic patients compared to those in normal controls. Data are expressed as the mean ± standard deviation (SD). P-values indicate significance .(for $p<0.0001$ ***)



ECP levels were elevated significantly in patients with severe symptoms of asthma (mean= 3.28 ng/ml, P =0.0006) in comparison to those in normal controls or patients with controlled asthma (1.9 ng/ml, P=0.02). In addition, there was no significant increase in ECP levels in patients with controlled asthma relative to those in normal controls (figure 2).

Figure 2: Plasma levels of ECP. ECP levels were measured by using a specific ELISA. ECP levels were elevated significantly in asthmatic patients with severe exacerbations compared to those in normal controls as well as those in patients with controlled asthma. Data are expressed as the mean ± standard deviation (SD). P-values indicate significance .(for p<0.05 and *** for p<0.0001 *)



Discussion

This study aimed to assess plasma levels of ECP and the IL-4 cytokine as possible markers in asthma execrations during sandstorms. Allergic asthma is characterized by elevated IgE levels. To further ensure that samples received were taken from allergic patients, total IgE levels were measured. As expected, a significant increase in the total IgE level was noticed in all asthmatic patients compared to that in normal controls (figure 1).

Several studies have established that in asthma, serum levels of ECP reflect the activity of eosinophil cells and the severity of disease [14, 15]. In the current study, ECP levels were increased significantly in all asthmatic patients who were on ICS treatment relative to those in normal controls, and patients with severe exacerbations had higher levels of ECP than patients with controlled asthma or normal controls (figure 2). However, it has been shown that ECP levels are reduced during treatment with ICSs and therefore can be used to evaluate the response to steroid treatment[16, 17].

Taken together, these findings suggest that high doses of ICSs are necessary to manage or prevent asthma exacerbations, as not all asthmatic patients respond equally to ICSs [18], and evaluation of ECP may reveal a useful marker to evaluate disease exacerbation during sandstorms. On the other hand, ECP does not necessarily represent a specific marker of asthma exacerbations, as this protein can be measured in several inflammatory conditions; therefore, assessment of ECP levels in patients

diagnosed with asthma may be used for further evaluation of the extent and severity of inflammation in asthma [19, 20].

Furthermore, IL-4 levels in plasma were found to be positively correlated with the lung function and severity of asthma and therefore can be used as a potential marker for the evaluation of disease [21]. However, in the current study, there was no detection of IL-4 in the plasma of either normal controls or patients with asthma. This result could be explained as follows: the lower detection limit of IL-4 in the ELISA was approximately 31 pg/ml; therefore, IL-4 was not detected either because its levels were very low or because IL-4 is not produced by healthy subjects. Additionally, ICSs have been reported to inhibit the gene expression of IL-4 [22], which may explain why there was no detection of IL-4 in asthmatic patients since the patients were using ICSs during the experiment. Thus, IL-4 measured in the plasma of asthmatic patients cannot be used as a marker to evaluate the severity of disease during exacerbation.

The limitations of the current study are that patients with high plasma levels of total IgE were not evaluated for further evidence of parasitic infection or allergic bronchopulmonary aspergillosis; therefore, a further study should determine whether increased levels of total IgE are a result of allergic reaction and not due to parasitic infection or allergic bronchopulmonary aspergillosis. Furthermore, the analyses of ECP and IL-4 in lung secretions, such as sputum or BALF, were outside the scope of this study, and therefore, subsequent studies should address the possibility that lung cytokine expression is a good indicator of disease activity.

In conlusion, IL-4 in plasma may not be a useful diagnostic biomarker to evaluate airway inflammation and monitor asthma severity during sandstorms, especially if the patients have used ICSs. However, ECP measured in the plasma may represent a useful diagnostic marker for asthma exacerbation.

Funding

I would like to thank Majmaah University for supporting this work.

Acknowledgments

I would like to acknowledge the patients with asthma, the normal controls, the medical consultants Sajad Ahamed Mir MD MRCP (UK) and Adnan Afridi MBBS, the Nursing Staff Head of the Laboratory and Blood Bank Abdulaziz Jassir Alshalani, and the Administrative Head of Zulfi General Hospital, Al Zulfi city, Kingdom of

Saudi Arabia. Special thanks to Dr. Suresh Mickymaray for unlimited support during the experiments.

Conflict of interest

The author has no conflicts of interest to declare.

References

[1] Al-Moamary M, Alhaider S, Alangari A, Al Ghobain M, Zeitouni M, Idrees M, et al. The Saudi Initiative for Asthma - 2019 Update: Guidelines for the diagnosis and management of asthma in adults and children. Annals of Thoracic Medicine. 2019;14(1):3-48.

[2] Subbarao P, Mandhane PJ, Sears MR. Asthma: epidemiology, etiology and risk factors. CMAJ: Canadian Medical Association journal = journal de l'Association medicale canadienne. 2009;181(9):E181-90.

[3] Kanatani KT, Ito I, Al-Delaimy WK, Adachi Y, Mathews WC, Ramsdell JW. Desert Dust Exposure Is Associated with Increased Risk of Asthma Hospitalization in Children. American Journal of Respiratory and Critical Care Medicine. 2010;182(12):1475-81.

[4] PLATTS-MILLS TAE. The Role of Immunoglobulin E in Allergy and Asthma. American Journal of Respiratory and Critical Care Medicine. 2001;164 (supplement_1):S1-S5.

[5] McBrien CN, Menzies-Gow A. The Biology of Eosinophils and Their Role in Asthma. Frontiers in medicine. 2017;4:93-

[6] Niimi A, Amitani R, Suzuki K, Tanaka E, Murayama T, Kuze F. Serum eosinophil cationic protein as a marker of eosinophilic inflammation in asthma. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology. 1998;28(2):233-40.

[7] Bjork A, Venge P, Peterson CG. Measurements of ECP in serum and the impact of plasma coagulation. Allergy. 2000;55(5):442-8.

[8] Gour N, Wills-Karp M. IL-4 and IL-13 signaling in allergic airway disease. Cytokine. 2015;75(1):68-78.

[9] Kips JC. Cytokines in asthma. European Respiratory Journal. 2001;18 (34 suppl):24s-33s.

[10] Piehler D, Stenzel W, Grahnert A, Held J, Richter L, Köhler G, et al. Eosin-

ophils contribute to IL-4 production and shape the T-helper cytokine profile and inflammatory response in pulmonary cryptococcosis. Am J Pathol. 2011;179(2): 733-44.

[11] Brusselle GG, Kips JC, Tavernier JH, van der Heyden JG, Cuvelier CA, Pauwels RA, et al. Attenuation of allergic airway inflammation in IL-4 deficient mice. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology. 1994;24(1):73-80.

[12] Wenzel S, Ford L, Pearlman D, Spector S, Sher L, Skobieranda F, et al. Dupilumab in persistent asthma with elevated eosinophil levels. The New England journal of medicine. 2013;368(26):2455-66.

[13] Dunican EM, Fahy JV. The Role of Type 2 Inflammation in the Pathogenesis of Asthma Exacerbations. Ann Am Thorac Soc. 2015;12 Suppl 2(Suppl 2):S144-S9.
14. Jiang X-G, Yang X-D, Lv Z, Zhuang P-H. Elevated serum levels of TNF-α, IL-8, and ECP can be involved in the development and progression of bronchial asthma. Journal of Asthma. 2018;55(2):111-8.

[15] Venge P, Bystrom J, Carlson M, Hakansson L, Karawacjzyk M, Peterson C, et al. Eosinophil cationic protein (ECP): molecular and biological properties and the use of ECP as a marker of eosinophil activation in disease. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology. 1999;29(9):1172-86.

[16] Guo C-L, Sun X-M, Wang X-W, Guo Q. Serum Eosinophil Cationic Protein Is a Useful Marker for Assessing the Efficacy of Inhaled Corticosteroid Therapy in Children with Bronchial Asthma. The Tohoku Journal of Experimental Medicine. 2017;242(4):263-71.

[17] Kato M, Yamada Y, Maruyama K, Hayashi Y. Serum Eosinophil Cationic Protein and 27 Cytokines/Chemokines in Acute Exacerbation of Childhood Asthma. International archives of allergy and immunology. 2010;152(suppl 1) (Suppl. 1):62-6.

[18] Szefler SJ, Martin RJ, King TS, Boushey HA, Cherniack RM, Chinchilli VM, et al. Significant variability in response to inhaled corticosteroids for persistent asthma. The Journal of allergy and clinical immunology. 2002;109(3):410-8.

[19] Koh GC, Shek LP, Goh DY, Van Bever H, Koh DS. Eosinophil cationic protein: is it useful in asthma? A systematic review.

Respiratory medicine.
2007;101(4):696-705.

[20] Vijverberg SJ, Hilvering B, Raaijmakers JA, Lammers J-WJ, Maitland-van der Zee A-H, Koenderman L. Clinical utility of asthma biomarkers: from bench to bedside. Biologics. 2013;7:199-210.

[21] Huang A-X, Lu L-W, Liu W-J, Huang M. Plasma Inflammatory Cytokine IL-4, IL-8, IL-10, and TNF-α Levels Correlate with Pulmonary Function in Patients with Asthma-Chronic Obstructive Pulmonary Disease (COPD) Overlap Syndrome. Med Sci Monit. 2016;22:2800-8.

[22] Barnes PJ. Inhaled Corticosteroids. Pharmaceuticals (Basel, Switzerland). 2010;3(3):514-40.

Original article

Alum Usage for Control of Epistaxis as an Alternative to Silver Nitrate

Ibrahim K. Al jabr

Assistant Professor, Consultant,Department of Surgery, Division of Otorhinolaryngology, Head and Neck Surgery, College Of Medicine, King Faisal University, Al-Ahsa City, Kingdom of Saudi Arabia.

Received on 16.10.2019, accepted for publication on 15.12.2019 (Doi : dx.doi.org/10.5455/mjhs.2020.03.005)

Correspondence author:
Ibrahim K. Al jabr Assistant Professor, Consultant Department of Surgery, Division of Otorhinolaryngology, Head and Neck Surgery, College Of Medicine, King Faisal University, Al-Ahsa City, Kingdom of Saudi Arabia

Abstract

Background and Aims:
Silver nitrate is well known as an effective topical treatment for epistaxis. It has some disadvantages like the local burn extension and the noxious smell that stimulates lacrimation and sneezing. Alum, on the other hand, has been used in the medical field to control bleeding by different specialties. If alum which does not have silver nitrate disadvantages can control epistaxis more efficiently, it would be a better alternative.
The aim of this study is to compare the efficacy and the outcome of silver nitrate and alum in control of epistaxis.

Methods:
This is an experimental animal study on 15 rabbits divided into 3 groups. A similar incision was made in the nose of all rabbits in the 3 groups. In the first group silver nitrate was used to stop bleeding, in the second alum was used and the third was left for spontaneous cessation of bleeding. The mean time needed for cessation of bleeding was measured and compared. One week later, one biopsy from the healed

الملخص

الخلفية والأهداف:
نترات الفضة تعتبر من العلاجات الموضعية المعروفة والفعالة في علاج الرعاف. نترات الفضة لها بعض العيوب مثل امتداد الحرق في أنسجة الأنف والرائحة القوية التي تحفز على زيادة افراز دموع العين وكذلك استثارة العطاس. من ناحية أخرى، الشب تم استخدامه في المجال الطبي للسيطرة على النزيف بواسطة تخصصات مختلفة. إذا كان بإمكان الشب الذي لا يحتوي على عيوب نترات الفضة التحكم في الرعاف بشكل أكثر كفاءة ، فسيكون ذلك بديلاً أفضل.
الهدف من هذه الدراسة هو مقارنة فعالية ونتائج نترات الفضة والشب في السيطرة على الرعاف.

طريقة البحث:
هذه دراسة تجريبية على ١٥ أرنب مقسمين إلى ٣ مجموعات. حيث تم عمل جرح مماثل في الأنف في جميع الأرانب في المجموعات الثلاث. في المجموعة الأولى ، تم استخدام نترات الفضة لوقف النزيف ، وفي المجموعة الثانية تم استخدام الشب, والثالثة تركت من دون تدخل حتى توقف النزيف تلقائيا.
تم قياس ومقارنة متوسط الوقت اللازم لوقف النزيف. بعد أسبوع واحد ، تم أخذ خزعة واحدة من جرح ملتئم من المجموعة ١ وخزعة أخرى من المجموعة ٢ لدراسة مدى وطريقة التئام الجرح مجهريا.

incision was taken from group 1 and another biopsy from group 2 for histopathology.
Results: The bleeding stopped faster in the second group, for which alum was used, in comparison to the other two groups. The histopathological findings in the biopsies taken showed better healing in the wound on which the alum was used.

Conclusion:
Alum is a better alternative to silver nitrate in control of epistaxis. It controls bleeding in a shorter time, and also result in better healing characteristics when compared to silver nitrate.

Keywords:
Aluminum; Epistaxis; Silver nitrate; Therapeutics.

النتائج:
توقف النزيف بشكل أسرع في المجموعة الثانية ، التي استخدم فيها الشب ، مقارنة بالمجموعتين الأخريين. وأظهرت النتائج المجهرية في الخزعات التي تم دراستها ان التئام الجرح أفضل في الجرح الذي تم استخدام الشب فيه.

الخلاصة:
الشب هو بديل أفضل لنترات الفضة في السيطرة على الرعاف. إنه يتحكم في النزيف في وقت أقصر ، ويؤدي أيضًا إلى تحسين خصائص الشفاء بالمقارنة مع نترات الفضة.

Introduction

Bleeding of the nose has a prevalence of almost 10%, and about 10% of them need medical care. It affects most commonly the children and the old age population with comorbid conditions. It is one of the common emergency situations that are seen almost on daily practice by family and emergency physicians and by otolaryngologists.

There are many treatment options for treatment of epistaxis depending on many factors like the cause of the bleeding, the severity and site of the bleeding and the overall medical condition of the patient. These options may range from simple first aid procedures like pressing over the nose in mild cases to outpatient procedures like chemical or electrical cautery, topical decongestant and nasal packs to more aggrieve procedures like surgical ligation or embolization of the bleeding vessel in rare occasions with major recalcitrant bleeding. Having many treatment options make it very crucial to choose the right and the best available treatment modality for each patient to improve the practice and to reduce the incidence of morbidity associated with management of these emergencies.

Little's area on the anterior nasal septal mucosa is by far the most common site of epistaxis especially in children. In most patients, the bleeding is readily seen and

diagnosed by anterior rhinoscopy which shows the bleeding point/s on the nasal septum. Such bleedings are usually treated by chemical cautery (silver nitrate) or electrical bipolar cautery, with the first option being preferred in most cases as it is cheaper, easier and widely available.

Little in 1932 was the first to describe silver nitrate as an effective topical treatment for epistaxis.[1] Silver nitrate in an aqueous environment acts as a strong oxidizing agent, stimulating the production of free radicals which cauterize the involved tissue and stop the bleeding.[2] Its availability as stick applicator makes its usage very convenient for both physicians and patients. However, it has some disadvantages like its noxious smell which stimulates lacrimation and sneezing which may actually aggravates the epistaxis by increasing the intracranial pressure. Another disadvantage is the deep and wide local burn extension, which may result in long-term complications like nasal septal perforation due to tissue necrosis, especially in patients who were exposed to silver nitrate several times.[3] Tissues cauterized by silver nitrate will show cell death and thrombosis of vessels during the healing process, which eventually will lead to necrosis and repair as part of the inflammatory response after exposure to silver nitrate.[4]

Moreover, silver nitrate causes pain due to the chemical burn of the tissues which may necessitate the use of analgesics.[5] It could be also associated with palatal numbness, thermal injury to neural structures, nasolacrimal duct obstruction and injury to optic nerve especially in patient who underwent sinus surgery and ethmoidectomy previously.[6,7]

If alum which does not have these disadvantages can control epistaxis with better outcomes, it would be a better alternative. Alum has also the advantages of being cheap and easy to handle as it can be produced as stick applicators. Alum is a natural mineral salt. Its production is easy and cost effective. It has no color, no odor and it is soluble in water. Chemically, alum is a double salt of aluminum or potassium aluminum sulfate
(Alum, KAl [SO4] 2 _12H2O).[8]
Alum has been used widely since ancient times. It is used in industry to tan leather because it precipitates hide proteins. Also, it is used by barbers for refreshing the skin and to stop bleeding after shaving. It has been used in different industries like the production of textiles, paints, papers and deodorants.

Efficacy of alum is highly variable in medical fields depending on its concentration.

It acts as an astringent at concentrations higher than 0.5% by precipitating proteins over a bleeding surface.[9,10] Conversely, it may causes inhibition of platelet aggregation at concentrations of 0-1%.[11]

Alum, beside its protein precipitation, has low cell penetrability which limits its action to the surface of the cell and interstitial spaces, so the cells remain viable. Another advantage of alum is the low systemic absorption from topical application. [12] Alum excretion is through the kidneys, an increased serum levels can occur in patients with renal impairment and this may results in prolonged prothrombin time.[13]

The aim of this study is to ascertain whether alum can be a better alternative to silver nitrate in controlling epistaxis or not in terms of the time needed to stop bleeding and the healing characteristic.

Materials and Methods

This is an experimental animal study. It was carried out in the animal laboratory at College of Medicine, King Faisal University, Saudi Arabia. The study was approved by the institutional review board (IRB) at College of Medicine, King Faisal University. All animals received human care as the study protocol complied strictly with the guidelines of research on animals at King Faisal University.

Three groups of albino rabbits were used in this study, each group composed of 5 rabbits weighing 1800 ± 50 grams. Intraperitoneal injection of 120 mg thiopental was used for anesthesia on each rabbit, after almost 5 minutes the rabbit slept. An incision was made in right side of the nose of the rabbit on the nasal septum, at the little's area. This procedure was done for the all 15 rabbits, the incisions made in all rabbits were exactly similar with regards to site, depth and length.

First group was cauterized with silver nitrate sticks, in the second alum sticks (aluminum sulfate) was used and the third was left for spontaneous cessation of bleeding. The mean time for cessation of bleeding was measured in the 3 groups. After that, the rabbits were kept individually in cages at a constant temperature of 25 °C with access to food and water.

One week later, one biopsy from the healed incision was taken from one rabbit in group 1 and another biopsy from one rabbit in group 2 for histopathological analysis. The site of the biopsy was packed by gauze soaked in decongestant till haemostasis was achieved at the biopsy site.

The biopsy included a full thickness tissue from the wound, and the adjacent mucosa, and they were fixed immediately in formalin and cut into 4-µm-thick sections. Sections were stained with hematoxylin and eosin stain and examined by a microscope. The slides were examined by using a 400× objective lens of a light microscope (Nikon, Tokyo, Japan) which was connected to a digital camera (Coolpix990; Nikon). Two blinded histopathologists helped in preparation of the slides and in confirming the microscopic findings.

One-way analysis of variance (ANOVA) test was used to compare the different means, then a post-hoc test was done to compare inter-group difference by using the tukey's honest significant difference (Tukey's HSD) test. Analysis was performed using the SPSS program version 20 (IBM Corp., Armonk, NY, USA). A P value <.05 was considered statistically significant.

Results

The mean time needed for cessation of epistaxis was calculated in the 3 groups as shown in table 1. It was lowest with 29.4 seconds in group 2 in which alum was used, 36.4 seconds in group 1 for which silver nitrate was used, 45.6 seconds in the third group in which the incision was left for spontaneous cessation of bleeding. This difference was statistically significant. Tukey's HSD test for inter-group comparison was calculated as shown in table 2, and the difference was statistically significant between all groups.

The gross appearance of the incisions after

Table 1: Mean Time for Cessation of Bleeding in the Different Groups.

Group	Mean Time for cessation of bleeding in seconds ± SD	One way ANOVA, *P* value
Group 1 (silver nitrate)	36.4 ± 3.4	.000013
Group 2 (alum)	29.4 ± 2.7	
Group 3 (spontaneous cessation of bleeding)	45.6 ± 3.4	

Table 2: Inter-group Comparison of Means for Cessation of Bleeding.

Group	Means (seconds)	Tukey's HSD test *P* value
Group 1 vs Group 2	36.4 vs 29.4	.011
Group 1 vs Group 3	36.4 vs 45.6	.002
Group 2 vs Group 3	29.4 vs 45.6	.001

the control of bleeding was clean and clear with alum with no black discoloration and eschar formation as seen when silver nitrate is used.

One week later, one specimen from group 1 and another specimen from group 2 underwent histopathological analysis (as seen in figure 1 to figure 4).

Figures 1 and 2 show healing of nasal tissue one week after silver nitrate cautery of the rabbit.The sections show stratified squamous epithelium with areas of ulceration, and overlying exudate, areas of hemorrhage with underlying granulation tissue. There are areas of inflammatory infiltrate rich in eosinophils in the sub-epithelial tissue. These findings are indicative of an active ongoing healing process.

Fig. 1. Histopathology for healing of nasal tissue, 100X. It shows an active ongoing healing process after 1 week from exposure to silver nitrate, with areas of ulceration and granulation tissue.

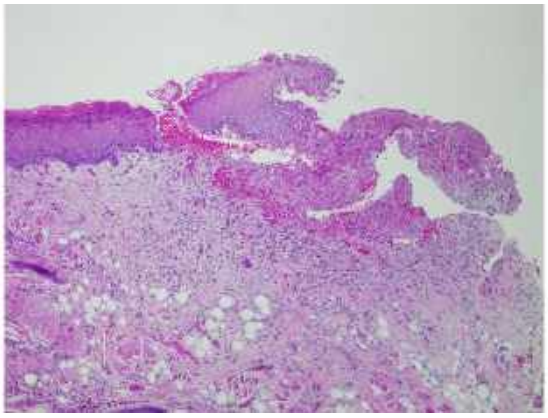
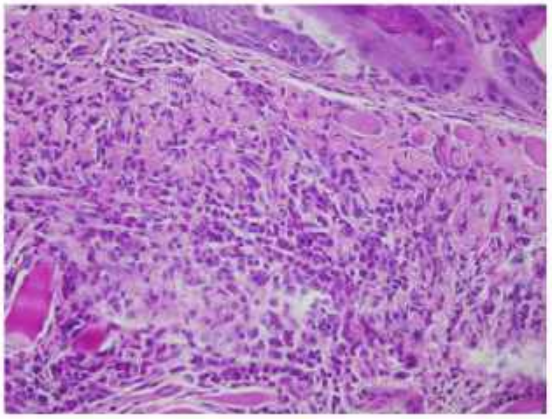


Fig. 2. Histopathology for healing of nasal tissue, after silver nitrate cautery, 400X.



Figures 3 and 4 show better healing characteristics of nasal tissue of the rabbit one week after exposure to alum. The sections show a near complete healing with stratified squamous epithelial lining cells with mildly distended superficial cells and areas of hemorrhage and minimal inflammatory infiltrate in the sub-epithelial tissue with no ulcers.

Fig. 3. Histopathology for healing of nasal tissue, 100X. It shows better healing characteristics and a near complete healing after 1 week from exposure to alum.

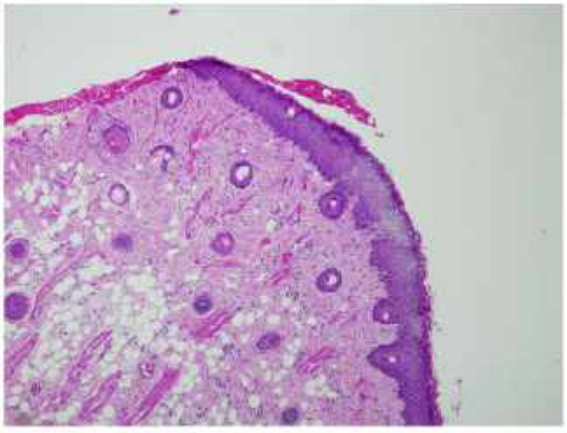
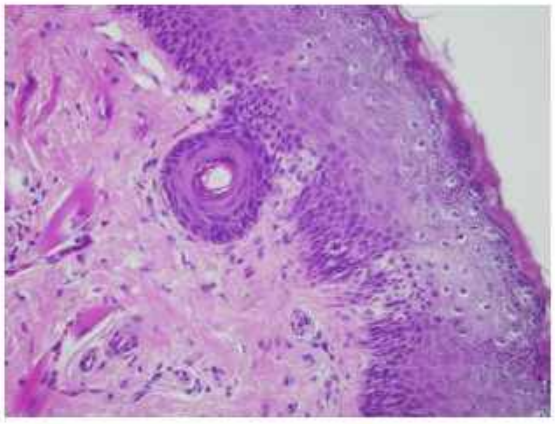


Fig. 4. Histopathology for healing of nasal tissue after using alum, 400X.



Discussion

While Muslims go for trimming or shaving their scalp off hairs as a last step of Umra (Muslims visiting Mecca), it is common to see barbers stop scalp bleeding with alum in a fast manner. So, alum is well known and has been used for long time by barbers for treating shaving injuries. In fact, Alum was used and described in Greek medicine and also by traditional medicine in different cultures.

Alum usage was also described widely in recent literature for different medical indications, like its antibacterial effects and its efficacy on the healing of oral ulcers. [14,15]

Searching the literature, no previous papers were found that have assessed the efficacy of alum in comparison to silver nitrate for the control of epistaxis or the mucosal wound healing after exposure to silver nitrate and alum. There are many published articles in other medical specialties about the usage of alum for control of bleeding in different sites.

Urologists used 1% alum solution as irrigation for control of uncontrollable hematuria in cases of non-operable cancer of bladder.[16] Irrigation of bladder with alum stops bleeding by two different mechanisms. First, it causes capillary constriction and second by precipitating of protein gel over the bladder wall.[17]

Ostroff and Chenaultin in 1982 were the first to report complete stop of hematuria with 1% alum solution in patients with massive bladder bleeding.[18] They did not report side effects of this treatment, which could be given with no anesthesia. After this study, several publications were reported,[9][19 - 21] with success rates between 66% and 100% with 1% alum solutions. Schootstra et al. reported good outcomes in patients with bladder haemorrhage after treating sixteen patients using 0.5% alum solution.[10] Nonetheless, intravesical alum instillation seemed to be effective, the most innocuous and inexpensive method with the least morbidity in both radiation cystitis and sloughing tumoral mass[19,22] Intravesical 1% alum in irrigation was also reported to represent an effective and well-tolerated option for patients with hemorrhagic cystitis associated with bladder carcinoma and irradiation.[23]

A 1% solution of alum also has been given to control bleeding from a rectal carcinoma.[24] On the other hand, there are possible side effects and complications after using alum. It is known that alum in salts can cause allergic reactions in susceptible individuals even after topical use.[20,25]
Encephalopathy and acute aluminum intoxication are also possible complications of using alum, they happened mainly in patients with impairment of renal function. [26 -28] Shoskes et al. reported the death of a patient with kidneys dysfunction, who was treated twice within a 3-month period using 1% alum given over 48 hours.[29] To avoid the systemic side effects in such situations, serum levels of aluminum can be measured during the treatment.

Wound healing is a physiological process that involves several overlapping stages. These stages could include inflammation, formation of granulation tissue, re-epithelialization, extra cellular matrix (ECM) formation and remodeling.[30] This experiment have demonstrated a better healing features in the form of tissue formation and re-epithelialization, an increased collagen distribution and deposition, and increased angiogenic marker in the healed tissue exposed to alum. These better healing characteristics will decrease the likelihood of developing complications related to the healing process like nasal septal perforation which is a well-known complication that may occur when using silver nitrate especially when it is used repeatedly or on both sides of the nasal septum at the same time.

The observations from this experiment also propose that alum possesses better efficiency to stop bleeding in a shorter

time in comparison to silver nitrate and this difference was statistically significant. Although the mechanism through which alum stops bleeding is not well clear, it is most likely secondary to its ability to precipitate proteins that fasten the formation of clots, and by causing constrictions of the bleeding vessels.

One of the limitations of this study is that it was done on animals, testing these findings on human subjects is necessary to confirm the outcomes seen in this study.

Another limitation is the small sample size, a larger number of subjects is necessary to make stronger conclusions.

This study should encourage further trials to confirm the objective of this study for treating a very common emergency in the field of otolaryngology, with a neatly faster, and more convenient method which will result in less morbidity.

Conclusion

This experiment showed that alum is a better alternative to silver nitrate in the treatment of a very common emergency in the field of otolaryngology. It represents a new option that is more efficient in controlling epistaxis in shorter time in comparison to silver nitrate, and with less risk for developing healing-related complications that could be encountered with using silver nitrate.

Conflict of Interest:

We declare no conflict of interest.

References

[1] Little JJ. An effective method of controlling secondary hemorrhage. Laryngoscope 1932;42:207-8.

[2] Lioyd S, Almeyda J, Di Cuffa R, Shah K. The effect of silver nitrate on nasal septal cartilage. Ear Nose Throat J 2005;84:41-4.

[3] Pond F., Sizeland A. Epistaxis. Strategies for management. Aust Fam Physician 2000;29:933-8

[4] Hanif, J, Tasca RA, Frosh A, Ghufoor K, Stirling R. Silver nitrate: histological effects of cautery on epithelial surfaces with varying contact times. Clin Otolaryngol Allied Sci 2003;28:368-70.

[5] Ahmed AE, Abo El-Magd EA, Hasan GM, El-Asheer OM. A comparative study of propranolol versus silver nitrate cautery in the treatment of recurrent primary

epistaxis in children. Adolesc Health Med Ther 2015;30:165-70.

[6] Wang L., Vogel D. H. Posterior epistaxis: comparison of treatment. Otolaryngol Head Neck Surg 1981;89:1001-6.

[7] Simmen D. B., Raghavan U., Briner H. R., Manestar M., Groscurth P., Jones N. S. The anatomy of the sphenopalatine artery for the endoscopic sinus surgeon. Am J Rhinol 2006;20:502–5

[8] Sevki C, Levent A, Ender G, Firdevs M. Reduction of house-dust mite allergen concentrations in carpets by aluminium potassium sulfate dodecahydrate (alum). Allergy Asthma Proc 2006;27:350-3.

[9] Nurmi M, Puntala P, Torniainen K. Alum irrigation in the treatment of severe haemorrhage from the bladder. Ann Chir Gynaecol 1987 Jan;76:173–5.

[10] Schootstra R, van Driel MF, Hassankhan R, van deWerff R, Oremus ET, Uges DR, et al. The use of an alum irrigation in the treatment of massive bladder haemorrhage. Pharm Weekbl Sci 1989;11:175–8.

[11] Mohammed FI, Shafagoj YA. Antiaggregation effect of alum on human platelets. Int J Clin Pharmacol Ther 2001;39:322–4.

[12] Goel AK, Rao MS, Bhagwat AG, Vaidyanathan S, Goswami AK, Sen TK. Intravesical irrigation with alum for the control of massive bladder hemorrhage. J Urol 1985;133:956–7.

[13] Goswami AK, Mahajan RK, Nath R, Sharma SK. How safe is 1% alum irrigation in controlling intractable vesical hemorrhage?. J Urol 1993;149:264–7.

[14] Shahriari R., Salari S, Shahriari S. In vitro study of concentration-effect and time-course pattern of white alum on Escherichia coli O157:H7 growth. Afr J of Tradit Complement Altern Med 2017;14:311-8.

[15 Rafieian N, Abdolsamadi H, Moghadamnia A, Jazayeri M, Seif-Rabiee M, Salmanzadeh M, et al. Efficacy of alum for treatment of recurrent aphthous stomatitis. Caspian J Intern Med 2016;7:201-5.

[16] Abt D, Bywater M, Engeler DS, Schmid HP. Therapeutic options for intractable hematuria in advanced bladder cancer. Int J Urol 2013;20:651–60.

[17] Seear MD, Dimmick JE, Rogers PC. 1990. Acute Aluminum Toxicity Af-

ter Continuous Intravesical Alum Irrigation for Hemorrhagic Cystitis. Urology 1990;36:353-4.

[18] Ostroff EB, Chenault OW Jr. Alum irrigation for the control of massive bladder hemorrhage. J Urol 1982;128:929–30.

[19] Arrizabalaga M, Extramiana J, Parra JL, Ramos C, Díaz González R, Leiva O. Treatment of massive haematuria with aluminous salts. Br J Urol 1987;60:223–6.

[20] Kennedy C, Snell ME, Witherow RO. Use of alum to control intractable vesical haemorrhage. Br J Urol 1984;56:673–5.

[21] Praveen BV, Sankaranarayanan A, Vaidyanathan S. A comparative study of intravesical instillation of 15(s) 15 Me alpha and alum in the management of persistent hematuria of vesical origin. Int J Clin Pharmacol Ther Toxicol 1992;30:7–12.

[22] Ghahestani SM, ShakhssalimN. Palliative Treatment of Intractable Hematuria in Context of Advanced Bladder Cancer: A Systematic Review. Urol J 2009;6:149-56.

[23] Miodosky M, Abdul-Hai A, Tsirigotis P, Or R, Bitan M, Resnick IB, et al. Treatment of post-hematopoietic stem cell transplantation hemorrhagic cystitis with intravesicular sodium hyaluronate. Bone Marrow Transplant 2006;38:507–11.

[24] Paes TRF, Marsh GDJ, Morecroft JA, Hale JE. Alum solution in the control of intractable haemorrhage from advanced rectal carcinoma. Br J Surg 1986;73:192.

[25] Kavoussi LR, Gelstein LD, Andriole GL. Encephalopathy and an elevated serum aluminum level in a patient receiving intravesical alum irrigation for severe urinary hemorrhage. J Urol 1986;136:665–7.

[26] Phelps KR, Naylor K, Brien TP, Wilbur H, Haqqie SS. Encephalopathy after bladder irrigation with alum: case report and literature review. Am J Med Sci 1999;318:181–5.

[27] Murphy CP, Cox RL, Harden EA, Stevens DA, Heye MM, Herzig RH. Encephalopathy and seizures induced by intravesical alum irrigations. Bone Marrow Transplant 1992;10:383–5.

[28] Perazella M, Brown E. Acute aluminum toxicity and alum bladder irrigation in patients with renal failure. Am J Kidney Dis 1993;21:44–6.

[29] Shoskes DA, Radzinski CA, Struthers NW, Honey RJ. Aluminum toxicity and death following intravesical alum irriga-

tion in a patient with renal impairment. J Urol 1992;147:697–9.

[30] Perini JA, Angeli-Gamba T, Alessandra-Perini J, Ferreira LC, Nasciutti LE, Machado DE. Topical application of Acheflan on rat skin injury accelerates wound healing: a histopathological, immunohistochemical and biochemical study. BMC Complement Altern Med 2015;30:203.

Original article

Cesarean Delivery in Majmaah, Saudi Arabia: prevalence, indications and complications

Hussam Zain[1,2], Yousif M.Y. Abdallah[3], Wifag Mustafa[4], Tayseer dhayfallah almuteiri [1], Rayan G Albarakati [1]

1.Department of Obstetrics and Gynaecology, College of Medicine, Majmaah University, Majmaah, 11952, Saudi Arabia
2. Department of Obstetrics and Gynaecology, College of Medicine, Alfashir University, Alfashir, Sudan
3.Department of Radiological Science and Medical Imaging, College of Applied Medical Science, Majmaah University, Majmaah, 11952, Saudi Arabia
4 Department of Obstetrics and Gynaecology, king Khalid hospital, Majmaah, 11952, Saudi Arabia

Received on 20.01.2020, accepted for publication on 30.04.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.006)

Correspondence author:
Hussam Zain. Department of Obstetrics and Gynaecology, College of Medicine, Majmaah University, Majmaah, 11952, Saudi Arabia. Email: zain98@hotmail.com phone +966598785122

Abstract

Aims:
The aim of this study was to study the prevalence, indications and the different complications of caesarean section in King Khalid Hospital (KKH)

Method:
This was a cross-sectional study done in one-year duration (January 2016- December 2016) at KKH Hospital (Majmaah Saudi Arabia) in the Gynecology &Obstetrics Department. The study population consisted of 394 women who delivered at the hospital during the period of the study.

Result:
Most of patients who underwent cesarean section were in the age group of 26-30 years(33.8%) and the lowest number was in the age group 15-20 (1%), the majority of patients were housewife (80.7%), regarding the parity most of them fall in the range para 2-4 (62.7%). C.S prevalence was 30.1% (394) and

الملخص

الأهداف:
الهدف من هذه الدراسة هو دراسة معدل، ومسببات ومضاعفات الولادة القيصرية في مستشفى الملك خالد بالمجمعة.
الطريقة: دراسة وصفية مرجعية أجريت في سنة واحدة (يناير ٢٠١٦ - ديسمبر ٢٠١٦) في قسم أمراض النساء والتوليد بمستشفى الملك خالد بالمجمعة. احتوت الدراسة على بيانات ٤٩٣ امرأة خضعن لعمليات قيصرية خلال فترة الدراسة.

النتائج:
كانت معظم المرضى اللاتي خضعن لعملية قيصرية في الفئة العمرية من ٢٦-٣٠ سنة (٨,٣٣ ٪) وكان أقل عدد في الفئة العمرية ٢٠-٢٥ (١ ٪)، وبالنسبة للمهنة غالبية المريضات ربات منزل (٧,٠٨ ٪). فيما يتعلق بعدد مرات الحمل السابق، فمعظمهن لديهن ٢-٤ حملا سابقا (٧,٢٦ ٪). معدل العمليات القيصرية كان ١,٠٣ ٪ (٤٩٣) ومعدل الولادة الطبيعيه هو ١,٩,٩٦ ٪ (٨١٩)، بلغت نسبه العمليات الطارئة (١,٩٥ ٪). نسبه المضاعفات بلغت ٩,١٣. بلغ أعلى معدل من المضاعفات التصاق البطن والحوض ٨٨(٩٦ ٪)، يليها نزيف اثناء وبعد الولادة ٦(٩,٧ ٪)، وحدوث تهتك المثانة٤(١,٣ ٪) وتأخر التآم الجروح ٤(١,٣ ٪).

vaginal delivery was 69.9.1% (918), performed as an emergency (59.1%) and the rest were done electively (40.9%). almost one third of C-sections had complications 31.9% ,the other two third were free of complications (68.1%), the highest rate of complications was abdomen and pelvic adhesion 88 (69%) followed by intra- and post-partum hemorrhage10 (7.9%), bladder injury 4 (3.1%) and poor wound healing was 4 (3.1%)

Conclusion :

This study concluded that KKH Majmaah hospital has high prevalence of C.S in comparison to the international figures which need effective strategies to bring this number to normal figures, pelvic adhesion is the most frequent complication which can led to further future complications.

Keywords:

Caesarean section, prevalence, indications, complications, Majmaah, Saudi Arabia

الخلاصة:

خلصت هذه الدراسة إلى أن مستشفى الملك خالد بالمجمعة يحتوي على نسبة عالية من العمليات القيصرية وفقًا للمعدل الطبيعي لمنظمة الصحة العالمية التي تحتاج إلى مزيد من الاستراتيجيات لجعل هذا الرقم مساويا للرقم الطبيعي. التصاقات بالحوض هو من المضاعفات الأكثر شيوعًا لدى النساء اللاتي خضعن لمليات قيصرية بالمستشفى.

الكلمات المفتاحية:

عملية قيصرية، معدل، مسببات، مضاعفات، المجمعة، العربية السعودية

Introduction

Caesarean section is a major obstetric surgical operation that result in greater reduction in maternal and fetal mortality since it has been discovered for the first time; the average rate has been stated by World Health Organization to be between (10 to 15)% , however the rate can reach up to 22.5% in UK and Canada [1-5]. Recently, there is increase in the normal rate in many countries, for instance in certain countries more than 50%of their deliveries are conducted by Caesarean section and the following information gives an idea about where the highest frequency of Caesarean section in the world , the Dominican Republic , Brazil and Egypt their rate range between 55% to 58% [6-8] and the reason behind this increase maybe due to performing C.S without medical indications.

Although C-section has managed many obstetric problems, it has many complications, which increases maternal mortality and morbidity such as hemorrhage, infection, trauma to bowl or bladder as well as thromboembolic diseases, more over ,the increase in the rate of C-section has a negative impact on hospital resources

[9-12] . Caesarean section is a name that describes surgery to the lower abdomen to deliver one or more fetus [13-15]. Sometimes vaginal rout of delivery can endanger the life of the mother, the baby or both [16-18]. Spinal or general anesthesia can be used for C-section, the choice depends on the indication of the surgery and the medical condition of the mother and the baby [19-21]. The skin of the lower abdomen is cleaned with antiseptic solution then opened with 15 cm incision; the uterus is identified and opened with separate incision followed by delivery of the baby and placenta [22-27]. Finally, both incisions were closed with sutures [28-30]. Cesarean section is done for many reasons such as multiple pregnancy, high blood pressure, obstructed labor, breech presentation and issues related to the placenta and umbilical cord [31-34]. Breast feeding is initiated as soon as possible as the baby needs early nutrition and the process of breastfeeding help uterus to contract, the mother needs about two to three days in the hospital before return to home. Cesarean section reduces maternal and fetal mortality and morbidity but also it has many maternal complications. (35). It remains the major cause of maternal death in developing countries and respiratory problem in the fetus. There are many guidelines recommend doing C-section after 39 weeks gestation and prevent performing it without medical reasons. [36-37] Twenty-three million C. sections were done all over the world during the years 2012. Research found that the highest rates was 27% in 45 countries and the lowest as 7.5% in more than 50 counters. [38] (WHO) has recommend that the normal rate of the C-section is 10% to 15%. The rate in North America in continuous increasing from 17.5% of deliveries in 1995 to 23.7% in 2003. Furthermore, caesarean delivery has a negative impact on maternal and neonatal health with many complications as well as financial burden. [39] vaginal delivery recommended by the Society of Obstetricians and Gynecologists of Canada (SOGC), to be the safest mood of delivery for both the mother and newborn. [40] Guidelines for clinical practice has a positive impact on dropping the high rate of C-section that seen in many countries., [41] these guidelines include educating the women and her family about the mood of delivery that helps her to take decision. There are many practices can lead to reduction of caesarean rate such as induction of labor at term, applying operative vaginal birth and vaginal birth after previous caesarean birth [42-45].

Methods

This study is a cross-sectional study, con-

ducted in king Khalid Hospital in Majmaah, it is a referral hospital providing health services to 130000 population, in addition to patients from many district hospitals. The hospital has a capacity of 225 beds distributed in different departments. The obstetrics and gynecology department consist of outpatient obstetrics and gynecology clinics, inpatients and two theaters. The study population consisted of all records of patients who were delivered in King Khalid Hospital Majmaah in the period from 1st January 2016 to 31 December 2016, and they were 394 record. The data were collected by filling a pre-tested checklist from the hospital records. Data analysis was performed by SPSS and presented in tables and graphs. The study obtained ethical approval from Majmaah University ethics committee. Permission taken from hospital authority.

Results

Table (1) summarized General and socio-demographic features of the patients of this study. Patients who underwent cesarean section were in the age group of 26-30 years (33.8%) and the lowest number was in the age group 15-20(1%), most of the patients were housewives (81.3%). Regarding parity, most of the patients were para 2-4 (63.1%) and the least were primigravidae (12.7%).

Table 1. Sociodemographic characteristics of women conducted Cesarean Section in KHH

Characteristics	Number (%)
Age	
15-20	4 (1.0%)
21-25	35 (8.9%)
26-30	133 (33.8%)
31-35	112 (28.4%)
35 or more	110 (28.0 %)
Occupation	
Housewife	318 (81.3%)
Employee	31 (7.9 %)
Other	45 (1.8 %)
Total	394(100%)
Parity	
1	50 (12.7%)
2-4	247 (63.1%)
5 or more	97(24.2%)

The total number of deliveries in King Khalid Hospital in the period from January 2015 to December 2015 was 1312 patients (with an overall CS rate of 30.1% (394) and rate of vaginal delivery was 69.9.1% (918). Most of C-sections were performed as an emergency (59.1%) and the rest were done electively (40.9%). Almost one third of C-sections had complications (31.9%), the other two thirds were free of complications (68.1%), as shown in table 2.

Table (2)Type of Caesarean section and its complications in King Khaled Hospital, Majmaah

Characteristics	Number (%)
Type of Caesarean section	
Emergency Elective	228 (57.9%) 166 (42.1%
Total	394(100)
Complications	
Not Complicated Complicated	268 (68.1%) 126 (31.9%)
Total	394(100)

Table 3 shows the rate of complications. The highest rate was abdomen and pelvic adhesion 88 (69%) followed by intra- and post-partum hemorrhage (7.9%), bladder injury(3.1%), poor wound healing (3.1%), post-operative endometritis (4.7%) and the least rate was anesthetic complication which constitute (0.7%).

Table (3)Types of complications of cesarean section in women delivered in KKH

Characteristics	Number (%)
Pelvic adhesion	88 (69.4)
Hemorrhage	10 (7.9%)
Endometritis	6 (4.7%)
Poor healing	4 (3.4%)
Bladder injury	4 (3.4%)
Wound infection	4 (3.4%)
ICU admission	4 (3.1%)
Re-opening	3 (2.3%)
Death	2 (1.7%)
Anesthesia	1 (0.7%)
Total	126(100)

Most of the patients were operated because of multiple previous scars (45.7%) followed by one previous scar (15.5%), fetal distress (7.4%), breech (5.1%) preeclampsia (2.5 %), Multiple pregnancy (1.8%) and failed to progress (3.2%) as shown in table 4.

Table 4.Indications of cesarean section in women delivered in KKH

Characteristics	Number (%)
Multiple scar	181 (47.2%)
Fetal Distress	29 (7.2%)
FTP	14 (3.2%)
Preeclampsia	10 (2.5%)
Multiple pregnancy	7 (1.2%)
Other	72 (18.1%)
Total	394(100)

Discussion

The prevalence of cesarean section during one-year was 30.1%, which far more from the normal rate of cesarean section according to WHO rate and much less in comparison to study done in Qassim Saudi Arabia by Alsheeha MA [47] which was 55.4 %. However, study done in japan by Eri Maeda shows rate of 18.5% which is close to international figure [48]. The most common indication of cesarean section was multiple previous C-section scars (two or more) with 47.5% followed by (one previous scar) with 15.5%. In this study, the multiple previous C-section scars was represented more than 60% of total number of cesarean section which considered the most frequent reason , in my opinion the

decision of primary C. section must be supervised because this is an important factor that lead to increase in overall rate, if we could managed to reduce primary C.S then this will reduces the overall rate of C-section . In this study, the overall rate of complication was 31.9%. The commonest complication was pelvic adhesion from previous surgery (69.4%) which necessitate the need for high skilled physicians to minimize the complications during the surgery. The hemorrhage (intra and post-partum) and wound infection were represented 7.9% and 3.1%, respectively. This result supports Tetsuya K et al study who stated in their study that those complications were represented only 2 to 7% [46]. In this study, bladder injury complication that resulted due to the high rate of pelvic adhesion represented 3.1% of the cases.

The study Concluded that there is high caesarean section rate in King Khaled Hospital, Majmaah, Saudi Arabia. Multiple scar is the most common indication of cesarean section in women delivered in the hospital. Pelvic adhesion is the most frequent complication.

Conflict of Interest

No potential conflict of interest in this article.

References

[1] Abenhaim HA, Benjamin A. Higher caesarean section rates in women with higher body mass index: are we managing labour differently. Journal of Obstetistics Gynaecology Canadian. 2011;33(5):443–448.

[2] Billard M. Cesarean section on demand: is it a fad or an advance in medical practice? Can Fam Physician. 2011;57(11): 406, 1243.

[3] Ashtiani N, Hagmolen of ten Have W, Vreede WT, Vogt WP, van Elburg RM. Respiratoire complicaties bij vroege electieve sectio caesarea [Respiratory complications in early elective caesarean section] Ned Tijdschr Geneeskd. 2009;153:157.

[4] McDonnell NJ, Paech MJ, Clavisi OM, Scott KL, Group AT. Difficult and failed intubation in obstetric anaesthesia: an observational study of airway management and complications associated with general anaesthesia for caesarean section. Int J Obstet Anesth. 2008;17(4):292–297.

[5] Maric T, Tomic V, Darko K. Puerperalne komplikacije u prvorotki porodenih carskim rezom: studija parova [Puerperal complications in nulliparous women deliv-

ered by section caesarean: pair study] Med Arh. 2006;60(4):246–250.

[6] Bulow-Lehnsby AL, Gronbeck L, Krebs L, Langhoff-Roos J. Komplikationer i forbindelse med kejsersnit i elektivt sectio-team [Complications of elective caesarean section performed by a special section team] Ugeskr Laeger. 2006;168(47):4088–4090

[7] Jonsdottir G, Bjarnadottir RI, Geirsson RT, Smarason A. Eru tengsl a milli ti[eth]ni keisaraskur[eth]a og bur[eth]armalsdau[eth]a a Islandi undanfarin 15 ar? [No correlation between rates of caesarean section and perinatal mortality in Iceland] Laeknabladid. 2006;92(3):191–195

[8] Hounton SH, Newlands D, Meda N, De Brouwere V. A cost-effectiveness study of caesarean-section deliveries by clinical officers, general practitioners and obstetricians in Burkina Faso. Hum Resour Health. 2009;7:34

[9] Murray SF. Relation between private health insurance and high rates of caesarean section in Chile: qualitative and quantitative study. BMJ. 2000;321(7275): 1501–1505

[10] Giani U, Bruzzese D, Pugliese A, Saporito M, Triassi M. Risk factors analysis for elective caesarean section in Campania region (Italy) Epidemiol Prev. 2011;35(2):101–110

[11] Kmietowicz Z. NICE advises against caesarean section on demand. BMJ. 2004;328(7447):1031

[12] Sultan AH, Stanton SL. Preserving the pelvic floor and perineum during childbirth – elective caesarean section? Br J Obstet Gynaecol. 1996;103(8):731–734

[13] Scioscia M, Vimercati A, Cito L, Chironna E, Scattarella D, Selvaggi LE. Social determinants of the increasing caesarean section rate in Italy. Minerva Ginecol. 2008;60(2):115–120

[14] Barton A. Caesarean section and litigation. Lancet. 2001;357(9255):556

[15] Belizan JM, Quaranta P, Paquez E, Villar J. Caesarean section and fear of litigation. Lancet. 1991;338(8780):1462

[16] McCallum C. Explaining caesarean section in Salvador da Bahia, Brazil. Sociol Health Illn. 2005;27(2):215–242

[17] Nuttall C. Caesarean section controversy. The caesarean culture of Brazil. BMJ. 2000;320(7241):1074

[18] Ba'aqeel HS. Cesarean delivery rates in Saudi Arabia: a ten-year review. Ann Saudi Med. 2009;29(3):179–183

[19] Feng XL, Xu L, Guo Y, Ronsmans C. Factors influencing rising caesarean section rates in China between 1988 and 2008. Bull World Health Organ. 2012;90(1):30–39.

[20] Barber EL, Lundsberg LS, Belanger K, Pettker CM, Funai EF, Illuzzi JL. Indications contributing to the increasing cesarean delivery rate. Obstet Gynecol. 2011;118(1):29–38

[21] Stavrou EP, Ford JB, Shand AW, Morris JM, Roberts CL. Epidemiology and trends for caesarean section births in New South Wales, Australia: a population-based study. BMC Pregnancy Childbirth. 2011; 11:8

[22] American College of Obstetricians and Gynecologists ACOG committee opinion no. 559: cesarean delivery on maternal request. Obstet Gynecol. 2013;121(4): 904–907

[23] Al-Mubarak KA, Adamchak DJ. Fertility attitudes and behavior of Saudi Arabian students enrolled in U.S. universities. Soc Biol. 1994 Fall-Winter;41(4):267–273

[24] Wilson D, Dornan J, Milsom I, Freeman R. UR-CHOICE: can we provide mothers-to-be with information about the risk of future pelvic floor dysfunction? Int Urogynecol J. 2014;25(11):1449–1452

[25] Rogers RG, Leeman LM, Borders N, et al. Contribution of the second stage of labour to pelvic floor dysfunction: a prospective cohort comparison of nulliparous women. BJOG. 2014;121(9):1145–1153.

[26] Handa VL, Pierce CB, Munoz A, Blomquist JL. Longitudinal changes in overactive bladder and stress incontinence among parous women. Neurourol Urodyn. 2015;34(4):356–361

[27] Gyhagen M, Bullarbo M, Nielsen TF, Milsom I. A comparison of the long-term consequences of vaginal delivery versus caesarean section on the prevalence, severity and bothersomeness of urinary incontinence subtypes: a national cohort study in primiparous women. BJOG. 2013;120(12):1548–1555

[28] Gyhagen M, Bullarbo M, Nielsen TF, Milsom I. The prevalence of urinary incontinence 20 years after childbirth: a national cohort study in singleton primiparae after vaginal or caesarean delivery. BJOG. 2013;120(2):144–151

[29] Faisal I, Matinnia N, Hejar AR, Khodakarami Z. Why do primigravidae request caesarean section in a normal pregnancy? A qualitative study in Iran. Midwifery. 2014;30(2):227–233

[30] Adekanle DA, Adeyemi AS, Fadero FF. Booking status and caesarean section outcome in LAUTECH teaching Hospital, Osogbo. Niger J Med. 2008;17(1):25–28

[31] Kottmel A, Hoesli I, Traub R, et al. Maternal request: a reason for rising rates of cesarean section? Arch Gynecol Obstet. 2012;286(1):93–98.

[32] Shaaban MM, Ahmed WS, Khadr Z, El-Sayed HF. Obstetricians' perspective towards cesarean section delivery based on professional level: experience from Egypt. Arch Gynecol Obstet. 2012;286(2): 317–323

[33] Pradhan A, Tincello DG, Kearney R. Childbirth after pelvic floor surgery: analysis of Hospital Episode Statistics in England, 2002–2008. BJOG. 2013;120(2):200–204

[34] Demoulin G, Thubert T, Faivre E, Trichot C, Deffieux X. Grossesse et post-partum des patientes porteuses de bandelette sous-uretrale: revue de la litterature [Pregnancy and postpartum of women with mid-urethral sling procedure: a review of the literature] J Gynecol Obstet Biol Reprod (Paris) 2013;42(6):518–524

[35] Tommaselli GA, Di Carlo C, Formisano C, Fabozzi A, Nappi C. Vaginal delivery following single incision sling (TVT-Secur) for female stress urinary incontinence. J Obstet Gynaecol Res. 2013;39(2):608–610

[36] Kohorst F, Flock F, Kreienberg R, Reich A. Pregnancy and delivery after tension-free vaginal tape (TVT) procedure: literature review and case report. Eur J Obstet Gynecol Reprod Biol. 2010;151(1):10–13

[37] Tan HJ, Siu W, Faerber GJ, McGuire EJ, Latini JM. Long-term durability of pubovaginal fascial slings in women who then become pregnant and deliver. Int Urogynecol J. 2010;21(6):631–635

[38] Ebulue V, Vadalkar J, Cely S, Dopwell F, Yoong W. Fear of failure: are we

doing too many trials of instrumental delivery in theatre? Acta Obstet Gynecol Scand. 2008;87(11):1234–1238

[39] Gharoro EP, Enabudoso EJ. Labour management: an appraisal of the role of false labour and latent phase on the delivery mode. J Obstet Gynaecol. 2006;26(6):534–537

[40] Vimercati A, Greco P, Loizzi V, Loverro G, Selvaggi L. Medicina Difensiva nella scelta del taglio cesareo ["Defensive medicine" in the choice of cesarean section] Acta Biomed Ateneo Parmense. 2000;71(Suppl 1):717–721

[41] Kornacka MK, Kufel K. Ciecie cesarskie a stan noworodka [Neonatal outcome after cesarean section] Ginekol Pol. 2011;82(8):612–617.

[42] Laws P, Sullivan EA. Australia's mothers and babies 2007. Sydney, Australia: National Perinatal Statistics Unit; 2009

[43] Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Mathews TJ, Kirmeyer S, Osterman MJK. Births: final data for 2006. Natl Vital Stat. 2009;58(24):1–85

[44] Information Centre. Method of delivery, 1980 to 2007–8. NHS maternity Statistics, England: 2008-09. Department of Health; 2009

[45] Zeitlin J, Szamotulska K, Drewniak N, Mohangoo A, Chalmers J, Sakkeus L, Irgens L, Gatt M, Gissler M, Blondel B. Preterm birth time trends in Europe: a study of 19 countries. BJOG. 2013.

[46] Tetsuya K & Helain L. Surgical site infections after cesarean delivery: epidemiology, prevention and treatment. Maternal Health, Neonatology and Perinatology. 2017:3. 10.1186/s40748-017-0051-3.

[47] AlSheeha M, Epidemiology of Cesarean Delivery in Qassim, Saudi Arabia, journal of medical science 2018 May 20; 6(5): 891–895.

[48] Eri Maeda. .Cesarean section rates and local resources for perinatal care in Japan, The Journal of Obstetrics and Gynecology Research , 44 (2): 208-16

Original article

Medication non-adherence factors and difficulties among psychiatric patients in Madinah

Amal Mohammed Surrati[1], Nawal Abdullah Al-Harbi[2], Hebah Mohammed Surrati[2], Mohaamed Ahmed ALawaz[2], Sarah Hassan Almalki[2], Sarah Sameer Salamah[2]

1 Taibah University, College of Medicine
2 Taibah University, College of Pharmacy

Received on 08.12.2019, accepted for publication on 04.05.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.007)

Correspondence author:
Amal Mohammed Surrati
Assistant professor at family and community medicine department
College of Medicine-Taibah university KSA- Madinah Munwarrah-KSA
Phone numbers: 0503334890 , E-mail address: Dr-aamaal@hotmail.com

Abstract

Background &Aims:
Adherence to medication is an important part of patient management, Adherence rates may be lower among patients with psychiatric disorders compared to patients with a physical disorder. Our aim was to measure adherence to medication among outpatient psychiatric patients, and the factors associated with it.

Methods:
A cross-sectional study was conducted in Al-Amal Hospital for Mental Health in Al-Madinah. Eligible participants met with one of the data collectors for assessment of their adherence. Adherence was investigated by use of the Morisky Medication Adherence Scale plus Information about the demographics and reasons of difficult adherence were collected.
Descriptive Statistical analysis was performed using Statistical Package for Social Sciences, version 20 (SPSS Inc., Chicago, IL, USA). P< 0.05 was considered as significant. Correlation between adherence and other independent variables was calculated.

الملخص

الخلفية والأهداف:
يعتبر الالتزام بأخذ الدواء جزءًا مهمًا من خطة علاج المرضى ، ووجد أن معدلات الالتزام أقل بين المرضى الذين يعانون من اضطرابات نفسية مقارنة بالمرضى الذين يعانون من أمراض عضوية، الهدف من الدراسة هو قياس مدى الالتزام بالأدوية بين المرضى النفسيين المراجعين للعيادات الخارجية بالمدينه، والعوامل المرتبطة بذلك.

طريقة البحث:
دراسة مقطعية أجريت في مستشفى الأمل للصحة النفسية في المدينة المنورة.جمعت المعلومات عن طريق مقابلة المرضى وتعبئة الإستبانه والتحقق من الإلتزام بأخذ الدواء بإستخدام مقياس Morisky Medicatio Adherence
بالإضافة إلى المعلومات الديموغرافية وأسباب صعوبة الإلتزام.تم إجراء التحليل الإحصائي الوصفي باستخدام
برنامج SPSS.

النتائج:
جمع حوالي ٣٨٥ استبانة من مرضى منطبق عليهم شروط المشاركة بالبحث. من بين هؤلاء كان ٢٤٤ (٦٣,٤ ٪) من الذكور في حين أن ١٤١ (٣٦,٦ ٪) من الإناث ، أعمارهم ما بين ٢١-٥٠ سنة. أفاد نصف المرضى (٥١,٢ ٪) انخفاض معدل الالتزام بأدويتهم ، مع وجود فروق ذات دلالة إحصائية بين الالتزام والعوامل المتعلقة

Results:
A total of 385 patients met the inclusion criteria and participated in the study. Of those, 244 (63.4%) were males while the remaining 141(36.6%) were females. Half of the patients (51.2%) reported low adherence to their psychiatric medication, with statistically significant differences was observed related to sex and education level.

Conclusions:
Our study concluded that adherence to psychiatric mediations is low among psychiatric patients in a hospital in Madinah. Our study highlighted the important socio-demographic factors affecting adherence of psychiatric mediations.

Keywords:
Al-Amal hospital-Madinah KSA, Non-adherence, psychiatric patient.

بالجنس ومستوى التعليم.

الاستنتاجات:
انخفاض الالتزام بالأدوية مشكلة شائعة بين المرضى النفسيين في المدينة المنورة. حسنت هذه الدراسة لفهم الأسباب المرتبطة بالالتزام بأدويتهم.

الكلمات المفتاحية:
مستشفى الأمل ، المدينة المنورة ، المملكة العربية السعودية ، عدم الالتزام ،مرضى الأمراض النفسية.

INTRODUCTION:

Adherence to medication is an important part of patient management, The WHO defines adherence as "the extent to which the individual behaviour including drugs-taking coincide with agreed recommendations from a healthcare provider.[1]

Medication adherence behaviour refers to compliance by patients in taking their prescribed medications as ordered by their treating doctor (adherence) as well as following out their orders throughout the duration of drug course (persistence).[2] [3]

Non-adherence has been a major concern to healthcare workers and an important health problem that jeopardizes the patient's therapeutic outcome, especially psychiatric patient.[4] Non-adherence has a major effect on illness it increase probability of relapse leading to higher rate of hospitalization.[5] It includes unwillingness to follow psychiatrist instructions ,not initiating the drug therapy and termination before desired time. The typical rates of non-adherence in general about 50% for prescribed medication, ranged from 10% to 76% among psychiatric patients. [4,6] It's found that Adherence rates lower among psychiatric individual compared to patients with a physical disorder. [7] Different studies have reported different non-adher-

ence rates of psychiatric medication that vary between different types of psychiatric illnesses. Non-adherence range for major depressive disorder was 28% - 52%, for bipolar disorder (20%-50%), and for schizophrenia (20% - 72%). Furthermore, it was reported as 57% for anxiety disorders in one of the studies.[8] One of the important reasons of non-adherence to psychiatric medication is the chronic nature and long duration of treatment. Many studies reported that most of the medicines which were prescribed for chronic diseases were not actually recommended.[9] Studies showed that violence , suicide, relapse, readmission to hospital highly increase with non-adherent consumers compared with adherent ones[10,11,12], confirming that adherence to antipsychotic medication decrease the risk of violence according to study in Canada among schizophrenia patients. [13] This emphasize that low adherence to medication is pivotal for relapse after depressive episode and hence proven that this is an important public health issue to address.[14]

Patients having an attitude of non- adhering to medications can suffer from other complications due to relapse of psychiatric disease thereby resulting in re-hospitalization. One of the challenges that a psychiatrist facing during discussing treatment modality is to ensure patients adherence to medication. Factors of non-adherence include the attitude of the patient towards medication which could be a probably a result of any previous trial, lack of understanding or knowledge , severity of the case, support from caregiver or society which plays an major important role as well as relationship between the psychiatrist and patient. [15] Patient-related factors such as age, sex, education , patient beliefs about drug and cultural myths.[16,17] A study in Saudi Arabia on depressed patients showed that there is a high relationship between non-adherence and patient beliefs about antidepressant medication.[18] Others important factors like disease-related factors and physician-related factors.[16] Some factor related to side effect like psychotropic medication cause sleep disturbance, weight change, and sexual dysfunction. In Pakistan, a study found that psychotropic medication side effect is a common cause of non-adherence. [19]

Fürthauer et al, reported that the factors associated with non-compliance against the psychiatric medications were physicians' limited knowledge, and patients' lack of awareness. This calls for improving the physician's knowledge related to these factors, communication and understanding and taking patient involvement as a key strategy to improve adherence to medications. [20] To the best of researcher's knowledge, there was no previous

study conducted in Madinah that find out the prevalence of non-adherence and its associated factors among psychiatric patients. Therefore, our study would report the magnitude of non-adherence of psychiatric medication among adult psychiatric patients in al-Amal hospital. Our study findings would help in finding the actual magnitude of this non-adherence issue in our study population that will eventually help in devising intervention to resolve this important public health issue.

The aim of our study was to measure adherence to psychiatric medications among outpatient psychiatric individuals, and the factors associated with non-adherence.

SUBJECTS AND METHODS:

We conducted a cross sectional study by recruiting 385 patients taken as systematic random sample every tenth patient attend the outpatient clinic who visited Al-Amal Hospital for Mental Health in Al-Madinah between 30 September to 31st October 2017. The sample size was calculated using online sample size software by assuming the proportion of non-adherence to be 50-52% (18), 5% precision with 95% confidence interval.

Inclusion criteria for this study were mainly adult psychiatric follow-up patients, whose age was more than 18 years and they were on prescribed psychiatric medications, while we excluded patients who were not able to communicate because of lack of insight. Data collected from the patients by interview, written consent was obtained from each respondent. Study tool was questionnaire included three parts that assessed patient socio-demographics, patient self-reported medication and adherence attitude. Adherence attitude was based on the 10 item The Medication Adherence Rating Scale (MARS) that evaluated both attitudes about medications and actual medication-taking behaviour. It also addressed common reasons for difficulty in medication adherence. Score for each patient was calculated using online calculator

(https://healthengine.com.au/info/psychosis-medication-adherence-rating-scale)

MARS was developed from Morisky et al's Medication Adherence Questionnaire (MAQ). The reliability of this tool is good, but the validity is moderate. Items in the MARS about attitude to medication is very helpful for clinicians which addresses in identifying barriers to adherence in individual cases. The validity and reliability of MARS has been established by Thompson et al .and then Flako et al. [21] [22]. The total score ranges from 0-10 with a higher score ≥6 indicating better adherence. Weaknesses of MARS Scoring required some

interpretation as, "yes" response does not necessarily indicate a positive attitude or behaviour.

Study Outcomes and Measures:

Dependent Variables:

• Non-adherence rate

• Factors associated with non-adherence

Independent Variables:

• Age

• Gender

• Education level

After IRB approval taken, the questionnaire was filled by interviewing the patients with different psychiatric disorder (Depression, anxiety, schizophrenia and bipolar disorder) to measure their non-adherence rate with medications according to MARS scale and factors associated with non-adherence according to Culig scale.

Statistical Analyses:

Descriptive Statistical analysis was performed using Statistical Package for Social Sciences, version 20 (SPSS Inc., Chicago, IL, USA).

P< 0.05 was considered as significant. Correlation between adherence and other independent variables were calculated.

Ethical Considerations:

Ethical approval was granted by the local committee of ministry of health -Madinah Saudi Arabia in 4/7/1439H (IRB-143).

Informed Consent:

Participation were voluntary and written informed consent were obtained from all the participants after describing the aim of the study. Privacy and confidentiality were assured.

RESULTS:

Most of the sample were men 244 (63.4%). Their ages mostly ranged from 21 to 50 years (56.4%) and level of education mainly secondary and university level 235 (97.9%) (table 1).

Table.1. Sociodemographic characteristic of study participates (n = total 385)

Variable		n	%
Gender	Male	244	63.4
	Female	141	36.6
Age group (years)	<15	23	6.0
	15-20	33	8.6
	21-50	217	56.4
	>50	112	29.1
Education level	Illiteracy	51	13.2
	Primary and elementary	99	25.7
	Secondary & university	235	97.9

Frequency of non- adhere in our study is 197 (51.2%), almost like study conducted by Al Jumah K among 403 depressed patient showed Half of them (52.9%) had low adherence to their antidepressant drug [18] but lower than the following two studies one at King Abdul-Aziz Hospital-Makkah among 342 psychiatric patients results showed74% of them not adherence to medication[23] second study in TAIF among 233 from Mental Health Hospital clinic the Incidence of non-adherence was high (84.1%) but the tool used was a self-administered questionnaire. [24]The most frequently endorsed items were Forgetting to take medication (74.5%), medication makes them feel tired and sluggish (48.3%), sometimes stopped when felt worse (47.5%). take medication only when they sick was one of the less frequently endorsed items (38.2%). (Table 2)

:Table.2. Frequencies of responses on Medication Adherence Rating Scale questions

Questions	Response	n	%
1-Do you ever forget to take your medication?	Yes	287	74.5
	No	98	25.5
2-Are you careless at times at taking medication?	Yes	170	44.2
	No	215	55.8
3- When you feel better do you sometimes stop taking your medication?	Yes	161	41.8
	No	224	58.2
4- Sometimes if you feel worse when you take the medication do you stop taking it?	Yes	183	47.5
	No	202	52.5
5- I take my medication only when I am sick	Yes	147	38.2
	No	238	61.8
6- It is unnatural for my mind and body to be controlled by medication	Yes	159	41.3
	No	226	58.7
7- My thoughts are clearer on medication*	Yes	263	68.3
	No	122	31.7
8- By staying on medication, I can prevent getting sick*	Yes	261	67.8
	No	124	32.2
9- I feel weird, like a zombie, on medication	Yes	154	40.0
	No	231	60.0
10- The medication makes me feel tired and sluggish	Yes	186	48.3
	No	199	51.7

* disagreeing with this item connotes non-adherenc
Note: that higher MARS scores indicate lower adherence

Frequencies of Reasons of difficulty adherence to medication among participants often because patient did not want to see by other while they take their medicine (23.4%), Drug is toxic (21.3%), afraid to being dependence on drug (20.0%). sometime mainly because also drug dependence (40.5%), high drug price (39.7%) and forget to take drug (37.9%). very rare cause because of drug not available (26%) and never because if they have cold (41.3%), numbers of drug per day (39.2%).
(Table 3)

Table. 3.Reasons of difficulty of adherence to medication among participants:

Variable	Never		Very rare		Sometime		Often	
	n	%	n	%	n	%	n	%
1- Not at home at time of drug take	140	36.4	83	21.6	113	29.4	49	12.7
2 - Drug not available	125	32.5	100	26.0	112	29.0	48	12.5
3 - Forget to take drug	83	21.6	94	24.4	146	37.9	62	16.1
4 - Many drugs per day	151	39.2	68	17.7	95	24.7	71	18.4
5 - To avoid the side effect	116	30.1	69	17.9	128	33.2	71	18.4
6 - Did not want to see by other	124	32.2	64	16.6	107	27.8	90	23.4
7- doctor change treatment plan frequently	148	38.4	81	21	49	24.4	61	15.8
8 - Because Drug is toxic	120	31.2	59	15.3	124	32.2	82	21.3
9 - Drug time is at my sleeping hours	113	29.4	80	20.8	221	31.4	71	18.4
10 - When I have cold	159	41.3	80	20.8	93	24.2	52	13.5
1 1- Because I feel depressed	139	36.1	63	16.4	125	32.5	57	14.8
12 - Inappropriate drug time with me	145	37.7	54	14	138	35.8	48	12.5
13 - Consume all available drug	148	38.4	68	17.7	101	26.2	68	17.7
14 - I feel well	124	32.2	57	14.8	138	35.8	66	17.1
15 - Afraid to be dependent	96	24.9	55	14.3	156	40.5	77	20.2
16 - Drug price is high	112	29.1	59	15.3	153	39.7	61	15.8

There was significant correlation between adherence and gender of participant p value 0.00. in favour of the male sex,91% of men versus 9.0% women and between education level and adherence p 0.00. 73.8% of adherent group had secondary or university level of education (table 4).

Table 4. Relationship between adherence to medication and Sociodemographic factors

Variable		Adherence*		Non - adherence		Chi square (X2)	P. value
		n	%	n	%		
Gender	Male (171+73=244)	171	70	73	30	120.4	0.000
	Female (17+124=141)	17	12	124	88		
Age group (yrs.)	<15 (12+11=23)	12	52	11	48	3.39	0.3
	15-20 (21+12=33)	21	64	12	36		
	21-50 (102+115=217)	102	47	115	53		
	>50 (53+59=112)	53	47	59	53		
Education level	Illiteracy (9+42=51)	9	18	42	82	28.1	0.000
	Primary & elementary (39+52=91)	39	43	52	57		
	Secondary & university (135+100=235)	135	57	100	43		

• Score ≥ 6 indicate adherence.

Rate for those adhere was 188(48.8%) and non-adhere 197(51.2%)

DISCUSSION:

The aim of this study was to measure adherence rate towards medication among outpatient psychiatric patients in Madinah city and its associated factors. Studies on reasons of non-compliance on drugs and difficulties that face the patient is important to address this problem and add strategy to decrease it by increase awareness of doctors toward this factor.

Our results showed that the frequency of non-adherence to medication by the patient was 51.2%, not far from other studies 66.9% [25] India, 55.5% Benin City Nigeria,[4] 54.2% [37]Maiduguri in North-eastern Nigeria, 41% [26] 39.6%[27] Ethiopia 39%[30] Pakistan non-adherence rates. Further-

more, 52.9% participants having major depressive disorder in Saudi Arabia reported low adherence to their antidepressant medication.[18] Ademola et al, reported 50.6% patients were adherent with the appointments of psychiatric clinic, while 57.4% reported to be non-adherent to medication in Nepal. [28]

From my view these high rates of non -adherence because nature of psychiatric illness and the long duration need it before symptoms resolved. Non-adherence to anti-depressive medication would eventually increase cost to healthcare systems. Reasons included were relapse, multiple admissions to the emergency room, re hospitalizations and further consultation by psychiatrics physicians. [29-30]

We found that important reasons for not adhering to prescribed medication were fear of toxic effect of drug and to become dependence. In Saudi the drug is free for citizen for that cost or drug availability not considered as obstacle to adhere to drug unlike other country like India[31] studies showed that the most common reasons for poor medication adherence were financial problems (41%), long distance to facilities (35%) and in Pakistan[32] the most prevalent reasons for non-adherence include drug cost (22%),in Andhra Pradesh medication cost (42%).[33] Forgetting to take medication (74.5%) in our study was much higher than forgetting to take medication (36%) [32] Pakistan and forgot to take medication (18%). [33]

In a study conducted in specialized hospital in Ethiopia it was found that prevalence of non-adherence to psychiatric medication was 41.2% and it was also reported that non-affective psychosis contributed 44.5%. In addition, around three fourth (78.2%) of psychiatric patients reported forgetting for their non-adherence [34].The common reasons reported for non-adherence to medication in Canada [35] and India [31] were feeling better and forgetting to take medication in time. In our study males were found to be more adherer than females. Our finding is supported by a study conducted in tertiary hospital in India, which reported that women were three times more likely to be non-adherent as compared to men (AOR 2.7; 95% CI: 1.1–7.1) [25] But in Ethiopian referral hospital women were 2.3 times more adherer to psychiatric medications as compared to men [36] (AOR 2.34; 95% CI: 1.45–3.74). Furthermore, another study showed that females were twice likely to be adherent as compared to males. [40] Another study conducted in Saudi Arabia among major depressive disorder patients reported higher level of adherence among males as compared to females and this was also statistically significant difference. [18] Another study conducted in Nigeria

among out-patient clinics of a Psychiatric Hospital found that there was no statistically significant difference between lower adherence to psychotropic medications and socio-demographic characteristics. [4] In our study education correlate better with adherence, around 73.8% of adherent group had secondary or university level of education. Similarly, a study conducted among psychiatric patients in Ethiopia reported that tertiary education (AOR 2.69; 95% CI: 1.46–4.85) was associated with better adherence. [36] Another study conducted in psychiatric inpatients in Austria, participants having higher education were statistically significantly found to be twice as adherent as compared to those who were illiterate. [40] Another study reported that illiteracy was statistically significantly associated with non-adherence, which is consistently reported in other studies. [38, 39] Role of physicians to the non-adherence of psychiatric mediations is vital. There may be several reasons which included: unable to prescribe simple prescription, failure to describe the advantages / side effects of therapy and not considering patients' lifestyle and treatment cost. We support the recommendation state that other healthcare providers such as pharmacists, nurse and their immediate family members should play their roles for improving psychiatric mediation adherence among high risk patients. [41]

This study strength points are used of well-validated scales, data collectors were interviewed participant face to face, while the limitation was the adherence patterns taken from patient in one hospital, so the study generalizability may be limited.

CONCLUSION

Our study concluded that adherence to psychiatric mediations was about 49% among psychiatric patients in a hospital in Madinah, highlighted the important socio-demographic factors affecting adherence of treatment.

REFERENCES:

[1] Baté, Adherence to Long-Term Therapies: Evidence for Action, World Health Organization, Geneva, Switzerland, 2003.

[2] Cramar, J.A., Roy, A., Burell, A., Fairchild, C.J., Fuldeore, M.J., Ollendorf, D.A. and Wong, P.K. Medication Compliance and Persistence: Terminology and Definitions.Value in Health.
2008; 11: 44-47.

[3] Caetano, P.A., Lam, J.M. and Morgan, S.G. Toward a Standard Definition and Measurement of Persistence with Drug

Therapy: Examples from Research on Station and Antihypertensive Utilization. Clinical Therapeutics 2006; 2: 1411-1424.

[4] Odo HO, Olotu SO, Agbonile IO, Esan PO, Soni JS, James BO. Assessment of adherence to psychotropic medications among out-patients at the Pharmacy Department of a Psychiatric Hospital, in Benin City, Nigeria. Asian J Pharm 2014; 8:211-5.

[5] Velligan DI, Weiden PJ, Sajatovic M, et AL; Expert Consensus Panel on Adherence Problems in Serious and Persistent Mental Illness; J Clin Psychiatry. 2009; 70 (Suppl 4):1–46.

[6] Haynes RB, McDonald HP, Garg AX. Helping Patients Follow Prescribed Treatment Clinical Applications. JAMA. 2002;288(22):2880–2883. doi:10.1001/jama.288.22.2880

[7] Cramer, J. and Rosenheck, R. Compliance with Medication Regimens for Mental and Physical Disorders. Psychiatric Services 1998; 49(2): 196-201. doi:10.1176/ps.49.2.196

[8] Julius RJ, Novitsky MA Jr, Dubin, WR. Medication adherence: a review of the literature and implications for clinical practice. J Psychiatr Pract 2009; 15: 34-44.

[9] Haynes, R.B., McDonald, H., Garg, A.X. and Montague, P. Interventions for Helping Patients to Follow Prescription for Medications. The Cochrane Database of Systematic Reviews. 2002; No. 2. Article No. CD000011.

[10] Herings R, Erkens J. Increased suicide attempt rate among patients interrupting use of atypical antipsychotics. pharmacoepidemiology and drug safety. 2003;12(5):423–424. DOI: 10.1002/pds.837

[11] Kozma CM, Weiden PJ. Partial Compliance with Antipsychotics Increases Mental Health Hospitalizations in Schizophrenic Patients: Analysis of a National Managed Care Database. American Health & Drug Benefits. 2009;2(1):31-38.

[12] Morken G, Widen J, Grawe R. Non-adherence to antipsychotic medication, relapse and rehospitalisation in recent-onset schizophrenia. BMC Psychiatry. 2008;8: 32.doi: 10.1186/1471-244X-8-32.

[13] Rezansoff S, Moniruzzaman A, Fazel S, McCandless L, Somers J. Adherence to Antipsychotic Medication and Criminal Recidivism in a Canadian Pro-

vincial Offender Population. The Journal for Psychoses and Related Disorders. 2017;43(5):1002–1010. Doi: 10.1093/schbul/sbx084

[14] Effiong, J. and Umoh, K. Medication Non-Adherence in Schizophrenia: Prevalence and Correlates among Outpatients in a Tertiary Healthcare Facility in Uyo, South-South Nigeria. Scientific & Academic Publishing 2015; 5(6): 107-113

[15] Kane JM. Review of treatments that can ameliorate nonadherence in patients with schizophrenia. J Clin Psychiatry. 2006;67(Suppl 5): 9–14.

[16] Lucca J, Ramesh M, Parthasarathi G, Ram D. Incidence and factors associated with medication nonadherence in patients with mental illness: A cross-sectional study. Journal of Postgraduate Medicine. 2015;61(4):251-256. doi:10.4103/0022-3859.166514.

[17] AlHewit A. Adherence to Long-Term Therapies and Beliefs about Medications. International Journal of Family Medicine. 2014; 8. doi: 10.1155/2014/479596

[18] Al Jumah K, Hassali M, Al Qhatani D, El Tahir K. Factors associated with adherence to medication among depressed patients from Saudi Arabia: a cross-sectional study. neuropsychiatric disease and treatment journal. 2014; 10: 2031—2037. DOI: 10.2147/NDT.S71697

[19] Taj F, Tanwir M, Aly Z, Khowajah A, Tariq A, Syed F et al. Factors associated with Non-adherence among Psychiatric patients at a Tertiary Care Hospital, Karachi, Pakistan: a questionnaire based cross-sectional study. JPMA. 2008; 58:432

[20] F-rthauer J,Flamm M,Snnichsen A,Bmc Fam Pract. Patient and physician related factors of adherence to evidence-based guidelines in diabetes mellitus type 2, cardiovascular disease and prevention: a cross sectional study.2013; 47. DOI: 10.1186/1471-2296-14-47.

[21] Thompson, K., Kulkarni, J. and Sergeiew, A.A. Reliability and Validity of a New Medication Adherence Rating Scale (MARS) for the Psychoses. Schizophrenia Research. 2000; 42: 241-247. https://doi.org/10.1016/S0920-9964(99)00130-9

[22] Fialko, L., Garety, P.A., Kniers, E., Dunn, G., Bebbington, P.E., Fowler, D. and Freman,D. (2008) A Large Scale Validation Study of the Medication Adherence Rating Scale (MARS). Schizophrenia Research. 100; 53-59. https://doi.

org/10.1016/j.schres.2007.10.029

[23] Suliman Alsalem, M. (2017). Psychotropic Medication Non-adherence among Psychiatric Patients at King Abdulaziz Hospital-Makkah. International Neuropsychiatric Disease Journal, 10(2), 1-11. https://doi.org/10.9734/INDJ/2017/37064

[24] Alalyani, Abdullah Saad Abdullah., Prevalence and risk factors of non-adherence in psychiatric patients in Taif,Saudi Arabia. (2107)

[25] Banerjee S, Varma R. Factors Affecting Non-Adherence among Patients Diagnosed with Unipolar Depression in a Psychiatric Department of a Tertiary Hospital in Kolkata, India. Depression Research and Treatment. 2013;1-12.

[26] Gilmer, T.P., Dolder, C.R, Lacro, J.P., Folsim, D.P., Lindamer, L., Garcia, P. and Jeste, D.V. (2004) Adherence to Treatment with Antipsychotic Medication and Healthcare Costs among Medicaid Beneficiaries with Schizophrenia. The American-Journal of Psychiatry.161; 692-699.

[27] Hibaye, G., Dessarlegne, Y., Debero, N., Bekan, L. and Sintayehu, M. Prevalence of Drug Non-Adherence and Associated Factors among Patients with Bipolar Disorder at Outpatient Unit of Amanuel Hospital, Addis Ababa, Ethiopia. Journal of Psychiatry. 2013; S1: 003

[28] Ademola B, Adeponle: Family participation in treatment, post-discharge appointment and medication adherence at a Nigerian psychiatric hospital, The British Journal of Psychiatry. 2009; 194: 86–87.

[29] Higashi K, Medic G, Diez T, Granström O, De Hert M, Littlewood KJ. Medication adherence in schizophrenia: factors influencing adherence and consequences of nonadherence, a systematic literature review. Ther Adv Psychopharmacol. 2013; 1–19.

[30] Morken G, Widen JH, Grawe RW Non-adherence to antipsychotic medication, relapse and rehospitalisation in recent-onset schizophrenia. BMC Psychiatry. 2008; 8:32. pmid:18447935.

[31] Rekha R, Masroor J, Sushma K, Prashant K,Chakraborty: Reasons for Drug Non-Compliance of Psychiatric Patients:A Centre Based Study,2003.

[32] Fawad T, Mansoor T: Factors associated with Non-adherence among Psychiatric patients at a Tertiary Care Hospital, Karachi, Pakistan: JPak Med Assoc August. 2008; Vol. 58: No. 8.

[33] Nirojini P, Bollu M, Nadendla Prevalence of medication non-adherence among the psychiatric patients-. International Journal of Pharmacy and Pharmaceutical Sciences. 2014;6(4) :1-3.

[34] Tesfay K, Girma E, Negash A, Tesfaye M, Dehning S. Medication non-adherence among adult psychiatric outpatients in Jimma University Specialized Hospital, Southwest Ethiopia. Ethiop J Health Sci. 2013;23(3):227–236.

[35] Lacro P, Dunn B, Dolder R, leckband G, Jeste V. Prevalence of and risk for medication adherence in patients with schizophrenia a comprehensive review of recent literature. j clin psychiatry. 2002; 63:892–909.

[36] Woldehaimanot T, Legesse B, Teklay G, Shewamene Z, Abera M, Demeke B et al. Medication adherence and its determinants among psychiatric patients in an Ethiopian referral hospital. Patient Preference and Adherence. 2014;1329.

[37] Ibrahim, A W, Pindar, S K, Yerima, M M et al. Medication-related factors of non-adherence among patients with schizophrenia and bipolar disorder: Outcome of a cross-sectional survey in Maiduguri, North-eastern Nigeria. Journal of Neuroscience and Behavioral Health. 2015;7(5):31-39.

[38] Hudson T, Owen R, Thrush C, Han X, Pyne J, Thapa P, et al. A pilot study of barriers to medication adherence in schizophrenia. J Clin Psychiatry. 2004; 65:211–216. pmid:15003075

[39] Janssen B, Gaebel W, Haerter M, Komaharadi F, Lindel B, Weinmann S Evaluation of factors influencing medication compliance in inpatient treatment of psychotic disorders. Psychopharmacology. 2006; 187:229–236. pmid:16710714

[40] Rittmannsberger H, Pachinger T, Keppelmuller P, Wancata J. Medication adherence among psychotic patients before admission to inpatient treatment. Psychiatr Serv. 2004;55(2):174–179.

[41] Markowitz M, Karve S, Panish J, Candrilli SD, Alphs L Antipsychotic adherence patterns and health care utilization and costs among patients discharged after a schizophrenia-related hospitalization. BMC Psychiatry. 2013; 13:246. pmid:24094241

Original article

Prevalence and sociodemographic correlates of depressive symptoms among male expatriate workers in Saudi Arabia

Dr. Hyacinth O. Ukuhor

Received on: 12 /February /2020, Accepted on: 8 / May / 2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.008)

Correspondence author:

Hyacinth Ukuhor

Saudi Electronic University, Department of Public Health, P. O. Box 93499, Riyadh 11673, KSA.

Email: hyacoo2000@yahoo.com

Tel: +966112613500 ext. 3208

Abstract

Background & Aim:

Expatriate workers are frequently marginalized and vulnerable but we know little about their mental health. Depressive disorders have been shown to have significant effects on workforce productivity and the economic development of a country. Thus, this research aims at determining the prevalence and sociodemographic factors associated with depressive symptoms in expatriate workers in Saudi Arabia.

Methods:

A cross-sectional interview survey of 4575 male expatriate workers from 270 randomly selected businesses/companies was conducted. The predictor variables are sociodemographic and workplace characteristics. Trained interviewers employed the Composite International Diagnostic Interview (CIDI) instrument to determine the Diagnostic and Statistical Manual (DSM-IV) for depressive symptoms (outcome variable). The relationship between sociodemographic, workplace correlates and depressives symptoms was investigated using multivariate regression analysis

Results:

الملخص

الخلفية و الأهداف :

كثيرا ما يتعرض العمال الأجانب للتهميش والضعف ، لكننا لا نعرف سوى القليل عن صحتهم العقلية. ثبت أن الاضطرابات الاكتئابية لها تأثيرات كبيرة على إنتاجية القوى العاملة والتنمية الاقتصادية للبلد. وبالتالي ، يهدف هذا البحث إلى تحديد مدى انتشار العوامل الاجتماعية الديموغرافية المرتبطة بأعراض الاكتئاب لدى العمال الوافدين في المملكة العربية السعودية.

طريقة البحث

تم إجراء مسح مقابلة مقطعية مع ٤٥٧٥ عامل أجنبي من ٢٧٠ شركة / شركة تم اختيارها عشوائيًا. المتغيرات التنبؤية هي الخصائص الاجتماعية والديموغرافية وخصائص مكان العمل. استخدم المقابلات المدربون أداة المقابلة التشخيصية الدولية المركبة (CIDI) لتحديد الدليل التشخيصي والإحصائي (DSM-IV) لأعراض الاكتئاب (متغير النتيجة). تم دراسة العلاقة بين الأعراض الاجتماعية والديموغرافية ، وأسباب الارتباط والاكتئاب ، باستخدام تحليل الانحدار متعدد المتغيرات.

النتائج :

بلغ معدل انتشار أعراض الاكتئاب ١٩,٧٪. تشمل عوامل خطر أعراض الاكتئاب العرق
(الفلبينيون (نسبة الأرجحية المعدلة - AOR = ١,٥١٠ (١,٠٥٤-٢,١٦٢) واليمنيين (AOR = ٢,٠١٠ (١,٤٥٥-٢,٧٧٦)) ، كبار

The depressive symptoms prevalence was 19.7%. Risk factors for depressive symptoms include ethnicity (Filipinos (adjusted odds ratio – AOR=1.510 (1.054-2.162) and Yemenis (AOR=2.010 (1.455-2.776)), older age ≥50 years (AOR = 2.648 (1.861-3.768)), diploma or university qualifications (AOR = 2.144 (1.602-2.870)), income >6000SAR (AOR = 2.024 (1.318-3.107)), poor physical health (AOR =1.709 (1.137-2.569)) and emotional health (AOR = 9.130 (5.664-14.716)).

Conclusions:

The prevalence of depressive symptoms is high among expatriates. The findings provide new understanding of the impact of the identified sociodemographic correlates on the occurrence of high levels of depressive symptoms such as ethnic differences are associated with greater depressive symptoms risk. These results suggest there may be a benefit in screening for depressive disorders, provision of ethnically bespoke, and adapted clinical interventions and workplace prevention programs to ensure equal quality care.

Keywords:

Depressive symptoms; Expatriate workers; Workplace; Sociodemographic; Prevalence

السن ≥٥٠ سنة (AOR = ٢,٦٤٨ (١,٨٦١-٣,٧٦٨)) ، دبلوم أو مؤهلات جامعية (AOR = ٢,١٤٤ (١,٦٠٢-٢,٨٧٠)) ، الدخل< ٦٠٠٠ ريال سعودي (AOR = ٢,٠٢٤ (١,٣١٨-٣,١٠٧)) ، سوء الصحة البدنية (AOR = ١,٧٠٩ (١,١٣٧-٢,٥٦٩)) والصحة العاطفية (AOR = ٩,١٣٠ (٥,٦٦٤-١٤,٧١٦)).

الخلاصة :

انتشار أعراض الاكتئاب مرتفع بين المغتربين. توفر النتائج فهمًا جديدًا لتأثير الارتباطات الاجتماعية والديموغرافية المحددة على حدوث مستويات عالية من أعراض الاكتئاب مثل الاختلافات العرقية المرتبطة بزيادة خطر الاكتئاب. تشير هذه النتائج إلى أنه قد تكون هناك فائدة في الكشف عن اضطرابات الاكتئاب ، وتوفير مفصل عرقيا ، والتدخلات السريرية المتكيفة وبرامج الوقاية في مكان العمل لضمان رعاية ذات جودة متساوية

INTRODUCTION

A recent World Health Organization report[1] describes depression as the most common mental illness, predominant cause of disability, a leading contributor to the global burden of disease with approximately 300 million people affected globally and contributes to 800000 suicides annually. Mental disorders are common in the Eastern Mediterranean Region (EMR) [2, 3]. Large-scale community surveys conducted in the region suggest rates of psychological distress between 15•6% and 35•5%, with higher rates in countries with complex emergencies. The prevalence of depression among expatriates in the United Arab Emirates and Bahrain varied from

13% to 25% [4, 5], and in Saudi Arabia, depression prevalence of 20% has been reported among expatriate workers [6].

Depression has significant effects on workforce productivity, society, and relationships which consequently impact organizational effectiveness and economic development of a country [7]. When expatriate workers arrive in the destination country, they are often healthier than similar indigenous populations. The reason is that of positive self-selection at the time of immigration and the positive selection, screening, and discrimination applied by the host countries [8]. However, the advantage of the healthy migrant effect may deteriorate over time due to negative aspects of the process by which expatriates change their attitudes, values, and behaviors as they are exposed to their host culture [9, 10]. Besides, a combination of personal transitions, distortion of psychosocial contexts, family, social systems, language, and financial constraints may give rise to anxiety and depression in this group [5, 7]. Crucially, expatriates tend to have low uptake of essential health insurance coverage, engage in an occupation that natives are reluctant to take up and labor long hours in energy-demanding industries [11, 12]. Consequently, expatriates are frequently viewed as marginalized and vulnerable, making them susceptible to depressive disorders [10, 13]. Research provides a strong argument for greater investment in mental health services in countries of all income levels. It suggests a fourfold increase in economic production and health outcomes for every United States Dollar (US$1) invested in scaling up treatment for depression and anxiety [14]. Interestingly, this finding is important in the context of the Kingdom of Saudi Arabia (KSA) given the goal of increased economic production outlined in Vision 2030 [15]. KSA has been largely dependent on migrant labor since the oil boom to the extent that one-third of its current population consists of expatriate workers [16]. Indeed, suicide is more common among expatriate workers compared to Saudi nationals and expatriates experience a greater risk of psychosis during hospital admissions [17]. We know little about the effect of sociodemographic and work-related factors on the risk of depression in the expatriate population in Saudi Arabia. The only available research involved interview surveys of immigrant workers in one company in Al-Qassim, Saudi Arabia [6]. The authors reported that perceived life stress and general health conditions were strong correlates of depression and expatriates aged ≥51 years were less likely to be depressed. However, the study focused only on the basic psychosocial correlates of depression in a small-scale sample of expatriates. The

detailed workplace and sociodemographic correlates such as age, income, ethnicity, and how these factors are independently associated with depressive symptoms have not been fully investigated in a large nationally representative sample. This study aims to extend existing work using data from a large scale cross-sectional study. A comprehensive understanding of the risk factors for depressive symptoms in this underserved group could provide an empiric basis for targeted workplace preventative mental health interventions. Therefore, the objectives of this study included

(1) to investigate the prevalence of depressive symptoms (2) to determine the sociodemographic and workplace correlates of depressive symptoms in a representative sample of expatriate workers.

MATERIALS AND METHODS

Respondents

This study reports on the aspect of the survey that investigated the prevalence, sociodemographic, and workplace correlates of depressive symptoms. The study used an approach that includes face-to-face interviews with a representative survey sampling to collect cross-sectional data from expatriate workers in Riyadh. Riyadh was chosen because most businesses/industries in Saudi Arabia have their main offices there. The surveys employed a multistage stratified cluster sampling method to collect self-reported sociodemographic and health-related information from expatriate workers in 102 495 companies randomly selected businesses/industries. The sample size of respondents required in the study was 4629. This study methods and sample size calculation have been described in detail elsewhere [18, 19]. The managers or relevant departments in the selected industry sectors provided the staff list from which respondents were randomly selected. The inclusion criteria are respondents must be 18 years and over and be non-Saudi nationals. Ten interviewers were employed in the study to administer the survey to respondents. The interviewers were trained during a full-time week and coached at regular meetings during the period of data collection on interview techniques, skills on how to advertise the importance of the survey, and educating respondents. The training ensured the interview process was the same for all respondents. To test and refine the questionnaire and procedure, a pilot study was conducted with a sample of 150 expatriate workers. Respondents selected in this study were informed they could withdraw from the study at any time without it affecting their employment or access to healthcare. Respondents who agreed to take part in the study were re-

quested to sign a consent form. The Institutional Review Board of King Abdullah International Medical Research Centre approved this study.

Measures

Demographic and workplace characteristics

The validated MEP questionnaire [20] was used to investigate the socio-economic, psychosocial, demographic, and workplace characteristics of respondents. They included ethnicity, first language, level of education, age, income, married or not married, duration of stay, occupation type, industry group, health insurance status, self-reported emotional and physical health statuses. To determine physical and emotional health statuses, respondents were provided with five options (excellent, very good, good, fair, and poor) to rate their physical and emotional health. The options were combined into two categories (good and poor) for the analyses.

Depressive symptoms

Depressive symptoms was the dependent variable and was estimated using the WHO Composite International Diagnostic Interview (CIDI). The CIDI is a validated and standardized diagnostic tool designed for the assessment of mental disorders by trained lay interviewers. The instrument is widely used to investigate the prevalence of mental disorders worldwide. The CIDI instrument [21] applicable to depressive disorders was used to determine DSM-IV symptoms criteria for major depressive disorder and episodes [22] using the full range of questions for the past 12 months. The DSM-IV categories for major depressive disorder and episodes are;

(1) no depression (2) depressive episode but did not meet criteria for major depressive disorder (MDD) and (3) met criteria for major depressive disorder. The categories were collapsed into two main outcomes (1. No, depressive symptoms, and 2. Yes, had depressive symptoms), Therefore, depressive symptoms in this study sample is described as expatriate workers who met the criteria for depressive episode and/or major depressive disorder [19, 23, 24].

Statistical analysis

The data were analyzed using descriptive statistics and logistic regressions. The software used to perform the analyses was the Statistical Package for the Social Sciences Windows Version 24.0. The prevalence rates were calculated for the study sample. The association between depressive symptoms and sociodemographic and workplace characteristics was investigated using the backward stepwise method in logistic regression analysis. All statistical analyses were two-sided and $p < 0.05$ was considered significant. Odds ratios and 95% confidence intervals (CIs) were calculated for

each variable.

RESULTS

In this study, the majority of the respondents completed the questionnaires (n=4575) resulting in a high response rate of 98.83%. Table 1, shows the frequency of the sociodemographic, and workplace characteristics of the study respondents. The highest population of respondents were from Bangladesh (25.3%), the majority were Arabic speakers (32.4%), manual workers (45.1%), earned income of 2000SAR or less per month (67.4%), between the ages of 30 and 49 years (69.4%), more than 5 years duration of stay (33.16%) and married but with family living outside Saudi Arabia (65.2%). The depressive symptoms prevalence among the sample was 19.7%. Table 2, indicates the highest prevalence of depressive symptoms was among expatriates workers from Yemen (26.86%), followed by Filipinos (22.18%), Indians (18.34%) and Pakistani (17.41%). The lowest prevalence was among the Bangladeshis (11.80%). For the age groups, the highest prevalence of depressive symptoms was reported in the age group ≥ 50, followed by the 30-49 age group (16.1%) and less than 30 years (15.6%). Among arterial language, the highest prevalence was found in expatriates that spoke Arabic (22.4%). A higher prevalence of depressive symptoms was also reported by expatriates with a diploma or university education (23.3%), followed by those with secondary school education (12.6%), and expatriates who attended elementary school or preschool (11.7%). Respondents' with income > 6000 Saudi Arabian Riyal had a higher prevalence of depressive symptoms (28.9%) than those with an income of 2001-6000 (21.8%) and income of ≤ 2000 (13%). The highest prevalence of depressive symptoms was found among specialist/ professional occupation and unskilled workers had the lowest prevalence. Table 2 shows the sociodemographic and workplace correlates of depressive symptoms in the univariate analysis.

Table 3 shows the multivariate logistic regression for depressive symptoms after the elimination of independent variables that were not statistically significant. Depressive symptoms were associated with reported ethnicity; Filipinos had 1.5 times and Yemenis 2.0 times greater odds of having depressive symptoms compared to Indians. Respondents in the age group ≥ 50 years were 2.7 times more likely to have depressive symptoms compared to the age group less than 30 years. Expatriate workers with a diploma or university degree had 2.1 times greater odds of depressive symptoms than respondents with elemen-

tary school education or less. Respondents receiving 2001-6000 Saudi Riyal per month were 1.3 times more likely to have depressive symptoms compared to those on income less than 2000SR. However, the risk of depressive symptoms was twice that of respondents earning more than 6000 Saudi Arabian Riyal per month. Respondents with poor physical health status had 1.7 times greater odds of depressive symptoms compared to expatriates with good health. Expatriates with poor emotional health had 9.0 times greater odds of depressive symptoms compared to those with good emotional health.

Table 1. Sociodemographic, workplace and health characteristics of study respondents

Variable	Number of study respondents, Total n (%) 4575 (100%)
Ethnicity	
Indians	1100 (24.0%)
Bangladeshi	1159 (25.3%)
Pakistanis	498 (10.9%)
Egyptians	819 17.9%)
Filipinos	200 (4.4%)
Yemenis	234 (5.1%)
Others	565 (12.3%)
First Language	
Arabic	1480 (32.4%)
Bengali	1111 (24.3%)
Urdu	949 (20.7%)
Hindi	443 (9.7%)
Malayalam	171 (3.7%)
Tagalog	182 (4.0%)
Others	239 (5.2%)
Age category (Years)	
< 30	1014 (22.2%)
30 - 49	3176 (69.4%)
≥ 50	385 (8.4%)
Education	
Primary school or less.	1331 (29.1%)
Intermediate and secondary school completed.	1654 (36.1%)
Diploma or university degree	1590 (34.8%)
Income (monthly)	
≤ 2000S AR	3085 (67.4%)
2001 - 6000SR	1342 (29.3%)
> 6000	148 (3.2%)
Marital Status	
Single/Divorced.	842 (18.4%)
Married, family in KSA.	750 16.4%)
Married, family outside KSA	2983 (65.2%)
Duration of stay in KSA (years)	
<1	818 (17.9%)
1 - 5	2233 (48.8%)
> 5	524 (33.3%)
Occupation group	
Specialist/Professionals.	1189 (26.0%)
Manual workers.	2064 (45.1%)
Unskilled workers.	1322 (28.9%)

Variable	Number of study respondents, Total n (%) 4575 (100%)
Industry group	
Agriculture	115 (2.5%)
Mining	78 (1.7%)
Manufacturing	644 (14.1%)
Power, Utilities	100 (2.2%)
Construction	905 (19.8%)
Trade	1467 (32.1%)
Transportation	242 (5.3%)
Finance	184 (4.0%)
Education	692 (15.1%)
Others	148 (3.2%)

Variable	Number of study respondents, Total n (%) 4575 (100%)
Health Insurance Status	
Uninsured	1518 (33.2%)
Insured	3057 (66.8%)
Self-reported physical health	
Good	4424 (96.7%)
Poor	151 (3.3%)
Self-reported emotional health	
Good	4468 (97.7%)
Poor	107 (2.3%)

Table 2: Prevalence and logistic regression (univariate analysis) of respondents' characteristics with depressive symptoms

Variable	Depressive symptoms n (%)	Crude odds ratio (95% CI)	P-value
Ethnicity			<0.001
Indians	247 (18.34%)	1	
Bangladeshi	155 (11.80%)	0.513 (0.406-0.648)	
Pakistanis	105 (17.41%)	0.926 (0.703-1.220)	
Egyptians	139 (14.51%)	0.634 (0.492-0.817)	
Filipinos	57 (22.18%)	1.526 (1.064-2.189)	
Yemenis	86 (26.86%)	2.064 (1.492-2.855)	
Others	110 (16.30%)	0.918 (0.702-1.202)	
First Language			<0.001
Arabic	428 (22.43%)	1	
Urdu	167 (14.96%)	0.871 (0.681-1.114)	
Hindi	34 (7.13%)	0.379 (0.252-0.569)	
Malayalam	26 (13.2%)	0.629 (0.394-1.004)	
Bengali	182 (14.08%)	0.878 (0.674-1.143)	
Tagalog	42 (18.75%)	0.833 (0.562-1.233)	
Others	20 (7.72%)	0.299 (0.179-0.501	
Age category (Years)			0.001
< 30	188 (15.64%)	1	
30 - 49	608 (16.07%)	1.564 (1.222-2.002)	
≥ 50	103 (21.11%)	2.650 (1.855-3.785	

Education			<0.001
Elementary school or less.	177 (11.74%)	1	
High school completed.	239 (12.63%)	1.114 (0.886-1.400)	
Diploma or university degree	483 (23.30%)	2.113 (1.577-2.831)	
Income (monthly)			<0.001
≤ 2000SAR	462 (13.03%)	1	
2001 - 6000SR	374 (21.79%)	1.296 (1.032-1.627)	
> 6000	63 (29.86)	2.172 (1.407-3.354)	
Marital Status			<0.001
Single/Divorced.	206 (19.66%)	1	
Married, family in KSA.	224 (23%)	0.598 (0.438-0.816)	
Married, family outside KSA.	469 (13.59%)	0.539 (0.421-0.690)	
Duration of stay (years)			0.007
<1	176 (17.71%)	1	<0.001
1 - 5	463 (17.17%)	0.990 (0.787-1.247)	
> 5	260 (33.16%)	0.632 (0.486-0.823)	
Occupation group			<0.001
Specialist/Professionals.	349 (22.69%)	1	
Manual workers.	385 (15.72%)	1.222 (0.953-1.565)	
Unskilled workers.	165 (11.1%)	0.912 (0.674-1.233)	
Industry group			0.033
Agriculture	14 (10.85%)	1	
Mining	15 (16.13%)	1.565 (0.679-3.608)	
Manufacturing	112 (14.82%)	1.231 (0.653-2.321)	
Power, Utilities	17 (14.53%)	1.233 (0.545-2.789)	
Construction	169 (15.74%)	1.320 (0.712-2.448)	
Trade	311 (17.49%)	1.546 (0.840-2.846)	
Transportation	49 (16.84%)	1.604 (0.811-3.173)	
Finance	30 (14.02%)	1.224 (0.592-2.532)	
Education	160 (18.78%)	1.648 (0.886-3.068)	
Others	22 (12.94%)	0.964 (0.447-2.079)	
Health Insurance Status			0.055
Uninsured	274 (15.29%)	1	
Insured	625 (16.97%)	1.665 (1.105-2.506)	
Self-reported emotional health			<0.001
Good	821 (15.52%)	1	
Poor	78 (42.16%)	9.320 (5.774-15.043)	
Self-reported emotional health			<0.001
Good	821 (15.52%)	1	
Poor	78 (42.16%)	9.320(5.774-15.043)	

Table 3. Multivariate association of respondents' characteristics with depressive symptoms

Variables	Adjusted OR	95% C.I
Filippinos	1.510	1.054-2.162
Yemenis	2.010	1.455-2.776
Age 30-49	1.558	1.219-1.991
Age ≥50	2.648	1.861-3.768
Had diploma or university degree	2.144	1.602-2.870
Earned 2001 – 6000 SAR per month	1.272	1.014-1.595
Earned > 6000 SAR per month	2.024	1.318-3.107
Had poor physical health	1.709	1.137-2.569
Had poor emotional health	9.130	5.664-14.716

OR: Odds Ratio
C.I: Confidence Interval; SAR: Saudi Riyal

DISCUSSION

This is the first study on the association between workplace and sociodemographic factors with depressive symptoms from a nationally representative sample of male expatriate workers in Saudi Arabia. The response rate was 98.83%, which is quite high. The prevalence of DSM-IV depressive symptoms in this group was 19.7%, which is higher than the 5.9% prevalence of MDD reported in the general KSA population [25]. However, the religious, legal, and cultural contexts of Saudi Arabia could result in underreporting and underestimation of the burden of depressive disorders among the population [26]. The difference could also be attributable to the different methodologies used in the studies and Saudi nationals have access to free comprehensive healthcare compared to expatriate workers [27]. Interestingly, the prevalence of depressive symptoms among the respondents was lower but comparable to the 20% prevalence recently reported by Nadim, AlOtaibi [6], and the prevalence reported among expatriates in the neighboring countries of United Arab Emirate and Bahrain (13% - 25%) [4-6].

This study found a higher prevalence and greater odds of depressive symptoms among Yemenis and Filipinos which persisted after controlling for several factors. The reasons for this are unclear. The ethnic differences may be due to differences in depressive symptoms reporting due to

cultural factors or true differences in depressive symptoms burden across ethnic groups. However, this finding is particularly important because existing work that investigated ethnic differences in the prevalence rates of depressive disorders among immigrants have found opposing evidence. Previous research that investigated the prevalence of major depressive disorder among various ethnic groups found rates that were much higher in Turkish migrants, comparable in Moroccan migrants, and lower in Surinamese migrants when compared to the Native Dutch [13, 28]. Other research conducted in the United States reported that Asians, Hispanic and black migrants had lower rates of MDD than native-born Americans [13, 29]. These findings are, therefore, inconclusive and suggest more studies are required. Importantly, this study finding provides the first evidence on the positive correlation between ethnicity and increased risk of depressive disorders in expatriate workers. The implication is that since the majority of depressive disorders can be effectively treated [1], this represents an important clinical observation. It also suggests a gap in national health policy that could be strengthened by measures such as regular or periodic screening and monitoring of depressive symptoms among expatriate workers.

This study found that the risk of depressive symptoms increases with age. This finding is similar to previous studies [30, 31] but inconsistent with the study conducted in Saudi Arabia [6] which could be a result of the different methodologies employed. Respondents with higher qualifications (diploma/university education) have greater odds of depressive symptoms. This was an interesting finding because lower educational levels are commonly associated with depression [32, 33]. However, in Saudi Arabia, it is not uncommon to find expatriates with higher educational qualifications employed in lower-level jobs [27]. Although one cannot rule out confounding factors, a plausible explanation could be highly qualified expatriates working in lower-level jobs suffer low self-esteem or confidence and in combination with poor working conditions increase the probability of developing depressive symptoms.

The probability of depressive symptoms was significantly increased for respondents with an income of more than 6000SAR. This was a unique finding because low income is a well-known correlate of depression [4, 13, 34]. There is no clear explanation for this unexpected finding but a possible reason could be that higher-earning expatriates encounter greater amounts of stress due to increased exposure to work demands, long working hours, and extensive travels, which may negatively affect their

mental health. Further studies are required to investigate the relationship between socioeconomic factors and the risk of depressive symptoms and how this association varies among expatriate workers.

This study found higher odds of depressive symptoms among expatriates reporting poor self-rated physical and emotional health. Again this is similar to previous evidence which found an increased risk of depression or major depressive episode associated with poorer self-reported physical and emotional health [35].

Given that depressive symptoms are associated with complications such as suicide, enormous financial and social burdens on workers, employers, and society (14), there is an urgent need for employers and policymakers to make available culturally appropriate and ethnically tailored mental health interventions freely accessible to expatriate workers. This will increase economic production and enable the kingdom of Saudi Arabia to meet the goals of vision 2030. Moreover, lacking freely accessible mental health care could result in underestimating the burden of depressive disorders in the expatriate population. This study supports the argument that the workplace [36] may be the logical setting to implement culturally appropriate and ethnically tailored mental health preventive interventions for expatriate workers. Yet the stigma associated with workplace mental health screening and other prevention programs could pose a challenge [37-39]. Embedding depression prevention interventions into less stigmatizing programs such as stress management and other wellness programs could lead to more successful outcomes. Also, employing internet-based depression prevention programs that are ethnically tailored and could be accessed anonymously may be successful in reducing the stigma associated with participating in prevention interventions.

I believe that this is the first study to find evidence of the identified risk factors associated with a higher risk of occurrence of depressive symptoms among expatriate workers in Saudi Arabia. This research, however, has limitations. The bidirectional nature of the study design made it impossible to conclude cause and effect. Also, this study focused on the male expatriate population due to female workplace segregation [40] limiting transferability to the general population. Lastly, respondents may have underreported depressive symptoms out of fear of stigmatization and losing their jobs. However, the comparable prevalence with the study conducted among expatriates in Saudi Arabia makes underreporting unlikely. Lastly, this study only focused on major depressive disorder and episodes and did not account for other mood disor-

ders such as bipolar disorders, anxiety, and stress.

A key strength of the present study is the research sample was nationally representative of the expatriate population in Saudi Arabia.

CONCLUSIONS

This study found a high prevalence of depressive symptoms among expatriate workers. Ethnicity, older age groups, higher educational qualifications, income, poor physical, and emotional health are significant correlates. Periodic screening for depressive symptoms, ethnically bespoke, and adapted clinical interventions and effective workplace prevention programs targeting the identified possible risk factors are clearly needed. Employers and policymakers should be aware of these needs. Further research is needed to investigate if ethnic differences in significant depressive symptoms are in part because of health and workplace factors that are linked to socioeconomic status.

Conflict of interest:

None to declare

Acknowledgment:

The author wishes to thank Dr. Abdulwahab Alkhamis for his kindness and wonderful support.

REFERENCES

[1] WHO. Depression. World Health Organisation. 2018 [cited 2018 13/10]. Available from: http://www.who.int/news-room/fact-sheets/detail/depression.

[2] WHO. Strategy for mental health and substance abuse in the Eastern Mediterranean Region 2012–2016. World Health Organization 2011 [cited 2018 25/10]. Available from: http://www.emro.who.int/mental-health/strategy/.

[3] Mokdad AH, Forouzanfar MH, Daoud F, Mokdad AA, El Bcheraoui C, Moradi-Lakeh M, et al. Global burden of diseases, injuries, and risk factors for young people's health during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. The Lancet.387(10036):2383-401.

[4] Al-Maskari F, Shah S, Al-Sharhan R, Al-Haj E, Al-Kaabi K, Khonji D, et al. Prevalence of depression and suicidal behaviors among male migrant workers in United Arab Emirates. Journal of Immigrant and Minority Health. 2011;13(6):1027.

[5] Sarwani SAAL, Abdulla KB, Mandeel MAJ. Prevalence of Stress, Anxiety and Depression among Expatriate Workers. Bahrain Medical Bulletin. 2013;35(3):126-9.

[6] Nadim W, AlOtaibi A, Al-Mohaimeed A, Ewid M, Sarhandi M, Saquib J, et al. Depression among migrant workers in Al-Qassim, Saudi Arabia. Journal of Affective Disorders. 2016;206:103-8.

[7] Qiu P, Caine E, Yang Y, Chen Q, Li J, Ma X. Depression and associated factors in internal migrant workers in China. Journal of affective disorders. 2011;134(1):198-207.

[8] Constant AF, Garcia-Munoz T, Neuman S, Neuman T. A "healthy immigrant effect" or a "sick immigrant effect"? Selection and policies matter. The European journal of health economics : HEPAC : health economics in prevention and care. 2018;19(1):103-21.

[9] Lu Y, Hu P, Treiman DJ. Migration and depressive symptoms in migrant-sending areas: findings from the survey of internal migration and health in China. International journal of public health. 2012;57(4):691-8.

[10] Mou J, Cheng J, Griffiths SM, Wong S, Hillier S, Zhang D. Internal migration and depressive symptoms among migrant factory workers in Shenzhen, China. Journal of Community Psychology. 2011;39(2):212-30.

[11] Lau JT, Cheng Y, Gu J, Zhou R, Yu C, Holroyd E, et al. Suicides in a mega-size factory in China: poor mental health among young migrant workers in China. Occup Environ Med. 2012;69(7):526-.

[12] Wong K, Fu D, Li CY, Song HX. Rural migrant workers in urban China: living a marginalised life. International Journal of Social Welfare. 2007;16(1):32-40.

[13] Zhong B-L, Liu T-B, Chan SS, Jin D, Hu C-Y, Dai J, et al. Prevalence and correlates of major depressive disorder among rural-to-urban migrant workers in Shenzhen, China. Journal of affective disorders. 2015;183:1-9.

[14] Chisholm D, Sweeny K, Sheehan P, Rasmussen B, Smit F, Cuijpers P, et al. Scaling-up treatment of depression and anxiety: a global return on investment analysis. The lancet Psychiatry. 2016;3(5):415-24.

[15] COED. The Council of Economic and Development Affairs. Saudi Arabia's

Vision 2030 2016 [Available from: http://vision2030.gov.sa/en.

[16] GASTAT. General Authority for Statistics, Kingdom of Saudi Arabia. Statistical yearbook of 2015 2015 [Available from: http://www.stats.gov.sa/en/4515.

[17] Al Madni OM, Kharoshah MAA, Zaki MK, Ghaleb SS. Hanging deaths in Dammam, Kingdom of Saudi Arabia. Journal of forensic and legal medicine. 2010;17(5):265-8.

[18] Ukuhor HO, Abdulwahab AA. Prevalence and workplace correlates of tobacco smoking among male expatriate workers in Riyadh, Saudi Arabia. Eastern Mediterranean Health Journal. 2018;24(12):1155-64.

[19] Ukuhor HO, Alkhami AA. The Relationship Of Tobacco Smoking To Depressive Symptoms Among Male Expatriate Workers In Saudi Arabia: A Cross-Sectional Study. Majmaah Journal of Health Sciences. 2019;7(1):39-51.

[20] AHRQ. MEPS-HC questionnaire 2009 [Available from: http://www.meps.ahrq.gov/mepsweb/survey_comp/survey.jsp.

[21] WHO. The World Mental Health Composite International Diagnostic Interview (WMH-CIDI). World Health Organization. 2004.

[22] PSN. Diagnostic Criteria for Major Depressive Disorder and Depressive Episodes 2010 [cited 2018 16/09]. Available from: https://www.psnpaloalto.com/wp/wp-content/uploads/2010/12/Depression-Diagnostic-Criteria-and-Severity-Rating.pdf.

[23] Munafò MR, Araya R. Cigarette smoking and depression: a question of causation. The British Journal of Psychiatry.2010;196(6):425-6.

[24] Boden JM, Fergusson DM, Horwood LJ. Cigarette smoking and depression: tests of causal linkages using a longitudinal birth cohort. The British Journal of Psychiatry. 2010;196(6):440-6.

[25] Ferrari AJ, Charlson FJ, Norman RE, Patten SB, Freedman G, Murray CJL, et al. Burden of Depressive Disorders by Country, Sex, Age, and Year: Findings from the Global Burden of Disease Study 2010. PLoS Medicine. 2013;10(11):e1001547.

[26] Weatherhead S, Daiches A. Muslim views on mental health and psychotherapy.

Psychology and Psychotherapy: Theory, Research and Practice. 2010;83(1):75-89.

[27] Alkhamis A, Cosgrove P, Mohamed G, Hassan A. The personal and workplace characteristics of uninsured expatriate males in Saudi Arabia. BMC Health Services Research. 2017;17(1):56.

[28] Schrier AC, de Wit MA, Rijmen F, Tuinebreijer WC, Verhoeff AP, Kupka RW, et al. Similarity in depressive symptom profile in a population-based study of migrants in the Netherlands. Social Psychiatry and Psychiatric Epidemiology. 2010;45(10):941-51.

[29] Hasin DS, Goodwin RD, Stinson FS, Grant BF. Epidemiology of major depressive disorder: results from the National Epidemiologic Survey on Alcoholism and Related Conditions. Archives of general psychiatry. 2005;62(10):1097-106.

[30] Ma X, Xiang Y-T, Cai Z-J, Li S-R, Xiang Y-Q, Guo H-L, et al. Prevalence and socio-demographic correlates of major depressive episode in rural and urban areas of Beijing, China. Journal of affective disorders. 2009;115(3):323-30.

[31] Liu J, Yan F, Ma X, Guo H-L, Tang Y-L, Rakofsky JJ, et al. Prevalence of major depressive disorder and socio-demographic correlates: Results of a representative household epidemiological survey in Beijing, China. Journal of affective disorders. 2015;179:74-81.

[32] Lorant V, Deliège D, Eaton W, Robert A, Philippot P, Ansseau M. Socioeconomic inequalities in depression: a meta-analysis. Oxford Univ Press; 2003.

[33] Netterstrøm B, Conrad N, Bech P, Fink P, Olsen O, Rugulies R, et al. The Relation between Work-related Psychosocial Factors and the Development of Depression. Epidemiologic Reviews. 2008;30(1):118-32.

[34] Dua JK. Job Stressors and Their Effects on Physical Health, Emotional Health and Job Satisfaction in a University. Journal of Educational Administration. 1994;32(1):59-78.

[35] Chiu M, Amartey A, Wang X, Kurdyak P. Ethnic differences in mental health status and service utilization: a population-based study in Ontario, Canada. The Canadian Journal of Psychiatry. 2018;63(7):481-91.

[36] Joyce S, Modini M, Christensen H, Mykletun A, Bryant R, Mitchell PB, et al. Workplace interventions for common

mental disorders: a systematic meta-review. Psychological medicine. 2016;46(4):683-97.

[37] Hanisch SE, Twomey CD, Szeto ACH, Birner UW, Nowak D, Sabariego C. The effectiveness of interventions targeting the stigma of mental illness at the workplace: a systematic review. BMC psychiatry. 2016;16:1-.

[38] Cook R, Schlenger W. Prevention of substance abuse in the workplace: Review of research on the delivery of services. The Journal of Primary Prevention. 2002;23(1):115-42.

[39] Billings DW, Cook RF, Hendrickson A, Dove DC. A web-based approach to managing stress and mood disorders in the workforce. Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine. 2008;50(8):960.

[40] Alswaidi F, Memish Z, Al-Hakeem R, Atlam S. Saudi Arabian expatriate worker fitness-screening programme: a review of 14 years of data. Eastern Mediterranean Health Journal. 2013;19(7).

Original article

Evaluation of Ferritin Levels in Saudi Female Patients with Type 2 Diabetes

Wala Mohammed Saeed[1], Lobnah Saber[1]

1. Department of Medical Laboratory Technology , Faculty of Applied Medical Science, Taibah University, Al Madinah, Saudi Arabia.

Received on: jan-29-2020 , Accepted on: may-09-2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.009)

Correspondence author:
Wala Mohammed Saeed
Department of Medical Laboratory Technology , Faculty of Applied Medical Science,
Taibah University, Al Madinah, Saudi Arabia.
E_mail:wmohammedsaeed@taibahu.edu.sa

Abstract

Background and Aims:
The main aim of the present work was to establish the relationship between ferritin level (FERR) and glucose status in diabetic Saudi females and to validate serum FERR as a marker of insulin resistance (IR).

Materials and Methods:
case- control study was done on 180 subjects including 100 female patients with type 2 diabetes and 80 healthy female (control) of the same age were enrolled. Fasting blood samples were procured to measure concentrations of FERR by an electrochemiluminescence immunoassay using the Cobas e 411 immunoassay analyzer. Fasting serum glucose, glycated hemoglobin, lipid profile, kidney function tests and minerals were automatically measured by Siemens Dimension X P and auto analyzer. The association of FERR with parameters of adiposity, glucose tolerance, and lipid profile was examined.

Results:
In the present study, unpaired student's t test detect-

الملخص

الخلفية والهدف :
أشارت بعض الدراسات الحديثة إلى أن زيادة مخزون الحديد (الفرتنين) في الجسم يلعب دور هام في تنظيم الجلوكوز في مرضى داء السكري من النوع الثاني. ولقد أجرينا دراسة مستعرضة لتحقق و إثبات العلاقة بين مستوى الفيريتين و داء السكري من النوع الثاني .و التأكد من ان ارتفاع مخزون الحديد (الفرتينين) في الجسم يؤدي الى ارتفاع خطر الاصابة بإمراض القلب لدى مرضى السكري من النمط الثاني .

طريقة البحث :
قد شمل البحث على ١٨٠ عينة ، منها ١٠٠ إناث مصابات بداء السكري من النوع الثاني و ٨٠ شخصا سليمين كمجموعة ضابطة. تم جمع العينات لقياس تركيز كلاً من الفيريتين بجهاز (Cobas e٤١١) و الجلوكوز و الهيموجلوبين و الدهون و وظائف الكلى بشكل آلي بواسطة جهاز (Siemens Dimension XP) ، و كذلك تم فحص علاقة الفيريتين مع الجلوكوز والدهون و ارتفاع خطر الاصابة بإمراض القلب و الاوعية الدموية .(AIP)

النتائج :
أظهرت النتائج (باستخدام T-test) على أن هنالك اختلاف في مستوى الفيريتين بين الإناث المصابات بداء السكري من النوع الثاني و الإناث السليمات في المجموعة الضابطة . (p< ٠،٠٥) ولوحظ

ed significant increase in the FERR levels in diabetic female patients compared to the control ($p< 0.05$). A noteworthy positive correlation of FERR with IR ($r=0.632$) and fasting insulin levels ($r=0.497$) was observed in female patients. Furthermore, the Atherogenic Index of Plasma (AIP=Log TG/HDL) conjectured cardiovascular risk showing that 65% of these patients with diabetes had increased risk while only 20% had intermediary risk. The AIP predicts that the cardiovascular risk showed statistically significant correlation with FERR levels and hyperglycemia.

Conclusion:

High serum FERR level was associated with impaired glucose metabolism and increased cardiovascular risk in type 2 diabetes female patients.

Keywords:

Cardiovascular Risk, Metabolic Syndrome, Type 2 Diabetes Mellitus, Serum Ferritin

وجود ارتباط إيجابي بين الفرتينين و معامل مقاومة الانسلوين ((IR r) = ٠,٦٣٢) و ايضا مع مستوى الأنسولين (r = ٠,٤٩٧) في المرضى الإناث . (p< ٠,٠٥) و مؤشر تصلب الشرايين من البلازما (AIP=Log TG/HDL) ينبأ باحتمال ظهور مخاطر أمراض القلب والأوعية الدموية بنسبة ٦٥٪ للخطر العالي و نسبة ٢٠٪ للخطر المتوسط لمرضى الإناث. مؤشر تصلب الشرايين في البلازما ينبأ بظهور مخاطر أمراض القلب و الأوعية الدموية مرتبطاً بدلالة احصائية مع ارتفاع مستوى الجلوكوز وارتفاع الفرتينين في الدم .

الخلاصة :

إن ارتفاع مستوى الفيريتين مرتبطاً مع ارتفاع مستوى الجلوكوز و ارتفاع مقاومة الانسلوين وزيادة خطر الإصابة بأمراض القلب والأوعية الدموية في مرضى السكري من النوع الثاني.

Introduction

The term diabetes mellitus (DM) describes a group of abnormal carbohydrate metabolic disorders that lead to hyperglycemia. Individual metabolic lesions in diabetics lead to their relative or absolute weakness in insulin secretion and/or varying degrees of peripheral resistance to insulin actions [1, 2]. According to American Diabetes Association (2010) about 85-95% of all diabetics have a latent, asymptomatic period of subclinical stages that often remain undiagnosed for several years. Signs and symptoms of diabetes are ignored by many because of the chronic development of the disease [3, 4]. People do not consider this a serious problem because unlike many other diseases, the symptoms of hyperglycemia do not appear immediately. People do not realize that damage may begin several years before symptoms are observed. This is unfortunate because identifying early symptoms can help control the disease immediately and prevent vascular complications. The dramatic increase in diabetes is a major health concern in communities of both developing and developed nations. Unregulated blood glucose levels in this metabolic and endocrine disorder can lead

to many debilitating conditions such as nephropathy, neuropathy, retinopathy, cardiovascular disease, stroke and amputation[5].

Iron prevents tissue damage from free radicals by binding to proteins, and the iron cellular state regulates the iron storage protein, FERR at the post-transcription level. In an individual's health, serum FERR is associated with iron storage; High levels of FERR can exist in acute or chronic inflammation. In T2DM, high FERR levels have been reported which may be due to the underlying inflammatory state [6, 7]. Current studies have shown that shortage in the body's iron supplies have been related to the onset of glucose intolerance, T2 DM, and metabolic disorders. It has also been linked to the progression of diabetes related retinopathy, nephropathy and vascular diseases [6, 7]. High levels of iron can induce diabetes through various mechanisms like oxidation of beta-pancreatic cells, weak extraction of insulin by the liver, and hindrance in the ability of insulin to inhibit glucose production by the liver [8, 9]. FERR serum can be used in healthy people as a sign of iron overload but does not give a reliable result for obese patients with diabetes [10]. The synthesis of FERR is stimulated by insulin which increases iron absorption. FERR is also considered a sign of pancreatitis. Its level is 2.5 times higher in T2DM patients without any evidence of iron overload [11-13]. A high level of FERR can disturb the glucose balance causing IR and inflammation with a high level of reactive protein [11-13]. Excess iron production produced a high level of serum FERR; IR may increase in females with T2DM but not in males [11-13]. High FERR level in deformed glucose metabolism is associated with increased fasting blood glucose, blood pressure, triglycerides, and hemoglobin A1C and assessment of the equilibrium model - insulin resistance (HOMA-IR) [12].

There is a strong connection between clinically linked FERR and the development of diabetes. The diabetic risk increased seven-fold in the clinically excited FERR groups. This striking association is potentially important in understanding the T2DM [12, 13]. Serum FERR can be considered as one of the routine biomarkers for diabetics, and measures should be taken to reduce iron load in diabetics to improve glycemic control and prevent the development of cardiovascular disease (CVD) because increased iron storage causes organ damage [14].

Objective of the stud: The main objective was to establish a relation between FERR levels and glucose status in diabetic females and validate serum FERR as a marker of insulin resistance (IR).

Materials and Methods

Study design and Subjects:

A case-control study was conducted in Al Madinah from January 2018 to January 2019 among adult females participants with type 2 diabetes and without aged between 20– 50 years.

This study was performed with a group of 100 patients with diabetes from Prince Abdul-Aziz Ben Maged Ben Abdul-Aziz diabetic center and different hospitals in Al Madinah, KSA. The control group consisted of 80 healthy female who had been referred to the laboratory center for routine checkup with no history of any medical disorder. Exclusions were made on the basis of complete blood count (CBC) showing iron deficiency or anaemia in patients above 65 years of age and/or with clinically significant simultaneously occurring conditions (like anaemia, CVD, acute infectious diseases or chronic inflammatory or debilitating diseases), and patients who smoke or are on medication (multivitamins and iron supplements). This study was approved by the Medical Ethics Committee of College of Applied Medical Sciences, Taibah University (CLS 201801). All participants signed the written informed consent.

Blood Sample Collection:

After obtaining written informed consent from all subjects, blood samples were (3 ml) collected in tubes containing heparin and EDTA by the lab technician at the Applied Medical Sciences collage at the main female campus of Taibah University and Prince Abdul-Aziz Ben Maged Ben Abdul-Aziz diabetic center – Al Madinah, KSA . The blood sample in the EDTA tubes was used for the estimation of glycated hemoglobin % (HbA1c %). The serum was separated from each sample by centrifuging at 3000 rpm for 5 min to estimate the lipid profile i.e. the concentration of Low-density lipoprotein cholesterol (LDL-c), High-density lipoprotein cholesterol (HDL), Triglycerides (TG) and total cholesterol. Also, fasting serum glucose was estimated immediately after the sample was collected. The collected serum was stored at -20oC until tested for FERR and Insulin hormone. All the assays were conducted using the automated Dimension XP machine and, Siemens Healthcare Diagnostics Ltd. (Frimley, Camberley, UK), with the help of kits as per the manufacturer's directions. The IR level was estimated using the homeostasis model assessment of insulin resistance (HOMA-IR) index [fasting insulin Uμ/mL x fasting glucose mg/dl /405]. The range considered healthy is lies between the values 0.5–1.4. The

values found less than 1.0 imply that the patient is insulin-sensitive and this is optimal. A value above 1.9 indicates early IR while above 2.9 indicates significant IR as described earlier.

Other Measurements

Each participant was physically examined for the measurement of height, weight and Body mass index (BMI) which is weight divided by square of the person's height (kg/m2). When high plasma triglycerides are present along with low HDL-concentrations the condition is defined as Atherogenic dyslipidemia. It was calculated as Atherogenic Index of Plasma = log (TG/HDL-C). An AIP value of less than 0.11 depicts low risk of CVD; the values between the range 0.11-0.21 is of intermediate risk while the values above 0.21 are associated with high risk CVD.

Statistical Analysis:

Statistical analysis was performed using Graph pad Prism 7 (GraphPad Software, CA, USA). Quantitative data was normally distributed and expressed as mean ± SD. Differences between groups were evaluated by Student's t-test and Two Away Anova test. Simple correlations were used to investigate the involvement among different parameters. $p<0.05$ indicated statistical significance. Calculation of Pearson correlation coefficients was performed to assess relationships between key variables.

Statement of ethics:

• The volunteers have given their written or verbal informed consent prior to the start of the study. They were assured that the information obtained will only be shared between the researchers and that they were free to withdraw from the study at any time without any pressure on them. Participants were identified by codes and never by their real names.

• The study protocol has been approved by the Faculty of Applied Medical Sciences' ethical committee on human research.

Results:

A total of 100 diabetic female patients with a range of age between 36-60 years against 80 healthy control females were investigated. The mean age of the patients with type-2 diabetes was 60±10.38 years while that of the control group was 40±7.54 years. The mean ± SD level for BMI in diabetics was 27.84 ±5.38 kg/m2 while for the control group it was 25.26±4.63kg/m2. The two groups differed in their body mass index (P=0.04) significantly. The haemoglobin A1clevels in patients with diabetes (8.95%±1.79) was significantly higher than those found in normal controls

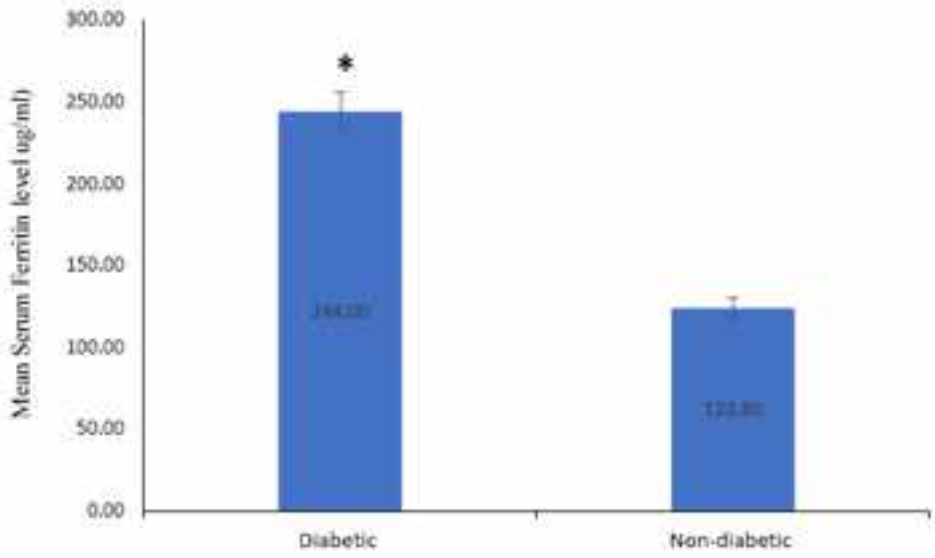
(5% ±0.49, P<0.001). The mean serum FERR in diabetics was also significantly higher than that found in the normal individuals (244.4±6.49 vs. 123.8±1.29 µg/ml, P<0.001, Figure 1). The results further show that the triglyceride (TG) concentration was higher in comparison to the control group, whereas, serum High-density lipoprotein (HDL) levels were significantly lower in type 2 patients with diabetes in comparison to non-diabetic healthy control group (p<0.001) (Table 1). The chief characteristics of the study population under consideration are presented in Table 1.

Table 1: Characteristics of the study population

Parameter	Non-diabetic N= 80	Diabetic N= 100	P- value
Age (years)	40.50±7.54	60.00±10.38	>0.05
Duration of diabetes (years)		11.2±9.7	
FBG (mmol/L)	5.2±0.49	11±4.21	<0.001**
HbA1c (%)	3.3±0.82	8.95±1.79	<0.001**
LDL-cholesterol (mmol/L)	3.59±1.10	2.45±1.23	0.03*
HDL-cholesterol (mmol/L)	1.67±0.46	0.8±0.23	0.09
Total cholesterol (mmol/L)	4.7±0.94	4.01±1.52	0.006*
Triglycerides (mmol/L)	0.88±0.49	2.01±1.41	0.002*
Weight (kg)	70.9±9.38	77±12.3	0.03*
Length (m)	1.66±0.09	1.66±0.09	0.070
Serum Ferritin µg/mL	123.8±1.29	244.40±83.49	<0.001**
BMI (kg/m2)	25.26±4.63	27.84±5.38	0.04**
Fasting insulin µ/Ml	5.8±1.45	11.77±3.03	0.03**
IR	1.36±0.32	5.065±2.52	0.02**
AIP	0.11±0.03	0.26±0.23	0.002**

The values represent the mean concentrations ± SD of biochemical parameters and general characteristics of patients and controls. BMI (body mass index), FBG (fasting serum glucose), HbA 1C (glycated hemoglobin), lipid profile (LDL-C (low-density lipoprotein cholesterol), HDLc (high-density lipoprotein cholesterol), total cholesterol and TG (triglyceride)), Serum Ferritin, Fasting Insulin, Insulin resistance (IR) and AIP (Atherogenic Index of Plasma) for control group and T2DM patients. *p<0.05, **p<0.01.

Fig. 1. Comparison between diabetic and normal cases regarding their ferritin



Statistical analysis indicated that there was no significant correlation between serum FERR and HbA1c (r= 0.15), BMI (r= 0.071) and FBS (r= 0.035) in patients with diabetes . However, a significant positive correlation of FERR was found with IR (r=0.632), and fasting insulin levels (r=0.497) in patients with diabetes (Table 2).

Table 2: Correlations of Serum Ferritin levels with other parameters

Correlations of Ferritin with	Pearson correlation coefficients (r)	P- value
FBG	0.035	**0.31**
HbA1c (%)	0.159	**0.22**
HDL	0.078	**0.34**
TG	0.027	**0.33**
CHOL	0.057	**0.21**
LDL	0.095	**0.31**
Fasting insulin	0.497	**0.03***
IR	0.632	**0.01***
BMI	0.071	**0.23**

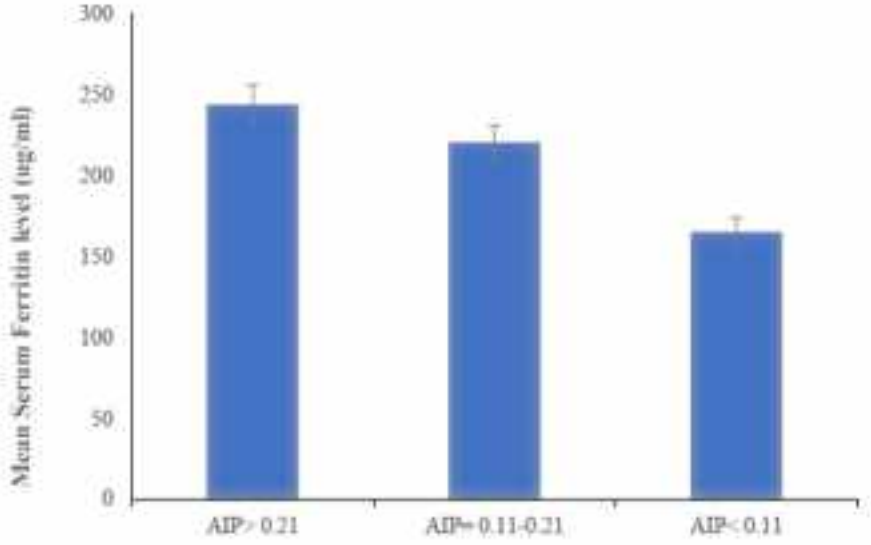
The values represent correlation between Serum Ferritin levels with different variables in diabetic female patients. *Correlation is significant at the 0.05 level (2-tailed)

Our results interesting showed that there was a positive correlation of IR with FBG (r=0.72), HbA1c (r=0.61), BMI (r=0.65) and Fasting Insulin levels (r=0.60, Table 3).

Table 3: Correlations of IR and Fasting Insulin levels with other parameters

	IR		Fasting insulin	
	r	P	R	p
FBG	0.720	0.02*	0.074	0.08
HbA1c (%)	0.619	0.04*	0.048	0.06
HDL	0.110	0.060	0.033	0.07
TG	0.092	0.076	0.126	0.08
CHOL	0.101	0.075	0.078	0.06
LDL	0.095	0.073	0.058	0.07
Fasting insulin	0.604	0.025*		
IR			0.604	0.02*
BMI	0.659	0.01*	0.546	0.01*
The values represent correlation between IR and Fasting insulin levels with different variables in diabetic female patients. *Correlation is significant at the 0.05 level (2-tailed)				

Fig. 2. The values represent the mean of serum ferritin levels in low, moderate, and high cardiovascular risk groups of diabetic patients; *P*= 0.03, n=100. 65% of diabetic patients had high risk and 20% had intermediate risk, whereas, 15% had low risk.



Atherogenic dyslipidemia or TG/HDL ratio increased significantly in patients with diabetes (p<001). Atherogenic Index of Plasma (AIP=Log TG/HDL) predicts cardiovascular risk. An AIP less than 0.11 denotes low risk while that between0.11 – 0.21denotes intermediate risk. An AIP greater than 0.21 denotes high cardiovascular risk. In the present study, 65% of the patients with diabetes had high risk while only 20% had intermediate risk (Figure 2). The Two Away Anova test detected a large difference between patients with low, moderate and high cardiovascular risk with respect to high levels of FERR (p= 0.03, Figure 2). Using the same test, significant differences were observed between patients with low, moderate and high cardiovascular risk with respect to the levels of FBG, HbA1C, IR, LDL, HDL, BMI and Cholesterol (Table 4). However, no significant differences were seen in the levels of TG (Table 4) in the three groups of patients with diabetes studied here.

Table 4: Represents the difference in the means between the three studied groups

Parameter	High risk (AIP>0.21) Mean ± SD, N=65, 65%	Intermediate risk (AIP= 0.11 – 0.21) Mean ± SD, N=20, 20%	Low risk (AIP<0.11) Mean ± SD, N= 15, 15%	P-value
FBG (mmol/L)	14.7 ±3.36	8.45 ±0.52	7.1 ±0.76	**0.04***
HbA1c (%)	9.6 ±1.47	7.9 ±0.27	6.8 ±0.36	**<0.001****
LDL-cholesterol (mmol/L)	3 ±0.98	1.8 ±0.11	0.9 ±0.36	**<0.001****
HDL-cholesterol (mmol/L)	1.8 ±0.07	1.5 ±0.09	1 ±0.08	**0.002***
Total cholesterol (mmol/L)	5.01±1.12	3.01 ± 0.30	2.01 ±0.48	**<0.001****
Triglycerides (mmol/L)	2.01 ±1.45	1.01 ±0.01	1 ±0.08	**0.06**
Serum Ferritin µg/mL	261.42 ±64.4	174.33 ±14.64	131.01 ±15.48	**0.03***
BMI (kg/m2)	31.23 ±3.93	24.9 ±0.75	21.04 ±1.84	**0.01***
IR (Insulin resistance)	6.64 ±2.15	3.97 ±0.33	2.69 ±0.43	**0.02***

The table shows the difference in the means between the three studied groups of diabetic patients (according to cardiovascular risk (AIP)) of diabetic patients using an ANOVA test: 15% of our patients with low risk (AIP<0.11), 20% of our patients with AIP intermediate risk (AIP= 0.11 – 0.21) and 65% of our patients with high risk (AIP>0.21), which displays statistically significant difference in serum Ferritin, FBG (Fasting Blood Glucose),HbA1C%, IR (Insulin resistance), LDL, HDL, BMI and Cholesterol levels. Whereas, non-significant difference in TG. *=p<0.05, **=p<0.001.

Discussion

Excess Iron is related to IR in case of T2DM patients. Deposition of this metal in the liver can cause IR as it can interfere with the capacity of insulin to reduce production of glucose by the liver. Free iron leads to the congregation of reactive oxygen species (ROS) which perpetually disrupts the body's homeostasis and causes oxidative stress-mediated diabetic complications. Recent studies have suggested that FERR level is higher in T2DM patients. As high FERR level can be present in acute or chronic inflammation, its elevation in T2DM could be due to the underlying inflammatory conditions [11,14]. The fact that excess iron in the system contributes to anomalous glucose metabolism was first confirmed from the observation that the incidence of diabetes increases in typical genetic hemochromatosis (HH). Improved insulin sensitivity and secretion was found blood was donated frequently and iron stores depleted [14, 15]. However, FERR's role as a marker of iron overload in pancreatic damage and peripheral resistance or its role as an inflammatory marker is not clear and hence this study was aimed to examine the relationship between serum FERR and glycemic status and markers in type 2 diabetes.

In type 2 diabetes, FERR is increased by 2.5-fold and there was no evidence of any excess iron load. However the high level leads to disturbance in the glucose homeostasis by causing IR as iron is auto-oxidized to form free radicals that are extremely reactive. . These iron–oxygen complexes are lipid soluble pro-oxidants which can cause tissue damage by changing membrane properties [16, 17].

In the present study, it was revealed that FERR level was statistically significantly augmented in diabetic female patients in comparison to the control group. The increase in FERR levels in patients with diabetes has a direct relation with IR. Previous studies suggest that metabolism of iron in the body could possibly induce IR by inhibiting adiponectin and Osteocalcin. This may have led to the assumption that iron metabolism can contribute to the development of T2DM [18]. Higher FERR levels have been reported by some studies to be associated with obesity, metabolic syndrome and cardiovascular diseases. It is under consideration that serum FERR, a marker of body iron status, maybe considered as a constituent of insulin-resistance disorder [19, 20]. There is also a recognized association between FERR levels and the presence and severity of fatty liver disease. This was in partial agreement with our results regarding increased ALT levels in diabetic female patients with micro vas-

cular and macro vascular complications. This differs significantly from female patients without complications. Also, LDL differed significantly between these two groups[21,23].

At present it is believed that IR is the main factor in inducing T2DM pathogenesis. The well-established IR markers are glucose, insulin, and C-peptide concentrations [24]. In our study we found a significant correlation between FERR level and IR in T2DM.The IR level was calculated using the homeostasis model assessment of HOMA-IR index. This finding is consistent with previous studies conducted on Chinese and Korean populations [11, 19]. Elevated levels of FERR have been recognized as an attribute of T2DM but its association with the iron levels is multifaceted. Insulin stimulates the synthesis of FERR and activates the uptake of iron. On the contrary, iron influences the insulin inhibition of glucose production by the liver [25]. On the other hand, FERR acts as an indicator of pancreatic inflammation and is thus referred to as marker for IR [26, 27].

In the present study, 65% of diabetic subjects had increased risk of CVD while only 20% had intermediate risk. American diabetes association studies have shown that there is an apparent risk of getting CVD in type 2 patients with diabetes especially in conditions of hypertension and dyslipidemia. It has been shown that CVD is the major cause of morbidity and mortality in people living with diabetes. Besides, the efficiency with which cardiovascular risk is controlled is also dependent on factors that can prevent or slow CVD in patients with diabetes [28].

Conclusion and recommendation

In conclusion, our studies showed that FERR levels are higher in people who have diabetics than those who do not (controls). No correlation was observed between serum FERR and blood glucose control in diabetics implying that that FERR may be playing a significant role in the pathogenesis of T2DM. A decrease in insulin production and induction of IR may be caused by hyper ferritinemia in T2DM. Nevertheless, it seems important to consider the question as to whether serum FERR levels should be routinely estimated in all type 2 diabetes patients and to whether cutoff threshold value be maintained in order to achieve good glycemic control. Further studies should be done to understand this relationship in patients with diabetes and to lay down specific guidelines so that this chronic disease can be controlled.

Acknowledgement

Our appreciation goes to the Diabetic Clinic in Prince Maged Aben Abdel-Aziz Diabetic Center, Al Madinah. The authors would also appreciate Miss Rania Osta and Miss Johayna Aboalkayer, the lab technicians who helped us in the current study. Also recognitions go to our under-graduated students (Asmaa Fahad Alsehli, Sarah Brikan Almutiri and Nuorah Abdullah Alhotal) who assisted us in data collection.

Declaration

Author(s) declare that We have no conflicts of interest to disclose.

References

[1] Elhadd AT. The rising menace of diabetes in the Middle East: Time for action. Saudi J Health Sci 2012;1: 44-45.

[2] Abdulfatai O, Lateef. Type 2 Diabetes Mellitus: A Review of Current Trends. Oman Med J. 2012; 27: 269–273.

[3] World Health Organization. https://www.who.int/news-room/fact-sheets/detail/diabetes. Diabetes in Saudi World Health Organization (diabetes) Online Resources (updated 2019). Available from: https://www.who.int/countries/sau/en/.

[4] American Diabetes Association. https://www.diabetes.org/. Online Resources (updated 2019). Available from: https://www.diabetes.org/diabetes/type-2.

[5] Aastha, Rajeev, Shalini. Microvasular and Macrovascular complications in diabetes mellitus: Distinct or continuum. Indian J Endocrinol Metab 2016; 20: 546–551.

[6] Anjana, Joseraj, Geetha. Evaluation of serum ferritin in type 2 diabetes mellitus. Journal of evaluation of research in medical biochemistry 2016; 1: 4-6.

[7] Shim, Kang, Oh, Baek, Yang, et al. Association of serum ferritin with insulin resistance, abdominal obesity, and metabolic syndrome in Korean adolescent and adults, Medicine 2017; 96:8.

[8] Bao W, Chavarro JE, Tobias DK, Bowers K, Li S, et al. Long term risk of type 2 diabetes in relation to habitual iron intake in women with a history of gestational diabetes: a prospective cohort study. Am J Clin Nutr 2016;103:375-81.

[9] Wrede E, Buettner R, Bollheimer C, Scholmerich J, Palitzsch D, Hellerbrand C. Association between serum ferritin and the

insulin resistance syndrome in a representative population. Eur J Endocrinol 2006; 154:333-40.

[10] Faiza, Fasiha, Shehryar, Najeeha, Syeda. Elevated levels of Ferritin and hs-CRP in type 2 diabetes, Journal of Pakistan medical Association 2014; 64:89-91.

[11] Sun L, Franco H, Hu B, Cai L, Yu Z, Li H. Ferritin concentrations, metabolic syndrome and type 2 diabetes in middle-aged and elderly Chinese. J Clin Endocrinol Metab 2008; 93:90-6.

[12] Bo-wei, Xu-min, Jun-ru, Fang-ning, Fu-Zai. The Relationship between Serum Ferritin and Insulin Resistance in Different Glucose Metabolism in Non-obese an Adults. International Journal of Endocrinology 2015; 1: 34-36.

[13] Barton, Barton, Acton. Insulin Resistance and Metabolic Syndrome: Clinical and Laboratory Associations in African Americans Without Diabetes in the Hemochromatosis and Iron Overload Screening Study. Metab Syndr Relat Disord 2018;16:267-273.

[14] Suárez , Arbeláez, Mosquera, Méndez, Aguilar. C-reactive protein, waist circumference, and family history of heart attack are independent predictors of body iron stores in apparently healthy premenopausal women. Biol Trace Elem Res 2012;148:135-8.

[15] Tang, Liu, Tang , Tan, Lu Z, et al. High serum ferritin level is an independent risk factor for metabolic syndrome in a Chinese male cohort population. Diabetol Metab Syndr 2015; 7:11.

[16] Cantur KZ, Cetinarslay B, Tarkun I, Canturk NZ. Serum ferritin levels in poorly- and well-controlled diabetes mellitus. Endocr Res 2003; 29:299-306.

[17] Carrera, Simó, Lecube, Hernández. Soluble transferrin receptors and ferritin in Type 2 patients with diabetes . Diabetic Medicine 2004; 1:97–101.

[18] Doyard M, Fatih N, Monnier A, Island ML, Aubry M. Iron excess limits HHIPL-2 gene expression and decreases osteoblastic activity in human MG-63 cells Osteoporos Int 2012; 23:2435–2445.

[19] Kim CH, Kim HK, Bae SL, Park JY, Lee KU. Association of elevated serum ferritin concentration with insulin resistance and impaired glucose metabolism in Korean men and women. Metabolism 2011; 60:214-20.

[20] Hernandez A, Lecube A, Carrera RS. Soluble transferrin receptors and ferritin in type 2 patients with diabetes . Diabetic Med 2005; 22:97.

[21] Aclan Ozder. Lipid profile abnormalities seen in T2DM patients in primary healthcare in Turkey: a cross-sectional study. Lipids Health Dis 2014; 13:183.

[22] Xifra G, Moreno, Ricart W, Fernández. Obesity status influences the relationship among serum osteocalcin, iron stores and insulin sensitivity. Clin Nutr 2018;37:2091-2096.

[23] Colagiuri S, Craig J. Assessment of kidney function in type 2 diabetes. Nephrology 2010; 15:146–16.

[24] Olga G, Evgenya U, Yulia D, Ekaterina B, Ekaterina S, Olga B. Insulin resistance and inflammation markers in myocardial infarction. J Inflamm Res
2013; 6:83-90.

[25] Pravenec M, Kajiya T, Zídek V, Landa V, Mlejnek P, Simáková M. Effects of human C-reactive protein on pathogenesis of features of the metabolic syndrome. Hypertension 2011; 57:731-7.

[26] Rajpathak S, Ma J, Manson J, Willett WC, Hu FB. Iron intake and the risk of type 2 diabetes in women: a prospective cohort study. Diabetes Care 2006; 29:1370-6.

[27] Buse JB, Ginsberg HN, Bakris GL. Primary prevention of cardiovascular diseases in people with diabetes mellitus: a scientific statement from the American Heart Association and the American Diabetes Association. Diabetes Care 2018; 30:162–172. https://www.diabetes.org/.

[28] American Diabetes Association. Cardiovascular disease and risk management. In Standards of Medical Care in Diabetes. Diabetes Care 2015; 38:49–57. https://www.diabetes.org/.

Original article

Prevalence of Carpal Tunnel Syndrome Symptoms and its Associated Risk Factors in Hail Region

Mohammad A Altraifi[1], Abdulrahman F Alluhaybi[1], Shamma M Alaezaimee[1], Sara A Aledaili[1], Syed Irfan Ali[2].

1. Student in College of Medicine, University of Hail, Hail, Saudi Arabia
2. Neurology consultant, King Khaled Hospital, Hail, Saudi Arabia

Received on 21.04.2020, accepted for publication on 28.05.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.010)

Correspondence author:
Mohammad A Altraifi / Postal address: 4636 Al Nasirah – Al Matar Dist. Unit No 6 Hail 55421- 8078 Kingdom of Saudi Arabia.
Mobile: 0531471638. Email. moo.om-120@live.com

Abstract

Background & Aims:
Early recognition and intervention will result in a better quality of life for patients with carpal tunnel syndrome (CTS). The aim of this study is to determine the prevalence of CTS symptoms and its associated risk factors in the Hail region.

Methods:
A cross-sectional study was conducted in Hail region, in 2020. A total of 584 subjects were selected and informed consent was obtained. A standardized and validated questionnaire was used to assess the symptoms of CTS if present and the functional status of the affected hand.

Results:
A total of 141(24.1%) were found to be symptomatic. Female gender, younger age group, and reported health problems were significantly associated with CTS symptoms development. The most reported symptomatic site was the right hand (40.6%) and the most reported symptom was tingling sensation (100%). Health problems were reported by 36% of the symptomatic subjects.

الملخص

الخلفية والأهداف:
تعتبر متلازمة النفق الرسغي واحدة من الاعتلالات العصبية المحيطية حيث يتم ضغط العصب المتوسط أثناء مروره خلال النفق الرسغي، مما يؤدي إلى مجموعة من العلامات والأعراض التي تزداد سوءًا بمرور الوقت عندما لا يتم تخفيف هذا الضغط. نتيجة لذلك، سيؤدي التشخيص والتدخل المبكرين إلى جودة حياة أفضل للمريض. تهدف هذه الدراسة إلى تحديد مدى انتشار أعراض متلازمة النفق الرسغي وعوامل الخطر المرتبطة بها في منطقة حائل.

طريقة البحث:
أجريت هذه الدراسة المقطعية في عام ٢٠٢٠ في منطقة حائل. تم اختيار ٥٨٤ شخص للمشاركة في البحث بعد أخذ الموافقة من كل شخص ووزّعت استبيانات موحدة ومصدّقة على المشاركين. تقوم هذه الاستبيانات بتقييم حدة الأعراض المتعلقة بمتلازمة النفق الرسغي إن وجدت وتحديد مدى تأثر الحالة الوظيفية في اليد المصابة.

النتائج:
أظهرت النتائج أن ١٤١ (٢٤.١٪) من المشاركين لديهم بعض أعراض متلازمة النفق الرسغي. وجدت الدراسة أن الإناث والأشخاص في الفئة العمرية الأصغر ومن لديهم مشاكل صحية مصاحبة كانوا أكثر عرضة من غيرهم بالإصابة بأعراض المتلازمة. بينت النتائج أن اليد اليمنى (٤٠.٦٪) أكثر موقع تظهر فيه الاعراض. كان الإحساس بالوخز أكثر عرض ذُكر من قبل المشاركين (١٠٠٪). وجد أن ٣٦٪

Conclusion:
Our study showed that the prevalence of CTS symptoms in Hail region is high. Multiple risk factors for developing CTS were recognized. We recommend further studies using clinical assessment and nerve conduction study.

Key words:
Carpal tunnel syndrome, Hail, Saudi Arabia.

من الأشخاص المصابين بالأعراض لديهم مشاكل صحية مصاحبة.

الخلاصة:
أظهرت الدراسة أن معدل انتشار أعراض متلازمة النفق الرسغي في منطقة حائل كان مرتفعاً. تم التعرف على العديد من عوامل الخطورة التي قد تسبب الإصابة بأعراض المتلازمة. نوصي بإجراء مزيد من الدراسات باستخدام التقييم السريري ودراسة التوصيل العصبي.

Introduction:

Carpal tunnel syndrome (CTS) is the most common nerve compression syndrome. It is a set of signs and symptoms caused by direct pressure on the median nerve as it passes across the carpal tunnel [1]. The etiology of CTS is usually unknown but may be linked with particular conditions, such as pregnancy, rheumatoid arthritis, acromegaly, hypothyroidism, obesity, and diabetes mellitus [2].

The prevalence of CTS is differently reported in various studies. The general prevalence in the United States is 2.7%. The female/male ratio is between 3:1 and 10:1. Bilateral CTS is diagnosed in 78% of patients clinically. However, it is diagnosed in 50% by electrodiagnostic findings [3]. Moreover, CTS falls under the category of occupational diseases with high prevalence rates among certain occupations [4]. There is a wide variety of symptoms in CTS patients depending on the severity of the condition. Reported symptoms are numbness, tingling, pain, and burning sensation felt in the median nerve distribution, which are more apparent at night or during sleep [5]. Some patients will complain of pain being radiated up to the forearm, arm, shoulder, and neck [6]. The motor deficit is manifested with weakness and reduced grip strength. Muscle wasting over thenar muscles would also occur but later as the condition progresses. Almost 55-65% of patients complain of bilateral symptoms at first presentation [7].

The treatment of CTS mainly depends on the severity of the symptoms. It is categorized broadly into surgical and non-surgical treatment. Non-surgical treatments are recommended for patients with mild symptoms of CTS. Patients with moderate to severe symptoms are recommended for surgical evaluation [8]. There is not much work done investigating the prevalence of CTS in Saudi Arabia. However, a study conducted in Riyadh among the general

population has found that 50% of all participants had CTS symptoms ranging from moderate to severe [9]. Another study conducted in Al Majmaah city, Saudi Arabia has found the prevalence to be 14% among the adult population [10]. Other studies were conducted but are limited to high-risk groups [11,12]. Since there is no similar study conducted in Hail region, the aim of this study is to measure the prevalence of CTS symptoms and its associated risk factors in thepopulation.

Methods and Materials:

This descriptive cross-sectional study was conducted in Hail region, Saudi Arabia, in 2020. Ethical approval was obtained from the Ethical Committee of College of Medicine at University of Hail with an ethical approval number of HREC 00099/ CM-UOH.02/20. No personal data about identity was required. For the purpose of this study, a total of 584 subjects were selected and implied informed consent was obtained. A pre-designed standardized questionnaire known as "Boston Carpal Tunnel Syndrome Questionnaire" (BCTQ) which was established by Levine-Katz [13] was used. This questionnaire is valid, with good test-retest reliability and a high Cronbach's alpha (>0.9) for internal consistency [14]. It was translated and revised to Arabic by the researchers and distributed to participants in hard copies and online google forms. The questionnaire consists of two sections. The first section is called symptoms severity scale (SSS) and it is related to the assessment and grading of severity of symptoms. The second section which is related to function called function status scale (FSS). For the purpose of the study precision, all questions address the symptoms in a period of the last two weeks prior to answering the questionnaire. On the other hand, this questionnaire did not involve clinically diagnosed subjects with CTS as they were included in the prevalence directly. We also have included other questions related to demographic data, health conditions, body mass index (BMI), site of symptoms, and few additional questions related to CTS. Statistical Package for the Social Sciences (SPSS version 24) was used for the analysis of the data, where descriptive analysis such as frequency and percentage were applied for qualitative variables. The final score of SSS and FSS was calculated by measuring the mean and standard deviation of each applicable question. The Chi-square test was applied to find association between qualitative variables. Finally, independent t-test was used for the comparison between qualitative variables. A P value of less than .05 was considered statically significant.

Results:

Out of 584 subjects in this study, 258(44.2%) were male and 326(55.8%) were female. The study represents different age groups with 20-29 being the largest age group with 333(57%) subjects. The majority of them had finished higher education, 358(61.3%). A group of 8(1.4%) subjects have been already clinically diagnosed with CTS. (Table1)

Table 1. Demographic data of participants (N=584)

Characteristic		N (%)
Sex	Male	258(44.2)
	Female	326(55.8)
Age groups	14-19	86(14.4)
	20-29	333(57)
	30-39	98(16.8)
	40-49	36(6.2)
	50.above	31(5.3)
Education level	Illiterate	4(0.7)
	Elementary	5(0.9)
	Intermediate	22(3.8)
	High school	195(33.4)
	Higher education	358(61.3)
Nationality	Saudi	561(96.1)
	Non-Saudi	23(3.9)
Residence	Hail city	527(90.2)
	Rural areas	57(9.8)

Female gender was significantly associated with CTS symptoms development as 98(30%) of female subjects were symptomatic (P=.0001). CTS symptoms were more prevalent in obese subjects (28%) but this did not show any significance (P=.81). The younger age group was another significant predictor of CTS symptoms development as those with the age group of 14-19 reported symptoms more than others (30%) (P=.029). Similarly, subjects with health problems were more likely to complain of CTS symptoms (36%) than those with no health problems (21%) (P=.0002) (table 2)

Table 2. Characteristics of participants with and without symptoms of carpal tunnel syndrome

Characteristic		CTS symptoms		P value
		No (443) N (%)	Yes (141) N (%)	
Sex	Male	215(83)	43(17)	0.0001*
	Female	228(70)	98(30)	
BMI	Underweight	47(77)	14(23)	0.81
	Healthy Weight	199(76)	61(24)	
	Overweight	113(77)	34(23)	
	Obese	84(72)	32(28)	
Age group	14-19	56(65)	30(35)	0.029*
	20-29	268(80)	65(20)	
	30-39	72(73)	26(27)	
	40-49	25(69)	11(31)	
	50 and above	22(71)	9(29)	
Health problems	Yes	85(64)	48(36)	0.0002*
	No	358(79)	93(21)	
* statistically significant.				

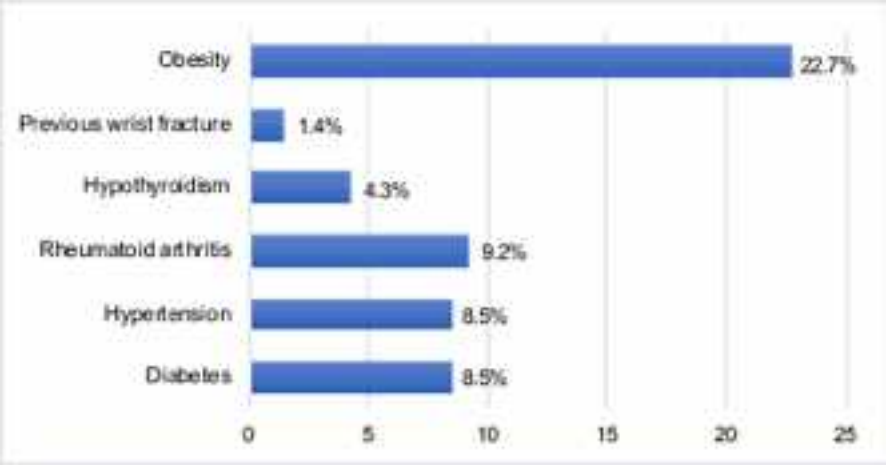
The site of symptoms was reported differently among participants with the palm of the hand being the most common, 63(47.4%) followed by the wrist, 47(35.3%), and thumb 36(27.1%). (table 3)

Table 3. Reported site of symptoms

Site	N	%
Thumb	36	27.1%
Index	14	10.5%
Middle finger	17	12.8%
Fourth finger	18	13.5%
Fifth finger	16	12.0%
The palm of the hand	63	47.4%
Wrist	47	35.3%

Health problems of symptomatic subjects were variable with obesity being the most reported, 32(22.7%). Other health problems such as rheumatoid arthritis 13(9.2%), diabetes 12(8.5%), and hypertension 12(8.5%) were also reported. (Fig.1)

Fig. 1. Health problems of symptomatic participants



The right hand was the most reported symptomatic hand, 54(40.6%) followed by bilateral symptoms, 50(37.6%), and left hand, 29(21.8%). The most frequently reported symptoms are as follows: tingling 133(100%), pain during daytime 93(69.9%), pain during night 75(56.4%), weakness 64(48.1%). 39(29.3%) have difficulty grasping and using small objects. A total of 17(12.8%) subjects have mentioned waking up at night due to pain and it shows that the mean value for SSS is significantly higher in those who reported waking up due to pain when compared to those who did not (p= <0.0001). Also, another 27(20.3%) subjects have reported waking up at night due to tingling sensation. Muscle wasting of the palm of the hand was reported in only 20(15%) of our subjects. With regards to SSS, our study revealed that out of total 576 subjects, 17.4% are mildly symptomatic, 5.4% are moderately symptomatic, 0.17% are severely symptomatic, and 0.17% are very severely affected.

Discussion:

In our study, we tried to enroll in a different age, social, and work categories. These included a total of 584 participants. The prevalence of CTS symptoms in this study was 24.1% (including those with confirmed diagnosis). In a similar study conducted in Al Majmaah city, the prevalence of symptoms of CTS was 14% [10]. On the contrary, a study among the general population of Riyadh city, Saudi Arabia revealed a prevalence of 50% of CTS symptoms considering the general prevalence of warning symptoms [9].

This research shows that gender is significantly associated with CTS symptoms development, as females tend to be more

affected than males. This is similar to what has been mentioned in other studies where female gender was considered a significant risk factor for CTS development [9,11,15]. Regarding BMI, CTS symptoms were more prevalent in obese subjects than others, but this did not show any significance in our analysis. Numerous studies have shown that BMI is considered as a significant risk factor for CTS development, as subjects with a BMI of 30 or more tend to be affected more [15,16,17]. On the other hand, a study conducted among medical laboratory staff showed no significant association between BMI and CTS symptoms development [12]. In our study, the younger age group was a significant predictor of CTS symptoms development. Likewise, a study conducted in Riyadh showed that the younger population reported symptoms more commonly than others [9]. Whereas a previous study in Brazil showed that the older age group (41-60 years) was a significant risk factor [15]. Few other studies reported no association between a specific age group and CTS development [11,12]. Furthermore, subjects with health problems were more commonly affected than others and this has shown to be significant. This is consistent with other studies as medical conditions were considered as a risk factor for CTS development [11,18].

Results of the current study found that the most frequently reported site of symptoms is the palm of the hand followed by wrist and thumb. One of the least affected was the little finger which was 12% and these results were somewhat similar to a study reported no single finger involvement [19]. Although the little finger has a different nerve supply, people may complain of little finger involvement. Various explanations suggested the reason behind the extraterritorial spread of symptoms (e.g. higher levels of pain and paresthesia) [20]. A previous study showed that increased severity of CTS symptoms was found to increase the time required to fall asleep and decreased total sleep time [21]. Similarly, as 12.8% of our subjects have mentioned waking up at night due to pain, it shows that the mean value for SSS was significantly higher in those who reported waking up due to pain when compared to those who did not ($p = <0.0001$). Another 20.3% of subjects have reported waking up at night due to tingling sensation.

Our results showed that among those subjects who reported the symptoms of CTS, 54(40.6%) perceived symptoms in the right hand, 29(21.8%) in the left hand, and 50(37.6%) in both hands. Our results were similar in comparison to a study conducted in Italy that aimed to evaluate the current management of CTS. They reported that 38% of cases manifested bilaterally, 41%

in the right, and 21% in the left [22]. On the other hand, a local study was conducted in the western area of Saudi Arabia showed that 55% of cases were bilateral, 30% in the right, and 15% in the left hand [23]. This slight difference could be due to a true difference between the two populations or to a bias in the answers of our subjects by not reporting the less affected hand.

Conclusion:

Our study showed that the prevalence of CTS symptoms in Hail region is high. Multiple risk factors for developing CTS were recognized. As female gender was significantly associated with CTS symptoms development. Likewise for the younger age group and those with associated health problems. We recommend further studies using clinical assessment and nerve conductionstudy.

References:

[1] Ballinger A. Essentials of Kumar and Clark's Clinical Medicine E-Book. 5th ed. Elsevier Health Sciences. 2011.

[2] Chammas M, Boretto J, Burmann LM, Ramos RM, Dos Santos Neto FC, Silva JB. Carpal tunnel syndrome - Part I (anatomy, physiology, etiology and diagnosis). Rev. bras. ortop. 2014;49(5):429-436. doi.org/10.1016/j.rboe.2014.08.001

[3] Dumitru D, Amato A, Zwarts M. Electrodiagnostic Medicine. 2nd ed. Philadelphia. Hanley & Belfus; 2002.

[4] Giersiepen K, Spallek M. Carpal tunnel syndrome as an occupational disease. Deutsches Ärzteblatt International. 2011;108(14):238-242.

[5] Marwan Y, Ghadanfari K, Kawar S, Husain W. Demographic Pattern and Clinical Features of Patients with Carpal Tunnel Syndrome Presenting to Orthopedic Outpatient Clinics in a Military Hospital in Kuwait. Kuwait Medical Journal. 2014;46(1):49-53.

[6] Ibrahim I, Khan W, Goddard N, Smitham P. Carpal Tunnel Syndrome: A Review of the Recent Literature. The Open Orthopaedics Journal. 2012;6(1):69-76.

[7] Bland Jeremy D P. Carpal tunnel syndrome. BMJ. 2007;335-343

[8] Ghasemi-rad M, Nosair E, Vegh A, Mohammadi A, Akkad A, Lesha E, et al. A handy review of carpal tunnel syndrome: From anatomy to diagnosis and

treatment. World Journal of Radiology. 2014;6(6):284-300.

[9] Al Shahrani AS, Albogami SS, Alabdali AF, Alohali SK, Almedbal HS, Aldossary GF. Does the use of electronic devices provoke the carpal tunnel syndrome (CTS) symptoms and functional impairment? A cross-sectional study. The Egyptian Rheumatologist. 2019;41(4):313-317.

[10] Alyousef Y, Alyousef F, Almaymoni S, Hazizi M, Almaymoni M, Alyousef A, et al. Awareness of carpal tunnel syndrome among adult population of Al Majmaah city, Saudi Arabia, 2018–2019. Journal of Family Medicine and Primary Care. 2019;8(10):3383-3387.

[11] Alhusain F, Almohrij M, Althukeir F, Alshater A, Alghamdi B, Masuadi E et al. Prevalence of carpal tunnel syndrome symptoms among dentists working in Riyadh. Annals of Saudi Medicine. 2019;39(2):104-111.

[12] Ahamed SS, Anas MB, Aref AA, Abdulrahman AA. Prevalence and associated factors of Carpal Tunnel Syndrome (CTS) among medical laboratory staff at King Saud University Hospitals, KSA. Pakistan Journal of Medical Sciences. 2015;31(2):331-335.

[13] Levine D, Simmons B, Koris M, Daltroy L, Hohl G, Fossel A, et al. A self-administered questionnaire for the assessment of severity of symptoms and functional status in carpal tunnel syndrome. The Journal of Bone & Joint Surgery. 1993;75(11):1585-1592.

[14] Bakhsh H, Ibrahim I, Khan W, Smitham P, Goddard N. Assessment of validity, reliability, responsiveness and bias of three commonly used patient-reported outcome measures in carpal tunnel syndrome. Ortop Traumatol Rehabil. 2012;14(4):335-40.

[15] Becker J, Nora DB, Gomes I, Stringari FF, Seitensus R, Panosso JS, et al. An evaluation of gender, obesity, age and diabetes mellitus as risk factors for carpal tunnel syndrome. Clinical Neurophysiology. 2002;113(9):1429-1434.

[16] Mansoor S, Siddiqui M, Mateen F, Saadat S, Khan Z, Zahid M et al. Prevalence of Obesity in Carpal Tunnel Syndrome Patients: A Cross-Sectional Survey. Cureus. 2017;9(7).

[17] Stallings S, Kasdan M, Soergel T, Corwin H. A case-control study of obesity as a risk factor for carpal tunnel syndrome in a population of 600 patients presenting

for independent medical examination. The Journal of Hand Surgery.
1997;22(2):211-215.

[18] Tseng CH, Liao CC, Kuo CM, Sung FC, Hsieh DP , Tsai CH. Medical and non-medical correlates of carpal tunnel syndrome in a Taiwan cohort of one million. European Journal of Neurology. 2011;19(1):91-97.

[19] Stevens J, Smith B, Weaver A, Bosch E, Deen H, Wilkens J. Symptoms of 100 patients with electromyographically verified carpal tunnel syndrome. Muscle & Nerve. 1999;22(10):1448-1456.

[20] Zanette G, Marani S, Tamburin S. Extra-median spread of sensory symptoms in carpal tunnel syndrome suggests the presence of pain-related mechanisms. Pain. 2006;122(3):264-270.

[21] Patel A, Culbertson M, Patel A, Hashem J, Jacob J, Edelstein D, et al. The Negative Effect of Carpal Tunnel Syndrome on Sleep Quality. Sleep Disorders. 2014;2014:1-7.

[22] Luchetti R, Tognon S, Cacciavillani M, Ronco S, Buzzelli N, Lanni G. Observational multicentric survey on carpal tunnel syndrome: Demographic and clinical data from 34 Italian centers. European Review for Medical and Pharmacological Sciences. 2017;21(3):460-469.

[23] Abumunaser LA. "Demographic pattern of carpal tunnel syndrome in western Saudi Arabia." Neuroscience. 2012;17. (1):44-47.

The questionnaire used in this study:

Carpal Tunnel Syndrome is a relatively common disorder. We are a group of medical students at UOH working on a study that aims to measure the prevalence of symptoms of this condition and its associated risk factors.

Thank you very much for agreeing to participate in this survey.

The information provided by you in this questionnaire will be used for research purposes only. It will not be used in a manner that would allow identification of your individual responses.

- **Sex:**
  - ☐ male
  - ☐ female

- **Age:**
  - ☐ 14-19
  - ☐ 20-29
  - ☐ 30-39
  - ☐ 40-49

☐ ≥ 50

• Educational level:

☐ illiterate
☐ Elementary
☐ Intermediate
☐ High school
☐ Higher education

• Nationality:

☐ Saudi
☐ other

• City:

☐ Hail city
☐ Rural side

• Occupation:

• Height:

• Weight:

•Do you suffer from any of these conditions?

please write down any chronic disease you have that haven't been mentioned. You can choose more than one.

☐ Diabetes
☐ Hypertension
☐ Rheumatoid arthritis
☐ Hypothyroidism
☐ Kidney failure
☐ Previous wrist fracture
☐ Others:
Please mention .....

• Have you been diagnosed with carpal tunnel syndrome:

☐ Yes
☐ No

• Please circle the word that describes your condition for each question.

Symptom severity scale (11 items)

	1	2	3	4	5
1. How severe is the hand or wrist pain that you have at night?	Normal	Slight	Medium	Severe	Very serious
2. How often did hand or wrist pain wake you up during a typical night in the past two weeks?	Normal	Once	2 to 3 times	4 to 5 times	More than 5 times
3. Do you typically have pain in your hand or wrist during the daytime?	No pain	Slight	Medium	Severe	Very serious
4. How often do you have hand or wrist pain during daytime?	Normal	1-2 times / day	3-5 times / day	More than 5 times	Continued
5. How long on average does an episode of pain last during the daytime?	Normal	<10 minutes	10~60 Continued	>60 minutes	Continued
6. Do you have numbness (loss of sensation) in your hand?	Normal	Slight	Medium	Severe	Very serious
7. Do you have weakness in your hand or wrist?	Normal	Slight	Medium	Severe	Very serious
8. Do you have tingling sensations in your hand?	Normal	Slight	Medium	Severe	Very serious
9. How severe is numbness (loss of sensation) or tingling at night?	Normal	Slight	Medium	Severe	Very serious
10. How often did hand numbness or tingling wake you up during a typical night during the past two weeks?	Normal	Once	2 to 3 times	4 to 5 times	More than 5 times
11. Do you have difficulty with the grasping and use of small objects such as keys or pens?	Without difficulty	Little difficulty	Moderately difficulty	Very difficulty	Very difficult

• Where do you feel those symptoms:

You can choose more than one.

- ☐ Thumb
- ☐ Index
- ☐ Middle finger
- ☐ Fourth (ring) finger
- ☐ Little (pinky) finger
- ☐ The palm of the hand towards the thumb wrist

• Did you notice any dimpling in the muscles of the palm of hand?

- ☐ yes
- ☐ No

• Does the pain extend to the forearm sometimes?

- ☐ Yes
- ☐ No

- **Do you think that there are certain activities that make you more prone to any of the mentioned symptoms above**:
  - ☐ Yes
  - ☐ No

- **Do you suffer the symptoms mentioned above in:**
  - ☐ Right hand
  - ☐ Left hand
  - ☐ Both hands

- **Do you do any type of work that requires frequent hand and wrist movement?**
  - ☐ Yes
  - ☐ No

- **For married females with kids, have you experienced any of those symptomswhile you were pregnant?**
  - ☐ yes
  - ☐ no
  - ☐ Never been pregnant

How difficult is it for you to do the mentioned activities below? Please circle the number according to the level of difficulty:

Functional status scale (8 items)

	No difficulty	Little difficulty	Moderate difficulty	Intense difficulty	Cannot perform the activity at all due to hands and wrists symptoms
Writing	1	2	3	4	5
Buttoning of clothes	1	2	3	4	5
Holding a book while reading	1	2	3	4	5
Gripping of a telephone handle	1	2	3	4	5
Opening of jars	1	2	3	4	5
Household chores	1	2	3	4	5
Carrying of grocery basket	1	2	3	4	5
Bathing and dressing	1	2	3	4	5

Thank you for your time, you have completed the questionnaire.

Original article

Relationship Between Sitting Duration During Working Days and Level of Physical Performance

Abdulaziz A. Alkathiry [1] .

1. Department of Physical Therapy, College of Applied Medical Sciences, Majmaah University, Saudi Arabia

Received on 02.05.2020, accepted for publication on 28.05.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.011)

Correspondence author:
Abdulaziz A. Alkathiry
Majmaah, Saudi Arabia , E_mail : a.alkathiry@mu.edu.sa , Mob : +966555413798

Abstract

Background & Aims:
Increased time spent in sitting during work is associated with poor physical performance and is identified as a risk factor for health complications. The aim of this study was to assess the effect of sitting duration during working days on level of physical performance in a university setting.

Methods:
A cross-sectional study of 35 male participants aged between 19 to 48 years were recruited during a 5 kilometers running contest. Demographics and sedentary lifestyle behavior data were collected via a questionnaire which included a question about the average number of hours spent sitting during working days. Physical performance was indicated by the finishing time of the running contest for each participant.

Results:
Participants mean time interval to complete the 5 kilometers running contest was 33 ± 6.5 minutes with an average speed of 2.5 m/s. A Pearson correlation coefficient indicated that number of hours of sitting

الملخص

الخلفية والأهداف:
النشاط البدني وممارسة الرياضة أمران ضروريان لتعزيز الصحة والحماية من الإعاقة. أظهرت الأدبيات الحديثة أن زيادة النشاط البدني وتقليل أوقات الخمول لهما أدوار أساسية في تحسين النتائج الصحية. افترضنا أن الوقت الذي يقضيه الأشخاص في الجلوس خلال أيام العمل سوف يرتبط بوقت أطول لإنهاء مسابقة الجري البالغ طولها ٥ كيلومترات.

طريقة البحث:
في هذه الدراسة تم إشراك ٣٥ شخصاً من الذكور تتراوح أعمارهم بين ١٩ إلى ٤٨ عامًا خلال مسابقة جري لمسافة ٥ كيلومترات. تم جمع البيانات الديموغرافية وبيانات نمط الحياة الخاملة عبر استبيان تضمن سؤالًا عن متوسط عدد الساعات التي يقضيها في وضع الجلوس أثناء أيام العمل. وتم قياس الأداء البدني من خلال الوقت المستغرق لإكمال مسابقة الجري لكل مشارك.

النتائج:
كان متوسط وقت إنهاء السباق للمشاركين ٣٣ ± ٦,٥ دقيقة بمتوسط سرعة ٢,٥ م / ث. أشار معامل ارتباط بيرسون إلى أن عدد ساعات الجلوس خلال أيام العمل كان مرتبطًا بشكل إيجابي مع الوقت لإنهاء مسابقة الجري لمسافة ٥ كيلومترات(P ≥ ٠,٠١).

during working days was significantly positively correlated with time to finish the 5 kilometers running contest ($r = 0.62835$, $P \leq 0.01$).

Conclusions:
Increased duration of sitting during working days was associated with the worse level of physical performance.

Keywords:
Physical Performance; Sedentary Behavior; Sedentary Life Style; Physical Activity

الخلاصة:
ارتبطت زيادة مدة الجلوس خلال أيام العمل مع مستوى أسوأ من الأداء البدني.

الكلمات الدلالية:
الأداء البدني، السلوك الخامل، نمط الحياة الخامل، النشاط البدني

Introduction

Physical activity and exercise are crucial in promoting health and in protecting from disabilities. Increasing physical activity and reducing total sedentary time has been emphasized in recent literature as having fundamental role in improving health outcomes [1–5]. Ainsworth and their team defined sedentary behavior as any activity with an energy expenditure below 1.5 times the resting metabolic rate which include sitting [6]. A growing evidence is showing the adverse effects raising from spending considerable amount of time in sedentary behavior, such as reclining or sitting, on the deterioration of physical functions. Furthermore, number of hours spent in sedentary level of activity was linked to worse health outcomes [7,8].

Individuals living a nonsedentary life style, which is defined as spending less than 3 wake hours a day in sedentary state, showed better health outcomes compared to individuals living a sedentary life style[9]. Stamatakis et al assessed sedentary behavior of 649 older adults using accelerometry and found that more than 65% of the older adults spent more than 8.5 hours sedentarily [10].

The advancement of technology has increased dependency on computer in workplace and daily living. Nowadays, the majority of work environments require employees to spend most of their working hours in sitting (i.e. sedentary state) leading to increased risk of health complications [7,8,11]. Keevil et al 2016, found that increased sitting time was linked to worse performance on tests of physical function

including number of sit-to-stand repetition test and gait speed test. The increased dependence on computer in workplace, especially for faculty and students, along with the increased evidence of the negative effects of the length of sitting duration on health, were the main motivators for this study.

The aim of the study was to assess the effect of sitting duration during working days on level of physical performance in university setting. We hypothesized that longer time spent in sitting during working days will be associated with longer time to finish the 5 kilometers running contest.

Methods

Participants

In this cross-sectional study, a convenience sample of 35 participants were recruited. All participants were male adults aged between 19 to 48 years
(mean 27.1 SD 7.1 years). Participants included students (n=22; 63%) and faculty (n=13; 27%). Participants' recruitment was performed during a 5 kilometers running contest that was organized by Majmaah University to promote healthy lifestyle among its faculty and students.

Procedures

The study protocol conforms to the ethical guidelines of the 1975 declaration of helsinki and was approved by the institutional review board at Majmaah University (Approval number MUREC-March.28/ COM-2018/04). All participants were voluntary recruited during the registration process for the 5 kilometers running contest in Majmaah University. The study investigator explained the study to interested participants in detail and obtained written informed consent from each participant. No compensation for participation was offered to the participants. Consenting and demographics questionnaire were completed in a private area after the participant registered for the running contest and were assigned a shirt number. The author consented all participants and measured the participants weight and height while the questionnaire and timing were performed by the 5 kilometers running contest organizers. Participants provided demographics and sedentary lifestyle behavior via a questionnaire which included a question about the average number of hours they spent sitting during working days. Next, all participants simultaneously started the 5 kilometers running contest in which each participant had a unique shirt number and the time to finish was recorded by the contest organizers by marking finishing time for each participant. Due to the contest rules, the participants were allowed a maximum of 45 minutes to complete the 5 kilometers

running contest. Finishing time was not recorded for participants reaching the finish line after the allowed time. Participants' physical performance was assessed during the 5 kilometers running contest by recording their ability to finish the 5 kilometers running contest and their finish time.

Physical performance

The 5 km running performance was shown to be a valid and reliable method to measure performance [12,13]. Fisher et al 2017, examined the reliability of the 5 km running performance in laboratory setting. They recruited 6 male-competitive runners to perform the 5 km running performance on 5 occasions separated by 48 hours to calculate the intra-subject variability of the 5 km running performance. They found that the intra-subject variability of the 5 km running performance was low with a coefficient of variation (CV) of 1.5% and a standard error of measurement (SEM) = 14.2 seconds. The inter-class correlation (ICC) of time to finish the 5 km running performance was 0.99 [12].

Hurst et al 2017, examined the reliability of the 5 km running performance in outdoor setting during 2 events of 5 km running that were 2 weeks apart. They recruited 15 endurance runners to perform the 5 km running performance on the 2 events. They found a CV of 0.95% and an ICC of 0.97[13].

Statistical Analysis

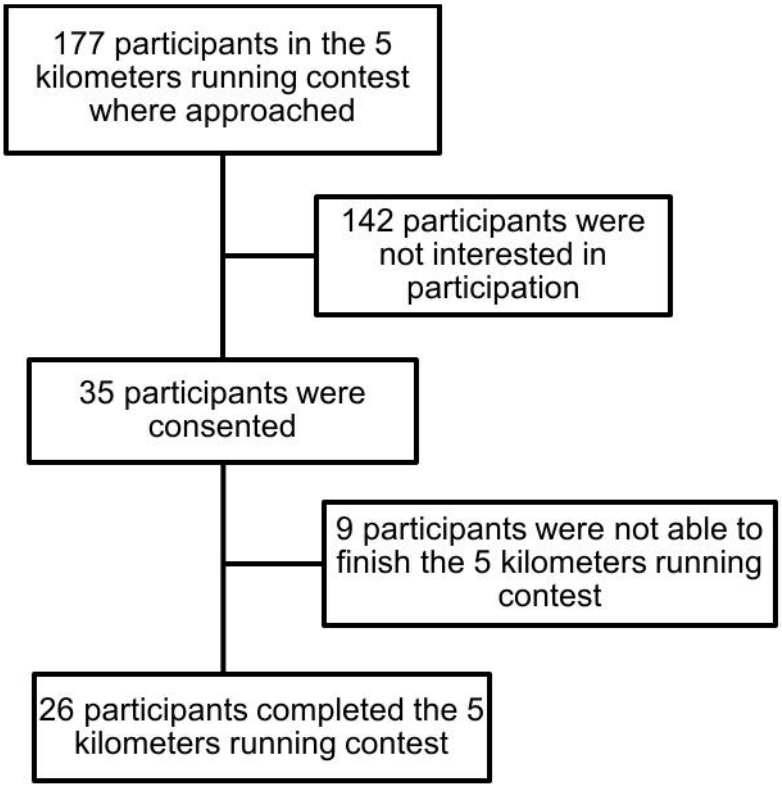
Demographics and descriptive information were presented as means and standard deviations for continuous data and percentages for ordinal and dichotomous data. The assumption of normality of the distribution of the variables was tested using the Shapiro-Wilk test of normality. The relationship between the variables were tested using Pearson correlation coefficient for normally distributed data and using Spearman rank-order correlation coefficient for not normally distributed data. Comparisons based on dichotomous outcomes were performed using the independent samples t test. All statistical analyses were conducted using SPSS version 22.0 with a significance level of $P < 0.05$.

Results

Participants

A total of 177 potentially eligible adults participating in the 5 kilometers running contest were approached for enrollment in the study. A total of 35/177 (20%) of potentially eligible participants were enrolled into the study. A flowchart indicating reasons for exclusion or inability to recruit participants is provided in Fig. 1.

Fig. 1: Participant enrollment flowchart



Twenty-four participants were able to finish the 5 kilometers running contest within the allowed time of 45 minutes, while 2 participants completed the running contest after the allowed time and were assigned a 45-minute finishing time. Twenty-six participants (74%) completed the 5 kilometers running contest and the length of time to finish the running contest ranged from 23.3 to 45 minutes. The mean time interval to complete the 5 kilometers running contest was 33 ± 6.38 minutes with an average speed of 2.5 m/s. Although the mean age of finishers was younger than non-finishers (m=26.5 years SD 6.5) and (m=29.2 years SD 8.5), respectively, this difference did not reach statistical significance (p = 0.3607). The reported average number of hours spent in sitting during working days ranged from 2 to 9 hours per working day (m=5.76 SD 1.92 hour). Twenty-two participants (63%) described their selves as athletics and half of the participants reported that they drove their own car to school/work while the other half walked and/or used public transportation. Demographic data of the participants are reported in Table 1.

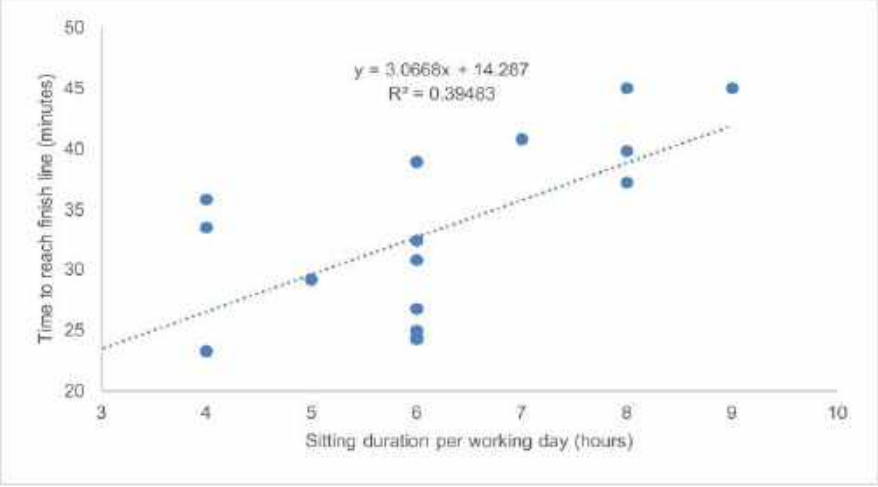
Table. 1 Demographics and baseline characteristics of the participants.

Characteristic	Mean	SD	Min	Max
Age (year)	27.1	7.1	19	48
Number of days exercised per week (day)	3.4	2.0	0	7
Number of minutes of exercise per week (minute)	191	204	0	750
Number of kilometers of walking/running per week (kilometer)	8.0	7.6	0	30
Sitting duration per working day (hour)	5.8	2.0	2	9
Last night sleep duration (hour)	6.0	1.8	3	11
Body mass index (BMI)	23.9	4.0	17.8	37
Weight (Kg)	70.8	10.9	49.7	93
Height (cm)	172.9	6.5	163	192
Time duration to complete the 5 kilometers running contest (minutes)	33.0	6.5	23.3	45

Relationship between sitting duration and physical performance

Results of the Pearson correlation coefficient (fig. 2) indicated that number of hours of sitting during working days was significantly positively correlated with time to finish the 5 kilometers running contest showing that when the number of hours spent in sitting during working days increased the time to finish the 5 kilometers running contest increased ($r = 0.62835$, $P \leq 0.01$).

Fig. 2: The relationship between sitting duration and physical performance



Relationship of age, weight and BMI with physical performance

Results of multiple Spearman rank order correlation coefficients indicated that age, weight, and BMI were significantly positively correlated with time to finish the 5

kilometers running contest. Which means the participants with older age, heavier weight, and higher BMI took longer duration to finish the 5 kilometers running contest (Table 2).

Table. 2 Spearman's rank correlation coefficient of study variables

Variable	1	2	3	4	6	7	8	9	10
Age (year)	-								
Number of days exercised per week (day)	-.04	-							
Number of minutes of exercise per week (minute)	-.28	.75**	-						
Number of kilometers of walking/running per week (kilometer)	-.13	.52**	.60**	-					
Last night sleep duration (hour)	.12	.09	.32	.25	-				
BMI	.53**	-.34	-.15	.01	.09	-			
Weight (Kg)	.47**	-.25	-.05	.11	.06	.87**	-		
Height (cm)	-.10	-.02	.04	-.02	.03	-.09	.24	-	
Time duration to complete the 5 kilometers running contest (minutes)	.54*	-.11	-.04	.33	.16	.70**	.62**	.07	-

*p < .05; **p < .01; BMI = Body mass index.

Discussion

The results of this study was in line with our hypothesis of the relationship between number hours spent in sitting during working days and level of physical performance as indicated by the length of the time needed to finish the 5 kilometers running contest. Furthermore, other statistically significant relationships of the level of physical performance with the participants' age, weight, and body mass index were found. Multiple studies assessed the association of physical function with sedentary life style behavior most of these studies used objective and/or subjective methods to assess or estimate the level of physical function and the sedentary life style. In this study we provided an objective measurement of the level of functional performance during a real-life rigorous activity to provide a meaningful results of the effect of sitting duration on the level of functional performance.

León-Muñoz et al. defined a non-sedentary life style as spending less than 3 wake-hours a day in sedentary state [9]. Using the definition of León-Muñoz et al., 2013

of living a non-sedentary life style only 2 individuals in our sample were classified as living a non-sedentary life style which limits the generalizability of our results to individuals living a sedentary life style.

The current findings support previous research of Keevil et al 2016, they found that increased sitting time was linked to worse performance on physical functions tests.

Our sample had an average time to finish the 5 kilometers running contest of 33 minutes which was longer than the time reported by Hanson NJ, et al., 2018 of 24.5 minutes in 11 male and female recreational runners. This difference was expected since 92% our sample were classified as living a sedentary life style according to León-Muñoz et al. definition.

Due to the aim of this study, we focused on university setting which limited the age range and the number of potential participants. Furthermore, we recruited the participants during a running contest which gave us access to a specific population who were willing to participate in the running contest. This may have limited the generalizability of our results and conclusions. Future studies should use larger sample of participants with a wider range of age with different occupations to improve generalizability. Another main limitation to our study is that no female participants were included in this study. This was due to the regulations of the running contest as it was for male participants only.

Although our results showed that participants with longer duration spent in sitting during working days had the least level of physical performance, causality cannot be inferred in this study. However, it is appropriate to advice for decreasing time spent in sitting during working days.

Conclusion

Duration of sitting during working days was negatively associated with the level of physical performance. With the increased dependency on computers in many work environment, modifications to the work environment to decrease the time spent in sitting may improve the physical performance and health of the workers.

Acknowledgment

I would like to thank Dr. Khaled I. Alofisan, Dean of students affairs and Dr. Shady A. Alshewaier, Vice-Dean of students affairs at Majmaah University, for organizing the 5-K running contest at Majmaah University and providing support for data collection.

References

[1] Giné-Garriga M, Roqué-Fíguls M, Coll-Planas L, Sitjà-Rabert M, Salvà A. Physical exercise interventions for improving performance-based measures of physical function in community-dwelling, frail older adults: A systematic review and meta-analysis. Arch Phys Med Rehabil 2014;95. https://doi.org/10.1016/j.apmr.2013.11.007.

[2] Granger E, Di Nardo F, Harrison A, Patterson L, Holmes R, Verma A. A systematic review of the relationship of physical activity and health status in adolescents. Eur J Public Health 2017;27:100–6. https://doi.org/10.1093/eurpub/ckw187.

[3] Reed JL, Prince SA, Elliott CG, Mullen KA, Tulloch HE, Hiremath S, et al. Impact of workplace physical activity interventions on physical activity and cardiometabolic health among working-age women. Circ Cardiovasc Qual Outcomes 2017. https://doi.org/10.1161/CIRCOUTCOMES.116.003516.

[4] Boberska M, Szczuka Z, Kruk M, Knoll N, Keller J, Hohl DH, et al. Sedentary behaviours and health-related quality of life. A systematic review and meta-analysis. Health Psychol Rev 2018;12:195–210. https://doi.org/10.1080/17437199.2017.1396191.

[5] Powell C, Herring MP, Dowd KP, Donnelly AE, Carson BP. The cross-sectional associations between objectively measured sedentary time and cardiometabolic health markers in adults – a systematic review with meta-analysis component. Obes Rev 2018. https://doi.org/10.1111/obr.12642.

[6] Ainsworth BE, Haskell WL, Whitt MC, Irwin ML, Swartz AM, Strath SJ, et al. Compendium of physical activities: An update of activity codes and MET intensities. Med Sci Sports Exerc 2000;32. https://doi.org/10.1097/00005768-200009001-00009.

[7] Van Uffelen JGZ, Wong J, Chau JY, Van Der Ploeg HP, Riphagen I, Gilson ND, et al. Occupational sitting and health risks: A systematic review. Am J Prev Med 2010. https://doi.org/10.1016/j.amepre.2010.05.024.

[8] Thorp AA, Owen N, Neuhaus M, Dunstan DW. Sedentary behaviors and subsequent health outcomes in adults: A systematic review of longitudinal studies, 19962011. Am J Prev Med 2011. https://doi.org/10.1016/j.amepre.2011.05.004.

[9] León-Muñoz LM, Martínez-Gómez D, Balboa-Castillo T, López-García E, Guallar-Castillón P, Rodríguez-Artalejo F. Continued sedentariness, change in sitting time, and mortality in older adults. Med Sci Sports Exerc 2013. https://doi.org/10.1249/MSS.0b013e3182897e87.

[10] Stamatakis E, Davis M, Stathi A, Hamer M. Associations between multiple indicators of objectively-measured and self-reported sedentary behaviour and cardiometabolic risk in older adults. Prev Med (Baltim) 2012. https://doi.org/10.1016/j.ypmed.2011.10.009.

[11] Dunstan DW, Healy GN, Sugiyama T, Owen N. "Too much sitting" and metabolic risk - Has modern technology caught up with us? US Endocrinol 2009;5:29–33. https://doi.org/10.17925/use.2009.05.1.29.

[12] Fisher J, Clark T, Newman-Judd K, Arnold J, Steele J. Intra-Subject Variability of 5 Km Time Trial Performance Completed by Competitive Trained Runners. J Hum Kinet 2017. https://doi.org/10.1515/hukin-2017-0055.

[13] Hurst P, Board L. Reliability of 5-km Running Performance in a Competitive Environment. Meas Phys Educ Exerc Sci 2017. https://doi.org/10.1080/1091367X.2016.1233421.

Original article

Blood group phenotypes associated with risk of gastric cancer: a case-control study

Nasser Alzerwi[1], Bandar Idrees[2],

1. Department of Surgery, College of Medicine, Majmaah University, Ministry of Education, Al Majmaah City, 11952, P. O. Box 66, Riyadh Region, Kingdom of Saudi Arabia.
2. Consultant of Surgical Oncology, Gastrointestinal, Biliopancreatic, and Minimally Invasive Surgery at Department of Surgery, Prince Sultan Military Medical City in Riyadh, Clinical Assistant Professor of Surgery at Al-Faisal University, College of Medicine, Department of Surgery, Riyadh city

Received on 31.1.2020, accepted for publication on 31.3.2020 (Doi : dx.doi.org/10.5455/mjhs.2020.03.012)

Correspondence author:
Nasser Alzerwi Department of Surgery, College of Medicine, Majmaah University, Ministry of Education, Al Majmaah City, 11952, P. O. Box 66, Riyadh Region, Kingdom of Saudi Arabia. Email n.alzerwi@mu.edu.sa

Abstract

Background & Aims:
The association of the ABO blood groups with gastric cancer is controversial and was examined in this study.

Methods:
We conducted a case-control study of 2145 cases of gastric cancer and 2472 controls of Korean ethnicity to determine the risk of gastric cancer for each blood group phenotype using multivariable logistic regression models.

Results:
Patient ages were 33.3 (SD = 9.76) years in controls compared to 59.5 (SD = 11.91) years in cases. The percentages of males and females were similar among cases and controls. The crude OR revealed phenotype O as a protective factor 0.63 (CI: 0.56–0.72) (P < 0.0001) compared to phenotype A 1.30 (CI: 1.15–1.47) (P < 0.0001) and AB 1.29 (CI: 1.07–1.57) (P < 0.01), which were risk factors for gastric cancer, and phenotype B 1.09 (CI: 0.94–1.24) (P = 0.27)

الملخص

الخلفية و الأهداف:
إن وجود علاقة إرتباطية بين فصائل الدم المختلفة و قابلية الإصابة بسرطان المعدة، لطالما كانت محل البحث و الدراسة، و كانت النتائج متناقضة و محل جدل، و الهدف من هذه الدراسة هو تقصي هذه العلاقة.

طريقة البحث:
قمنا بعمل دراسة حالات وشواهد على ٢١٤٥ حالة سرطان معدة من العرق الكوري، و مقارنتها ب ٢٤٧٤ شاهد من العرقية الكورية ، بإستخدام الإنحدار اللوجيستي المتعدد، للتحقق من وجود علاقة إرتباطية بين الحالات والشواهد و مختلف فصائل الدم.

النتائج:
كان متوسط أعمار الحالات ٣٣.٣ (إنحراف معياري =٩.٧٦)، مقارنة ب ٥٩.٩ (١١.٩١) عند الشواهد، نسب تمثيل الذكور و الإناث بين الشواهد و الحالات كانت متقاربة، نسبة الإحتمالات المبسطة كشفت أن فصيلة الدم O هي عامل وقاية من سرطان المعدة ٠.٦٣ (فاصل ثقة: ٠.٥٦ – ٠.٧٢) (قيمة إحتمالية: ٠٠٠١.) ، مقارنة ب فصيلتي الدم أ ١.٣٠ (فاصل ثقة: ١.١٥ – ١.٤٧) (قيمة إحتمالية: ٠٠٠١.) ، و أ-ب ١.٢٩ (فاصل ثقة: ١.٠٧ – ١.٥٧) (قيمة إحتمالية: ٠٠١.)، كعاملي خطر للإصابة بسرطان المعدة، مقارنة بفصيلة ب ١.٠٩ (فاصل ثقة: ١.٢٤ – ١.٩٤)

which was neither protective nor a risk factor. The adjusted OR taking patient characteristics into account and using blood group phenotype O as a reference baseline risk showed that phenotype A (1.21; CI: 1.14–1.39) (P = 0.012) and phenotype AB (1.17; CI: 1.08-1.26) (P = 0.038) conferred an increased risk for gastric cancer compared to phenotype B (0.97; CI: 0.84–1.04) (P = 0.63), which was not associated with gastric cancer risk.

Conclusions:
We revealed an association of blood group phenotypes A and AB with gastric cancer risk, emphasizing the need to further study the underlying molecular mechanism of this association with gastric cancer.

Keywords:
ABO blood group phenotype, Gastric carcinoma, Case-control study

(قيمة إحتمالية: ٢٧.)، كعامل محايد. بينما كشف الإنحدار اللوجيستي المتعدد ، آخذا بالإعتبار عوامل الإلتباس، و متخذا فصيلة الدم O كمرجع، عن نسبة إحتمالات معدلة لفصيلتي أ ١.٢١ (١.١٤- ١.٣٩) (قيمة إحتمالية: ٠١٢.) ، و أ-ب ١.١٧ (١.٠٨ – ١.٢٦) (قيمة إحتمالية: ٠٣٨.) ، مقارنة بفصيلة ب ٠،٩٧ (٠،٨٤ – ١،٠٤) (قيمة إحتمالية: ٦٣.).

الخلاصة:
إن قبيلتي الدم أ و أ-ب ، لهما علاقة إرتباطية يخطر الإصابة بسرطان المعدة، ذات دلالة و أهمية إحصائية و سريرية ، تستدعي إجراء دراسات أعمق لمحاولة تحديد وفهم طبيعة هذه العلاقة الإرتباطية على المستوى الجزيئي في آلية التسرطن لسرطان المعدة.

Background

ABO blood group antigens are extracellular complex carbohydrate antigens expressed not only on red blood cells but also on various other cell types, including epithelial, vascular endothelial, and sensorineural cells and platelets [1,2].These antigens were discovered in 1900 by Karl Landsteiner and provided insight into the human genetic make-up before the era of human genomic analysis. The blood group antigens were found to be associated with multiple human diseases [3], including hematological and transfusional diseases as well as cardiovascular and oncological diseases [4, 5, 6]. Whether this association is a marker of an underlying oncogene or if these antigens play a direct role in carcinogenesis is not fully understood; however, multiple biological mechanisms have been proposed for ABO antigens in human carcinogenesis [3, 7] .The association of ABO antigens with gastric epithelial diseases is well-established, including peptic ulcer disease, Helicobacter pylori infection, pernicious anemia and atrophic gastritis, stomal ulcers, and gastric cancer [7-14]. The first reported association between a disease and genetic indicator was the association between blood group A and gastric cancer (GC) in 1953 [15]. Since then, this associ-

ation has been extensively investigated, but the studies have shown controversial results [10,16, 17].

The most popular theory regarding the mechanism through which antigen A is involved in increasing the risk of GC is that this antigen reduces the antigenicity of GCs by inducing immunological tolerance and evasion of immunological surveillance, as GC cells produce an antigen that is immunologically related to antigen A. This also explains the protective effect of blood group O, which enhances tumor antigenicity and prevents neoplastic growth and dissemination by enhancing immuno-surveillance [3, 18]. GC is the fourth most common malignancy and second leading cause of death from cancer internationally [19, 20] according to the World Health Organization, particularly in East Asia, such as Mongolia, Japan, and Korea; Korea shows the highest incidence of GC in both sexes worldwide [21, 22]. It is also the most common cause of death in western Asian countries such as Iran, Turkmenistan, and Kyrgyzstan [22], with risk variation between the highest-risk and lowest risk populations reaching 15–20-fold [23]. Survival rates also vary widely, with the highest survival rate in Japan (90%) compared to 10–30% in Europe [23].

Non-modifiable risk factors such as age (12.8–19.8 per 100,000 for those above 60 years old, compared to 2.0–2.6 per 100,000 in those below 60 years old) [24], sex (2-fold more common in males than in females) [22], and family history (3-fold increase with a positive family history of first-degree relatives with GC [25]; however, GC also exhibits a strong modifiable risk factor element as shown in emigration studies, with significant reduction in risk in 3rd-generation Japanese immigrants to the USA [26], and a reduced risk of GC with eradication of H. pylori [27]. Thus, epidemiological studies of modifiable and non-modifiable risk factors and their interactions are needed for the prevention, early detection, and identification of new targets for biological therapy [10, 28, 29]. This study was conducted to explore the association between ABO antigens and GC in an ethnically homogenous group of Korean subjects. The results were compared to those of similar studies in the literature.

Methods

Study Design

This was a retrospective case control study.

Participants

Cases were histopathologically confirmed as GC with no previous history of peptic ulcer disease or seropositivity or treatment for H. pylori (n = 2145) from Saint Mary Catholic University Hospital, Seoul, Re-

public of Korea, and controls were cancer-free blood donors (n = 2472) from the blood bank at the same hospital with no previous history of peptic ulcer disease or seropositivity or treatment for H. pylori between March 2010 and December 2014. All participants were of Korean ethnicity and unrelated (through random sampling technique). Blood groups were identified phenotypically using standard serological methods.

Written informed consent was obtained from all participants. The Institutional Review Board approved the research protocols at the hospital. The study protocol conforms to the ethical guidelines of the 1975 declaration of Helsinki as reflected in a priori approval by the institution's human research committee.

Statistical analysis

Analyses were conducted using SPSS 26 software (SPSS, Inc., Chicago, IL, USA). The differences in characteristics between cases and controls were determined using descriptive statistics. The normal distribution and homogeneity of variance assumptions were checked using Kolmogorov-Smirnov and Shapiro-Wilk normality tests and were violated for all variables, and thus nonparametric tests were used to compare different categories of variables. For continuous variables, Mann-Whitney U test (also known as Wilcoxon rank-sum test) was used to detect differences in characteristics between cases and controls. Kruskal-Wallis tests were used for continuous variables with more than two categories. Games-Howell post-hoc test was conducted when there was a significant difference between categories. For categorical variables, we performed Pearson's $\chi 2$-test. The ABO-GC risk association was assessed using multivariable unconditional logistic regression models adjusting for age, sex, body mass index (BMI), smoking status, drinking status, and family history to determine the adjusted odds ratios (ORs) and 95% confidence intervals (CIs). Participants with the ABO phenotype O were considered as having a baseline risk. Two-tailed P values < 0.05 were considered as statistically significant. The sample size was calculated to be 1,067 patients in each arm to achieve 90% power to detect a 3% difference in in outcome variation.

Results

General participants characteristics

Participants' characteristics are summarized in Tables 1, 2, and 3. There were no significant ($P > 0.05$) differences between cases and controls in age, sex, BMI, smoking status, drinking status, or family history of GC. Only comorbidity was significantly different between cases and

controls (Table 1). There were 2472 controls and 2145 cases; Tables 2 and 3 show the subgroup distribution of demographics (age, sex, family history, BMI, and comorbidity status) and lifestyle habits (smoking status and drinking status) among the blood groups between controls and cases, and tumor stage (TNM staging, early vs. advanced), and type of operation (surgical access and extent of gastrectomy) between blood groups among cases.

GC risk by blood group phenotypes

The crude OR was calculated and compared to the adjusted OR for these variables using multivariable logistic regression models (Table 4). The distributions of blood groups O, A, B, and AB in the controls were 37.1%, 33.1%, 21.0%, and 8.94% and in cases were 27.18%, 39.3%, 22.24%, and 11.28%, respectively. The crude OR revealed that phenotype O was a protective factor for GC (0.63; CI: 0.56–0.72) ($P < 0.0001$) compared to phenotype A (1.30; CI: 1.15–1.47) ($P < 0.0001$) and AB (1.29; 1.07–1.57) ($P < 0.01$), which were risk factors for GC. The crude OR for phenotype B was 1.09 (CI: 0.94–1.24) ($P = 0.27$), revealing that it is not protective nor risk for GC in this study. The adjusted OR for age, sex, family history of GC, BMI, comorbidity status, smoking status, and drinking status using multivariable logistic regression models, using phenotype O as a reference baseline risk of 1.00, revealed an adjusted OR for phenotype A of 1.21 (CI: 1.14–1.39) ($P = 0.012$), AB of 1.17 (CI: 1.08–1.26) ($P = 0.038$), and B of 0.97 (CI: 0.84–1.04) ($P = 0.63$), indicating a confounding effect for other risk factors on the crude OR.

Table 1. Comparison of participants' characteristics between controls and cases.

Variable		Control	Gastric Cancer Cases
No		2472	2145
Age	Mean (SD)	33.3 (9.76)	59.5 (11.91)
	≤65 (%)	1755 (71.0%)	1357 (63.26%)
	>65 (%)	717 (29.0%)	788 (36.74%)
Gender	F n (%)	936 (37.86 %)	714 (33.29%)
	M n (%)	1536 (62.14%)	1431 (66.71%)
Smoking Status	Smoker n (%)	1049 (42.44%)	929 (43.33%)
	None-smoker n (%)	1423 (57.56%)	1216 (56.67%)
Drinking Status	Drinker n (%)	1389 (56.19%)	882 (41.12%)
	Non-drinker n (%)	1083 (43.81%)	1263 (58.88%)

[a] Comorbidity	Yes n (%)		112 (4.53%)		2082 (97.06%)	
	No n (%)		2360 (95.47%)		63 (2.94%)	
Family history of GC	Yes n (%)		746 (30.18%)		609 (28.39%)	
	No n (%)		1726 (69.82%)		1536 (71.61%)	
BMI Mean (SD)	Mean (SD)		20.83 (2.14)		23.45 (3.36)	
TNM Stage	I n (%)		-		1637 (63.73%)	
	II n (%)				301 (14.03%)	
	III n (%)				330 (15.38%)	
	IV n (%)				147 (6.86%)	
Early Vs Advanced	EGC n (%)		-		1329 (61.96%)	
	AGC n (%)				816 (38.04%)	
Surgical Access	Laparoscopic n (%)		-		1009 (47.04%)	
	Open n (%)				1136 (52.96%)	
Gastrectomy Extent	TG n (%)		-		550 (25.64%)	
	STG n (%)				1430 (66.67%)	
	Other n (%)				165 (7.7%)	
ABO-Rh n (%)	A	Rh+	818 (33.1%)	816 (99.76%)	843 (39.3%)	842 (99.88%)
		Rh-		2 (0.24%)		1 (0.12%)
	B	Rh+	517 (21.0%)	514 (99.42%)	477 (22.24%)	476 (99.79%)
		Rh-		3 (0.58%)		1 (0.21%)
	O	Rh+	916 (37.1%)	915 (99.89%)	583 (27.18%)	580 (99.50%)
		Rh-		1 (0.11%)		3 (0.50%)
	AB	Rh+	221 (8.94%)	220 (99.5%)	242 (11.28%)	241 (99.58%)
		Rh-		1 (0.5%)		1 (0.42%)

SD: standard deviation, n: number of participants, F: female, M: male, P: probability value, BMI: body mass index, ABO: blood groups, Rh: rhesus factor, GC: gastric cancer, EGC: early gastric cancer, AGC: advanced gastric cancer, TNM: T for tumor .depth, N for nodal status, M for metastases, comorbidity: DM, HTN, IHD, Hyperlipidemia, a: P = 0.034

Table 2. Comparison of participants' characteristics by ABO-Rh between controls and cases.

Variable		Control				Gastric Cancer Cases			
No		2472				2145			
		A	B	O	AB	A	B	O	AB
ABO n (%)		818 (33.1%)	517 (21.0%)	916 (37.1%)	221 (8.94%)	843 (39.30%)	477 (22.24%)	583 (27.18%)	242 (11.28%)
Rh	Rh+ n (%)	816 (99.76%)	514 (99.42%)	915 (99.89%)	220 (99.5%)	842 (99.88%)	476 (99.79%)	580 (99.50%)	241 (99.58%)
	Rh- n (%)	2 (0.24%)	3 (0.58%)	1 (0.11%)	1 (0.5%)	1 (0.12%)	1 (0.21%)	3 (0.50%)	1 (0.42%)
Age	Mean (SD)	28.6 (9.03)	31.4 (8.94)	33.1 (8.57)	40.2 (8.79)	58.88 (6.38)	59.52 (5.97)	60.55 (4.86)	59.07 (5.73)
	≤65 (%)	671 (82.03%)	368 (71.18%)	599 (65.4%)	117 (52.94%)	561 (66.55%)	299 (62.68%)	356 (61.06%)	141 (58.26%)
	>65 (%)	147 (17.97%)	149 (28.82%)	317 (34.6%)	104 (47.06%)	282 (33.45%)	178 (37.32%)	227 (38.93%)	101 (41.74%)
Gender	F n (%)	314 (38.4%)	211 (40.8%)	332 (36.2%)	79 (35.7%)	291 (34.52%)	161 (33.75%)	182 (31.22%)	80 (33.06%)
	M n (%)	504 (61.6%)	306 (59.2%)	584 (63.8%)	142 (64.3%)	552 (65.48%)	316 (66.25%)	401 (68.78%)	162 (66.94%)
Smoking Status	Smoker n (%)	386 (47.2%)	170 (32.9%)	415 (45.3%)	78 (35.3%)	351 (41.64%)	199 (41.7%)	275 (47.17%)	104 (43.0%)
	None-smoker n (%)	432 (52.8%)	347 (67.1%)	501 (54.7%)	143 (64.7%)	492 (58.36%)	278 (58.3%)	308 (52.83%)	138 (57.0%)
Drinking Status	Drinker n (%)	422 (51.59%)	335 (64.8%)	487 (53.17%)	145 (65.61%)	349 (41.4%)	188 (39.41%)	251 (43.05%)	94 (38.84%)
	Non-drinker n (%)	396 (48.41%)	182 (35.2%)	429 (46.83%)	76 (34.39%)	949 (58.60%)	289 (60.59%)	332 (56.95%)	148 (61.16%)
[a] Comorbidity	Yes n (%)	29 (3.54%)	23 (4.45%)	57 (6.2%)	3 (1.36%)	822 (97.51%)	461 (96.65%)	559 (95.88%)	237 (97.90%)
	No n (%)	789 (96.46%)	494 (95.55%)	859 (93.8%)	218 (98.64%)	21 (2.49%)	16 (3.35%)	24 (4.12%)	5 (2.10%)
Family history of GC	Yes n (%)	267 (32.64%)	160 (30.9%)	232 (25.33%)	87 (39.37%)	249 (29.54%)	132 (27.67%)	160 (27.44%)	68 (28.10%)
	No n (%)	551 (67.36%)	357 (69.1%)	684 (74.67%)	134 (60.63%)	594 (70.46%)	345 (72.33%)	423 (72.56%)	174 (71.90%)
BMI Mean (SD)	Mean (SD)	19.7 (1.37)	20.1 (1.49)	18.9 (0.86)	24.6 (2.26)	23.41 (2.89)	23.61 (3.04)	23.38 (2.91)	23.59 (3.13)
TNM Stage	I n (%)	-				543 (64.41%)	304 (63.73%)	376 (64.50%)	144 (59.50%)
	II n (%)					135 (16.01%)	53 (11.11%)	79 (13.55%)	34 (14.05%)
	III n (%)					112 (13.29%)	88 (18.45%)	87 (14.92%)	43 (17.77%)
	IV n (%)					53 (6.29%)	32 (6.71%)	41 (7.03%)	21 (8.68%)
Early Vs Advanced	EGC n (%)	-				537 (63.70%)	292 (61.22%)	361 (61.92%)	139 (57.44%)
	AGC n (%)					306 (36.30%)	185 (38.78%)	222 (38.08%)	103 (42.56%)
Surgical Access	Laparoscopic n (%)	-				387 (45.90%)	228 (47.80%)	278 (47.68%)	116 (47.90%)
	Open n (%)					456 (54.10%)	249 (52.20%)	305 (52.32%)	126 (52.10%)

Gastrectomy Extent	TG n (%)	-	202 (23.96%)	119 (24.95%)	166 (28.47%)	63 (26.03%)
	STG n (%)		567 (67.26%)	332 (69.60%)	369 (63.3%)	162 (66.94%)
	Other n (%)		74 (8.78%)	26 (5.50%)	48 (8.23%)	17 (7.25%)

SD: standard deviation, n: number of participants, F: female, M: male, P: probability value, BMI: body mass index, ABO: blood groups, Rh: rhesus factor, GC: gastric cancer, EGC: early gastric cancer, AGC: advanced gastric cancer, TNM: T for tumor depth, N for nodal status, M for metastases, comorbidity: DM, HTN, IHD, Hyperlipidemia, a: P = .034 between cases .and controls

.Table 3. Association of ABO with gastric cancer

ABO type	Controlsn (%) 2472	Gastric Cancer Cases n (%) 2145	OR (95% CI)			
			Crude OR (95% CI)	P	Adjusted OR (95% CI)	P
O	916 (37.1%)	583 (27.18%)	0.6340 (0.5593–0.7187)	<0.0001	1.00 (reference)	-
A	818 (33.1%)	843 (39.3%)	1.3021 (1.1542–1.4689)	<0.0001	1.21 (1.14–1.39)	0.012
B	517 (21.0%)	477 (22.24%)	1.0914 (0.9396–1.2446)	0.27	0.97 (0.84–1.04)	0.63
AB	221 (8.94%)	242 (11.28%)	1.2953 (1.0687–1.5699)	<0.01	1.17 (1.08–1.26)	0.038

n: number of participants, P: probability value, ABO: blood groups, CI: confidence interval, OR: Odds ratio, a: multivariable .adjustment by age, gender, smoking status, drinking status, BMI category, family history of gastric cancer, and comorbidity

Discussion

The ABO blood group distribution exhibits its significant variation among different ethnic groups and geographical territories [16,30]; thus, we evaluated cases and controls from the same ethnically homogenous Korean population to explore the qualitative and quantitative nature of the association between ABO blood groups and GC. Although standard serological phenotypical determination of blood groups may lead to different predictions and results in contrast to genotype determination, these differenc-

es are negligible in ethnically homogenous populations, as the reported discordance rate between phenotypical and genotypical grouping is 0.12% in Korea and 0.18% in Japan [20-33]. The association between ABO blood groups and gastric carcinoma has been extensively investigated. Although the results are conflicting [10, 16, 17], group A is recognized as an established risk factor for GC [10, 15, 34-36], which was confirmed in the present study (crude and adjusted OR) (Table 4), as well as in a recent large scale prospective study using standard serological ABO blood grouping [37].

Our study also confirmed the protective effect of group O against GC (crude OR) (Table 4), which has been demonstrated in multiple previous studies [3, 18], and is a protective factor against certain types of skin cancer [36] and pancreatic exocrine carcinoma [17, 39, 40]; however, group O has been shown to be a risk factor for benign gastric epithelial diseases (e.g., gastric peptic ulcer disease, H. pylori infection, and stomal ulcers) [8, 9, 11, 37]. This study is also consistent with previous studies showing that group B is neither a risk nor a protective factor for GC [33] (Table 4); however, group B is a risk factor for ovarian carcinoma [41], and vulvar cancer[42], and group O although protective factor for ovarian and vulvar cancer[42], is associated with increased risk of relapse of these cancers[42]. The most important finding of our study is that group AB is also a risk factor for GC (Table 4), which has been observed in few other studies, particularly in populations of Asian descent [43]; however, this meta-analysis showed that the risk factor effect of the AB group was maintained in the subgroup suffering from a high prevalence of H. pylori infection compared to that with a low prevalence of H. pylori infection, which may be a significant confounding factor [43] given that the AB group is considered a protective factor against H. pylori infection [11]. Thus, we found that the AB group is an independent risk factor for GC, as H. pylori infection was an exclusion criterion for both cases and controls (Table 4).

There were no significant difference between sexes (Tables 1, 2, and 3), although numerous modifiable risk factors for GC, such as smoking and drinking habits, are more common in Korean males than in females, as demonstrated by Song et al. 2013, who found that the A allele was only a risk factor in females with fewer modifiable risk factors compared to males with more modifiable risk factors, confounding the effect of the A allele [30, 16]. We found no significant difference between blood groups regarding the clinicopathologic characteristics of GC in terms of TNM stage (American Joint Committee on Can-

cer 7th edition 2010), surgical access type (open vs. laparoscopic), and extent of gastrectomy (total gastrectomy, subtotal gastrectomy, other) (Table 3). This is likely because most cases were screen-detected EGC across all blood groups. Other studies showed an association between ABO blood groups and GC clinicopathological characteristics, including the association between group A and the diffuse histological subtype [10, 30]; however, other studies failed to show an association between ABO blood groups and the tumor site of origin [30, 44]. The prognostic impact of ABO blood groups on GC survival was investigated, and the results showed that group AB has the best prognostic outcome compared to non-AB blood groups, with group A having the worst prognosis [45].

The strengths of this study include the well-powered large sample and ethnic homogeneity, which mitigate the confounding effect of the discordant rate of the blood group distribution that is sensitive to geographical and ethnic variations. One limitation of this study is that the controls were blood donors, which may have led to selection bias because of the strict inclusion and exclusion criteria of blood banks, altering the risk of the controls, e.g., being younger, less obese, and suffering fewer comorbidities. However, this effect was mitigated by the fact both controls and cases had no history of H. pylori or peptic ulcer disease, and showed no significant differences regarding other modifiable (i.e., smoking and drinking status) and non-modifiable (i.e., sex and family history of GC) risk factors. Further limitations of the study are the potential residual confounding due to differences between cases and controls, all limitations and risk of bias inherent to the study design, and an inability to generalize the results to other populations.

Conclusion

This large-scale case-control study was conducted to investigate the nature of the association between ABO blood groups and GC risk. The results were consistent with those of previous studies showing that group A is a risk factor for GC, group O is a protective factor, and group B is a neutral factor. The most important finding of this study is that group AB was observed to be an independent risk factor for GC even when other confounding factors (e.g., H. pylori seropositivity, smoking and drinking habits, sex, age, BMI, comorbidities, and family history of GC) were controlled. These results provide a foundation for further epidemiological studies to determine the underlying etiological mechanism of the A antigen in GC carcinogen-

esis to identify targets for prevention by risk-modification strategies, therapy, and prognosis prediction.

Acknowledgments

The authors would like to thank Dr. Suliman Almutairi MBBS, Dr. Suliman Al-Alshaikh MBBS, Dr. Abdul-Aziz Alhindi MBBS, and Dr. Ahmed Alhumaid MBBS for their valuable help in linguistic editing and drafting of this manuscript.

Ethics approval and consent to participate

Informed consent was obtained from all participants and IRB approval obtained from Saint Mary Catholic University Hospital, Seoul, Republic of Korea, as well as from King Fahd Medical City, Riyadh, KSA (IRB log number: 19-646E)

Conflict of Interest:
The authors declare no conflict of interest regarding this manuscript, and no funding was received for this manuscript from any public or private institution.

References

[1] Storry JR, Olsson ML. The ABO blood group system revisited: a review and update. Immunohematology 2009;25(2):48.

[2] Eastlund T. The histo-blood group ABO system and tissue transplantation. Transfusion 1998;38(10):975-988.

[3] Zhang BL, He N, Huang YB, Song FJ, Chen KX. ABO blood groups and risk of cancer: a systematic review and meta-analysis. Asian Pac J Cancer Prev 2014;15(11):4643-4650.

[4] Franchini M, Capra F, Targher G, Montagnana M, Lippi G. Relationship between ABO blood group and von Willebrand factor levels: from biology to clinical implications. Thromb J 2007;5(1):14.

[5] Franchini M, Favaloro EJ, Targher G, Lippi G. ABO blood group, hypercoagulability, and cardiovascular and cancer risk. Crit Rev Clin Lab Sci 2012;49(4):137-149.

[6] Kalita, C., Sarma, A., Sharma, J. D., Kalita, M., Krishnatreya, M., & Kataki, A. C. (2018). Correlation between ABO blood groups and various cancers in the north eastern region of India: a retrospective observational study. International Journal of Research in Medical Sciences, 6(11), 3643.

[7] Hakomori SI. Antigen structure and genetic basis of histo-blood groups A, B and O: their changes associated with human cancer. Biochim Biophys Acta 1999;1473(1):247-266.

[8] Buckwalter JA, Wohlwend EB, Colter DC, Tidrick RT, Knowler LA. ABO blood groups and disease. JAMA 1956;162(13):1210-1215.

[9] Doll R, Swynnerton BF, Newell AC. Observations on blood group distribution in peptic ulcer and gastric cancer. Gut 1960;1(1):31-35.

[10] Nakao M, Matsuo K, Ito H, Shitara K, Hosono S, Watanabe M, et al. ABO genotype and the risk of gastric cancer, atrophic gastritis, and Helicobacter pylori infection. Cancer Epidemiol Prev Biomarkers 2011;20(8):1665-1672.

[11] Kanbay M, Gür G, Arslan H, Yilmaz U, Boyacioĝlu S. The relationship of ABO blood group, age, gender, smoking, and Helicobacter pylori infection. Dig Dis Sci 2005;50(7):1214-1217.

[12] Doll R, Drane H, Newell AC. Secretion of blood group substances in duodenal, gastric and stomal ulcer, gastric carcinoma, and diabetes mellitus. Gut 1961;2(4):352-359.

[13] Wang Z, Liu L, Ji J, Zhang J, Yan M, Zhang J, et al. ABO blood group system and gastric cancer: a case-control study and meta-analysis. Int J Mol Sci 2012;13(10):13308-13321.

[14] Teshome, Y., Mekonen, W., Birhanu, Y., & Sisay, T. (2019). The association between ABO blood group distribution and peptic ulcer disease: a cross-sectional study from Ethiopia. Journal of blood medicine, 10, 193.

[15] Aird I, Bentall HH, Roberts JF. Relationship between cancer of stomach and the ABO blood groups. BMJ 1953;1(4814):799.

[16] Su M, Lu SM, Tian DP, Zhao H. Relationship between ABO blood groups and carcinoma of esophagus and cardia in Chaoshan inhabitants of China. World J Gastroenterol 2001;7(5):657.

[17] Iodice S, Maisonneuve P, Botteri E, Sandri MT, Lowenfels AB. ABO blood group and cancer. Eur J Cancer 2010;46(18):3345-3350.

[18] Beckman L, Ängqvist KA. On the mechanism behind the association between

ABO blood groups and gastric carcinoma. Hum Hered 1987;37(3):140-143.

[19] Crew KD, Neugut AI. Epidemiology of gastric cancer. World J Gastroenterol 2006;12(3):354.

[20] Brenner H, Rothenbacher D, Arndt V. Epidemiology of stomach cancer. In Cancer Epidemiology. Humana Press, Bethesda, USA, 2009; pp. 467-477.

[21] Jung KW, Park S, Kong HJ, Won YJ, Lee JY, Park EC, et al. Cancer statistics in Korea: incidence, mortality, survival, and prevalence in 2008. Cancer Res Treat 2011;43(1):1.

[22] Bray F, Ferlay J, Soerjomataram I, et al. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018; 68:394-424.

[23] Sitarz R, Skierucha M, Mielko J, Offerhaus GJA, Maciejewski R, Polkowski WP. Gastric cancer: epidemiology, prevention, classification, and treatment. Cancer Manag Res 2018; 10:239.

[24] Anderson WF, Camargo MC, Fraumeni JF, Correa P, Rosenberg PS, Rabkin CS. Age-specific trends in incidence of noncardia gastric cancer in US adults. JAMA 2010;303(17):1723-1728.

[25] Shin CM, Kim N, Yang HJ, Cho SI, Lee HS, Kim JS, et al. Stomach cancer risk in gastric cancer relatives: interaction between Helicobacter pylori infection and family history of gastric cancer for the risk of stomach cancer. J Clin Gastroenterol 2010; 44(2):e34-e39.

[26] Hayashi Y (Ed.). Diet, Nutrition and Cancer: Proceedings of the 16th International Symposium of the Princess Takamatsu Cancer Research Fund, Tokyo, 1985 (Vol. 16). VSP. 1986.

[27] Plummer M, Franceschi S, Vignat J, Forman D, de Martel C. Global burden of gastric cancer attributable to Helicobacter pylori. Int J Cancer 2015;136(2):487-490.

[28] Yusefi, A. R., Lankarani, K. B., Bastani, P., Radinmanesh, M., & Kavosi, Z. (2018). Risk factors for gastric cancer: a systematic review. Asian Pacific journal of cancer prevention: APJCP, 19(3), 591.

[29] Rawla, P., & Barsouk, A. (2019). Epidemiology of gastric cancer: global trends, risk factors and prevention. Przeglad gastroenterologiczny, 14(1), 26.

[30] Song HR, Shin MH, Kim HN, Piao JM, Choi JS, Hwang JE, et al. Sex-specific differences in the association between ABO genotype and gastric cancer risk in a Korean population. Gastric Cancer 2013;16(2):254-260.

[31] Mizuno N, Ohmori T, Sekiguchi K, Kato T, Fujii T, Fujii K, et al. Alleles responsible for ABO phenotype-genotype discrepancy and alleles in individuals with a weak expression of A or B antigens. J Forensic Sci 2003;49(1):1-8.

[32] Cho D, Kim SH, Jeon MJ, Choi KL, Kee SJ, Shin MG, et al. The serological and genetic basis of the cis-AB blood group in Korea. Vox Sanguinis 2004;87(1):41-43.

[33] Cho D, Song HR, Won EJ, Shin DJ, Shin MH, Kwon SY, et al. Application of real-time PCR for ABO genotyping for large-scale population screening. Korean J Blood Transfus 2011;22(2):110.

[34] Beasley WH. Blood groups of gastric ulcer and carcinoma. Br Med J 1960;1(5180):1167.

[35] Fuchs CS, Mayer RJ. Gastric carcinoma. N Engl J Med 1995;333(1):32-41.

[36] Lissowska J, Groves FD, Sobin LH, Fraumeni JJ, Nasierowska-Guttmejer A, Radziszewski J, et al. Family history and risk of stomach cancer in Warsaw, Poland. Eur J Cancer Prev 1999;8(3):223-227.

[37] Edgren G, Hjalgrim H, Rostgaard K, Norda R, Wikman A, Melbye M, et al. Risk of gastric cancer and peptic ulcers in relation to ABO blood type: a cohort study. Am J Epidemiol 2010;172(11):1280-1285.

[38] Xie J, Qureshi AA, Li Y, Han J. ABO blood group and incidence of skin cancer. PloS One 2010;5(8):e11972.

[39] Risch HA, Yu H, Lu L, Kidd MS. ABO blood group, Helicobacter pylori seropositivity, and risk of pancreatic cancer: a case–control study. J Natl Cancer Inst 2010;102(7):502-505.

[40] Wolpin BM, Kraft P, Xu M, Steplowski E, Olsson ML, Arslan AA, et al. Variant ABO blood group alleles, secretor status, and risk of pancreatic cancer: results from the pancreatic cancer cohort consortium. Cancer Epidemiol Biomarkers Prev 2010;19(12):3140-3149.

[41] Gates MA, Wolpin BM, Cramer DW, Hankinson SE, Tworoger SS. ABO blood group and incidence of epithelial ovarian

cancer. Int J Cancer 2011;128(2):482-486.

[42] Sartorius, C. M., Schoetzau, A., Kettelhack, H., Fink, D., Hacker, N. F., Fedier, A., ... & Heinzelmann-Schwarz, V. (2018). ABO blood groups as a prognostic factor for recurrence in ovarian and vulvar cancer. PloS one, 13(3), e0195213.

[43] Mao Y, Yang W, Qi Q, Yu F, Wang T, Zhang H, et al. Blood groups A and AB are associated with increased gastric cancer risk: evidence from a large genetic study and systematic review. BMC Cancer 2019;19(1):164.

[44] Glober GA, Cantrell EG, Doll R, Peto R. Interaction between ABO and rhesus blood groups, the site of origin of gastric cancers, and the age and sex of the patient. Gut 1971;12(7):570-573.

[45] Xu YQ, Jiang TW, Cui YH, Zhao YL, Qiu LQ. Prognostic value of ABO blood group in patients with gastric cancer. J Surg Res 2016;201(1):188-195.

Original article

Patients' Satisfaction with Dental Services in the Eastern Province Military Hospitals, Saudi Arabia.

Mohammad Joman Alzahrani
Department of Dental & Oral Health, Prince Sultan Military College of Health Sciences, Dhahran, 31932, Saudi Arabia

Received on 18.11.2019, accepted for publication on 2.4.2020, (Doi : dx.doi.org/10.5455/mjhs.2020.03.013)

Correspondence author:
Mohammad Joman Alzahrani, Assistant Professor, Department of Dental & Oral Health, Prince Sultan Military College of Health Sciences, Dhahran, 31932, Saudi Arabia
Mobile: +966-55 696 6683 - Email address: jomman@psmchs.edu.sa / malza001@odu.edu

Abstract

Background:
The quality of services provided by a dental specialist is a major concerned. The level of anxiety and stress among dental specialists has increased due to patients complaint.

Aim:
The purpose of this research is to measure the overall patients' satisfaction with the quality of dental services provided at Eastern Province Military Hospitals, Saudi Arabia

Methods:
The researcher has conducted a cross-sectional analytical study at dental clinics of three military hospitals. A stratified random sampling technique was employed in the data collection from pre-tested questionnaires. Descriptive statistics were followed by inferential statistics. Chi-square test (X2) and Fischer's exact test were also used to assess the male and female satisfaction levels.

الملخص

الخلفية:
ان جودة الخدمات المُقدَّمة من قبل أخصائي طب الأسنان هي أمرٌ جدير بالإهتمام. لقد إرتفع مستوى القلق والضغط عند أخصائيي طب الأسنان نتيجة لشكاوى المرضى.

الهدف:
إن الغرض من هذا البحث هو قياس الرضا الشامل للمرضى بما يتعلق بجودة خدمات طب الأسنان العلاجية المتوفّرة في المستشفيات العسكرية في المنطقة الشرقية في المملكة العربية السعودية.

طريقة البحث:
لقد أجرى الباحث دراسة مقطعية تحليلية والتي شملت ثلاث عيادات للأسنان في ثلاث مستشفيات عسكرية. لقد تم إعتماد تقنية أخذ عينات عشوائية شرائحية لتجميع المعلومات بواسطة إستبيانات تم إختبارها مسبقاً. الإحصاء الوصفي تبعه إحصاء إستنتاجي. لقد تم ايضاً إستخدام كل من إختبار (Chi-square (X٢ وإختبار Fisher الدقيق لتقييم مستويات الرضا لدى الذكور والإناث.

النتائج:
كان عدد المشاركين في هذه الدراسة ٢٤٧ مريضاً، منهم ٦٩,٦٪ إناث و ٣٠,٤٪ ذكور. أظهرت العوامل المرتبطة برضا المرضى نسبة مئوية تُعادل ٧١,٠٪ SD ± ١٤,٣١، وتشير المجالات الأربع للرضا إلى مستوى متوسط من الرضا.

Results:
The number of participants in this study was 247 patients, in which 69.6% were female and 30.4% were male. The factors associated with patient satisfaction disclosed a mean percentage of 71.0% SD ± 14.31, for the four domains of satisfaction indicate an average level of satisfaction. The results also show a significant difference in male and female patients' satisfaction in specific areas such as asking personal questions during the visit, or prolonged waiting time for appointments and maintaining confidentiality ($P < 0.05$).

Conclusion:
Patient-dentist interaction and system/ administrative efficiency are the factors that have the most significant effect on patients' satisfaction at these three sites. It is recommended that hospital administration arranges awareness sessions to enlighten dental service providers about professional conduct, sessions on how to avoid long waiting periods for dental appointments, and on how evening or weekend clinics could accommodate more patients.

Keywords:
Military Hospital; Dental services; Satisfaction; Saudi Arabia

ايضاً أظهرت النتائج فرقاً واضحاً في الرضا بين المرضى الذكور والمرضى الإناث في نقاط محددة مثل الأسئلة الشخصية خلال الزيارة أو طول وقت الإنتظار قبل المعاينة والحفاظ على السّرية. (P < ٠,٠٥)

الخلاصة:
إن التفاعل بين المريض والطبيب وفعالية النظام الإداري كانا عاملين مؤثرين جداً على رضا المرضى في تلك المواقع الثلاثة. يوصى بالإقتراح على إدارة تلك المستشفيات بأن تقوم بتنظيم دورات توعية لتثقيف الممارسين في حقل طب الأسنان حول السلوك المهني وبدورات حول كيفية تجنّب فترات الإنتظار الطويلة للمواعيد إضافة إلى كيف ان العيادات المسائية وعيادات عطلة نهاية الأسبوع قد تستوعب المزيد من المرضى.

الكلمات المفتاحية:
المستشفى العسكري، خدمات طب الأسنان، الرضا، العربية السعودية

Introduction

Patients' satisfaction is crucial for all dental specialists and has been shown to impact compliance and the success of treatment in both developed and developing countries[1]. The degree of patients' satisfaction is the major factor in determining the achievement of the services provided by oral health clinics. Also, it plays a huge role in the improvement of all services provided by dental specialists [2]. The reputation of all dental clinics is based on patients' satisfaction. Patient's satisfaction feedback used as a tool to measure the quality of all dental services. In this manner, patient satisfaction is a significant part of oral health care, which can affect treat-

ment outcomes[3].

The level of anxiety and stress among dental specialists has increased due to patients complaint[4].

The perception of a patient's family and friends about dental practice can be an effect due to unhappiness of dental services. Therefore, professional conduct should be promoted among all dental care providers. Moreover, patients' concerns about dental service should not be ignored and took immediate appropriate action[5].

Patients' attitude toward dental treatment is highly impacted by their satisfaction in dental services. According to Öhrn and Jönsson [6], satisfied patients are always attending their appointment, less fear of dental treatment, and pain perception. Establishing rapport between dentists and patents will enhance patients' commitment to dental appointments and advice. In order to evaluate the quality of dental services, patient satisfaction and contentment need to be appropriately addressed [7]. It also affects clinical outcomes and patient retention[8].

The health care sector is rapidly developing in Saudi Arabia. The government recognizes it together with an educational sector to be the top priority of its inner policy spending, a large amount of money on its growth and functioning. The positive tendency can be recognized. Namely, the quality and quantity of health care services have significantly improved in the past view decades[9]. However, this is still not the top positive outcome that can be reached. Therefore, a thorough investigation of patients' satisfaction with dental services is necessary as it can further improve the quality of health care services. Dental care was chosen to be researched as this sphere is among one of the most rapidly developing ones, and it is still not able to cover the demand for dental services. It is worth mentioning that Saudi Arabia might become the top dental, medical care destination in the Middle East region. As for now, dental medicine in Saudi Arabia is on the rise, with the prices cheaper here than in the Western and European countries. In turn, it makes it possible to suggest that the improvement of the quality of dental services might make Saudi Arabia the world's top destination for dental health medicine. Therefore, this study seeks to define the key factors influencing patients' satisfaction and the need to develop some further recommendations on how to enhance the standard of dental care services in Saudi Arabia.

This study focus on measuring overall patients' satisfaction levels towards the quality of dental services provided at Eastern Province Military Hospitals of Saudi Arabia. It also aims to measure the difference

in satisfaction levels concerning male and female patients.

Materials and methods

A cross-sectional analytical study was done at the dental clinics of the three military hospitals. The numbers of participants in this study were 300. The targeted hospitals were King Abdul-Aziz Airbase Hospital, Dhahran, King Fahd Military Medical Complex, Dhahran, and King Abdul-Aziz Naval base Hospital, Jubail from October to December 2018.

For sample size, a stratified random sampling technique was used, which based on a number of patients with a 95% confidence level (±0.05). Approximately 100 patients were selected equally from each hospital.

The study included patients having the privileges and legality to be treated within these military hospitals. One of the prerequisites of the survey was that the respondents had to be 18 years of age or older.

For data collection, a previously validated questionnaire based on a Mahrous and Hifnawy[10] study were used to measure patients' satisfaction. A granted written permission was received via email from the authors.

The questionnaire consists of 19 questions, which were designed to evaluate the factors affecting patients' satisfaction. The questionnaire consists of socio-demographic characteristics
(age, gender, and nationality); the questionnaire consisted of four sections. The first section of the questionnaire was about patient-dentist personal interaction (9 questions). The second section was related to patient satisfaction with technical competency (4 questions). The third section was about administrative efficiency
(4 questions), and the last section was about the clinical setup environment
(2 questions).

The survey was distributed to all participants with guidance. The responses were collected at the end of a dental care session to cover all factors included in the questionnaire. Some participants were excluded from the study due to their incomplete treatment or refused to participate in this study.

The English and Arabic questionnaires were used with a Likert scale (5 points) ranging from 1 to 5
(Strongly Disagree, Disagree, Uncertain, Agree, and Strongly Agree). For data analysis, the 5-point scale was afterward converted to a 3-point response scale ranging from 1 to 3.
(1 = Strongly Disagree & Disagree, 2 = Neutral and 3 = Strongly Agree & Agree). In the questionnaire, the standard pattern

for answering was avoided by using negative and positive statements. Therefore, meticulous reading of all questions by participants has been maintained.

Microsoft Excel was used for data tabulation and then analyzed by Statistical Package for the Social Sciences (SPSS, V.23, Chicago, Illinois USA). All results were calculated for qualitative and quantitative data. The association between patient satisfaction and gender were evaluated by Chi-square (X2) and Fisher's exact test. A P-value <0.05 was considered statistically significant.

Ethical approval was attained from the Institutional Review Board office at Prince Sultan Military College of Health Sciences, Dhahran (Ethical approval No. IRB-2019-DOH-036). The details regarding the objectives and benefits of this research were explained to participants, and informed consent was obtained before filling in the questionnaire. All information was kept classified and used only for statistical analysis.

Results

The response rate was 82.3 %, as 247 out of 300 questionnaires were returned. The patient's age ranged from 18 to 65 years (mean age= 31.86 years ±SD 9.8). The gender distribution showed 69.6% females and 30.4% males. More than 90 % of the respondents were Saudi nationals (Table no.1).

Table no. 1 Demographic characteristics of the respondents

Demographical Variable		N	%
Gender	Male	75	30.4
	Female	172	69.6
Nationality	Saudi	231	93.5
	Non Saudi	16	6.5
Age (years)	Less than 30	41	16.2
	31 – 40	80	32.4
	41 – 50	70	28.3
	51 – 60	42	17.0
	Greater than 60	16	6.1

Table no. 2 displays the overall average percent mean score of 71.0 (range 29.4 – 89.0, ±SD 14.31) for all four disciplines indicate an average level of patients' satisfaction. The mean percentage of agreement with regard to the satisfaction of four disciplines was done by calculating the level of satisfaction. It also shows the mean satisfaction for each discipline.

Table no. 2 Overall satisfaction for the four main discipline

Item	Minimum % (Agree)	Maximum % (Agree)	Mean % (Agree)	SD
Patient dentist interaction (PDI) (9 items)	29.4	86.3	72.3	±17.96
Technical Competency (TC) (4 items)	66.8	89.0	76.5	±9.22
Administrative efficiency (AE) (4 items)	56.6	68.0	60.5	±5.38
Clinical setup environment (CS) (2 items)	66.6	83.8	75.7	±12.16
Overall average percent mean score (19 items	29.4	89.0	71.0	± 14.31

Table no. 3 indicates satisfaction with regard to individual items in the questionnaire. It was noticed that 86.3 % of responded patients agreed on the item that dentists did not ask a question about personal life during treatment, and 85.8 % agree on their friendly behavior. However, this table also shows that only 29.4% of the patients agree that they were not compelled to get dental care from a student. Table no. 3 also showed 89% reported that dental instruments used were sterilized. In the administrative efficacy domain, 56.6 % of patients were satisfied because they do not have an extended appointment wait time and treatment. In the clinical setup environment, 66.6 % of patients agreed about comfortable waiting areas.

Table no. 3: Patients' satisfactions regarding individual item in the questionnaire.

Item	Disagree *N* (%)	Neutral *N* (%)	Agree *N* (%)
Patient dentist interaction (9 items)			
Dental Staff did not talk with each other while providing treatment	40 (16.2)	59 (23.9)	148 (59.9)
Dental Staff were concentrating on their work.	19 (7.7)	28 (11.3)	200 (81.0)
Dentist was friendly with me.	19 (7.7)	16 (6.5)	212 (85.8)
Dentist explained the procedures before start of treatment.	25 (10.1)	27 (10.9)	195 (78.9)
Dentist gave me advice after treatment.	24 (9.7)	22 (8.9)	201 (81.4)
Dentist facial's expression was cheerful with a smile.	30 (12.1)	24 (13.8)	183 (74.1)
Dentist did not criticize my oral condition or compared it with others.	33 913.3)	29 (11.7)	182 (74.9)
Dentist did not ask personal question during offering care.	19 (7.7)	15 (6.1)	213 (86.3)
I was not obliged to receive dental care by a student	99 (40.1)	68 (27.5)	80 (29.4)
Technical Competency (4 items)			
Treatment offered was not painful.	27 (10.9)	36 (14.6)	184 (74.5)
Thorough dental examination.	22 (8.9)	38 (15.4)	187 (75.7)
I received good quality treatment; e.g. Filling did not get dislodged or broken.	47 (19.0)	35 (14.2)	165 (66.8)
Dental instrument used were sterilized.	4 (1.6)	23 (9.3)	220 (89.0)

Administrative efficiency (4 items)			
Working hours of the clinic were suitable for me.	69 (28.0)	28 (11.30	150 (60.8)
I did not wait for long time to have an appointment.	85 (34.4)	38 (15.4)	140 (56.6)
Short waiting time to get the treatment.	60 (24.3)	47 (19.0)	140 (56.6)
Complete dental treatment.	45 (18.2)	34 (13.8)	168 (68.0)
Clinical setup environment (2 items)			
Comfortable waiting area.	55 (22.3)	28 (11.3)	164 (66.6)
Privacy of treatment was insured.	23 (9.3)	17 (6.9)	207 (83.3)

Table no. 4 shows the relationship between the patients' gender and the features of the four disciplines of satisfaction. The study reveals significant differences between Male and Female in 1 issue within the patient-dentist interaction ''Dentists did not ask personal questions while offering care'', 1 item within the Administrative efficiency: ''I did not wait for long time to get an appointment,'' and 1 item within Clinical setup environment ''Privacy of treatment was insured'' are shown by the P-values.

Item	Gender		Total	*P* value
	Male	Female		
Patient dentist interaction (9 items)	*N* = 75 (30.4%)	*N* = 172 (69.2%)	*N* = 247	
Dental Staff did not talk with each other while providing treatment.	48 (64.0)	100 (58.2)	148	0.333
Dental Staff were concentrating on their work.	60 (80.0)	140 (81.3)	200	0.537
Dentist was friendly with me.	60 (80.0)	152 (88.4)	212	0.235
Dentist explained the procedures before start of treatment.	59 (78.7)	136 (79.1)	194	0.679
Dentist gave me advice after treatment.	61 (81.3)	130 (81.40	191	0.699
Dentist facial's expression was cheerful with a smile.	56 (74.6)	127 (73.8)	183	0.329
Dentist did not criticize my oral condition or compared it with others.	58 (77.3)	127 (73.8)	185	0.837
Dentist did not ask personal question during offering care.	66 (88.0)	147(85.40	213	0.009*
I was not obliged to receive dental care by a student	34 (45.3)	65 (37.7)	99	0.246
Technical Competency (4 items)				
Treatment offered was not painful.	61 (81.3)	123 (71.6)	184	0.448
Thorough dental examination.	55 (73.3)	132 (76.7)	187	0.312
I received good quality treatment; e.g. Filling did not get dislodged or broken.	47 (62.7)	118 (68.7)	165	0.497
Dental instrument used were sterilized.	67 (89.4)	153 (89.0)	220	0.509

Administrative efficiency (4 items)				
Working hours of the clinic were suitable for me.	46 (46.3	104 (60.5)	150	0.529
I did not wait for long time to have an appointment.	44 (58.6)	96 (55.9)	140	0.009*
Short waiting time to get the treatment.	45 (60.0)	95 (55.2)	140	0.702
Complete dental treatment.	50 (66.7)	118 (68.6)	168	0.419
Clinical setup environment (2 items)				
Comfortable waiting area.	52 (66.7)	114 (66.3)	166	0.967
Privacy of treatment was insured.	58 (77.3)	140 (88.6)	207	0.048*

Only those who agree on each of these are represented in table
*Significant at 0.05 level (Fischer's exact test used)

Discussion

The patients' satisfaction is not based on the treatment quality but other factors such as staff behavior, facilities, and basic environmental needs[11]. One of the primary targets of dental treatment is to attain the patients' satisfaction, and it is a vital benchmark for deciding the outcome and the quality of the dental care delivered[12]. The current study seeks to measure the patients 'satisfaction with dental care services in Eastern Province Military Hospitals in Saudi Arabia. The outlined topic was chosen for scientific research as the investigation of the positive aspects, as well as the shortcomings in the provision of dental services in the Eastern Province military hospitals. They may be extremely useful for the situation analysis of elements affecting patients' satisfaction with the direct effect of the quality of dental healthcare received by patients and the enhancement of the performance of the dental staff.

The response rate was 82.3%,which is almost comparable to the respondent of studies conducted by 80.2 % of Mahrous and Hifnawy [10] , 81.9 % of Balhaddad et al. [13]but higher than the study conducted in the United Kingdom by Bedi, Gulati and McGrath [14] of 69 %.

This study also shows a high percentage of females, 69.6% as compared to the male, which were 30.4 %. The reason for this higher female patient percentage is that all three hospitals provide cosmetic dental treatments such as veneers, bleaching, and orthodontic services. These services are popular among women. Similarly, transportation is often an issue for Saudi women, who are now allowed to drive cars in their country. All three hospitals are located near military housing, which makes transportation easy for Saudi women. The ease of transportation can be an important factor in female patient percentages. Non-Saudis were almost not represented in this study, because military hospitals

offer services only to non-Saudi staff who work inside the hospitals.

The levels of patient satisfaction were measured at three targeted military hospitals in the Eastern Province, namely the Armed Forces Hospital, Dhahran, King-Fahad Military Medical Complex, Dhahran, and King Abdul-Aziz Naval Base Hospital, Jubail. The overall average percent mean score of 71.0 (±SD 14.31), as shown in table 2, denotes an average level of patients'' satisfaction. But it was still lower reported by a study of dental patients conducted by Hossain, Fageeh and Elagib[15] at King Khalid University's College of Dentistry in Saudi Arabia, which revealed a high level of patient satisfaction (87%) and better than the satisfaction (61.7 %) reported by Othman and Abdel Razak[16].

In the present study, the high level of patient satisfaction at the three hospitals is attributed to the following factors: treatment is provided free of charge, dental care is easy to access in each hospital, and high-quality materials are used in clinics similar to the highly reputed clinics offering the same dental care and services.

Among the factors that were examined in this study, the technical competency of the dental staff had the highest satisfaction levels (76.5%), followed by Clinics set up/ environment (75.7%) and Patient-dentist interaction (72.3%). System/administrative efficiency was the lowest-scoring factor of influence on the patient's satisfaction level, scoring only (60.5 %.).

The reason behind a high level of satisfaction was staff competence, cleanliness, and having up-to-date equipment being military hospitals. These findings are harmonious to other studies conducted by Saudi Arabia[10, 12, 13, 17].

Lower patient satisfaction with system/administrative efficiency and clinic set up/environment can be attributed to the fact that the clinic hours are during weekdays from 7:30 am to 8:30 pm, the same hours that most military personnel must work. This means that patients must miss work to attend dental appointments. This negatively impacts their level of satisfaction. Besides, it is difficult to schedule an appointment because of the high demand for services and the shortage of dental providers at all three sites. That is why patients who have difficulty in obtaining an appointment conveniently reported a low degree of satisfaction as reported by Stepurko, Pavlova, and Groot[18].

In this study, among the association between gender and of the four disciplines of satisfaction, the question related to ''Dentists did not ask personal questions during offering care'' showed a significant statistical difference between female and male

students ($p < 0.05$) This attributed to the fact that females don't like to discuss their personal matter with unknown health care providers.

There was also a significant statistical difference between the female and male regarding the privacy of the offered treatment, which may be attributed to the design of clinic or females need, extended privacy during dental treatment.

Concerning the administrative efficiency domain, there is also a statistical difference between females and males regarding a long time to get an appointment. In fact, both males and females are dissatisfied regarding long waiting times. The possible reason for this is the high demand for services and the shortage of dental service providers in all three sites.

Conclusion

The study demonstrates that the average number of patients were satisfied with the overall dental service, such as patient-dentist communication, professional competency, administrative efficiency, and a clinical setup environment. With regard to gender, there is a significant difference among females and males in the privacy of offered treatment, the dentist asking a personal question, and long waiting time for an appointment.

Technical competency and patient-personnel interaction are the factors that have the most significant effect on patient satisfaction levels at these sites. On the other hand, the clinical setup environment is the fact that it has the most impact on levels of dissatisfaction.

Recommendation

It is recommended that hospital administration arrange awareness sessions in order to enlighten the dental service provider about professional conduct. In addition, to avoid long waiting periods for the dental appointments, evening or weekend clinics would accommodate more patients. In addition, attention is essential to improve the waiting area for the patients.

Limitations of the Research

Although the satisfactory response rate was achieved in the study, however, patients' satisfaction is a broad area and requires further research with large sample size and involving several military hospitals.

Acknowledgment:

The author would like to thank Dr. Mohammed Saad Mahrous and Dr. Tamar Hifnawy for granting permission to use their

questionnaires in this study and Mr. Waheed Ahmad Baig for sharing his expertise and technical assistance in editing and formatting this paper. The author would also like to thank the Department of Dental & Oral Health at PSMCHS for supporting this research.

Financial Support:

Nil.

Conflict of interest:

In this paper, the author did not declare any conflicts of interest.

References

[1] Fitzpatrick R. Surveys of patients satisfaction: I--Important general considerations. BMJ: British Medical Journal 1991;302:887-889.

[2] Mills I, Frost J, Cooper C, Moles DR, Kay E. Patient-centred care in general dental practice - a systematic review of the literature. BMC Oral Health 2014;14:64
.

[3] Baldwin A, Sohal A. Service quality factors and outcomes in dental care. Managing Service Quality: An International Journal 2003;13:207-216.

[4] Humphris G, Cooper C. New stressors for GDPs in the past ten years: a qualitative study. British dental journal 1998;185:404-406.

[5] AlBedah A, Khalil M, ElOlemy A, Alqaed M. Integrative medicine outcome and patient satisfaction in Saudi Governmental hospitals. Integrative Medicine Research 2015;4:122.

[6] Öhrn K, Jönsson B. A comparison of two questionnaires measuring oral health-related quality of life before and after dental hygiene treatment in patients with periodontal disease. International journal of dental hygiene 2012;10:9-14.

[7] Al-Hawary SIS. Health care services quality at private hospitals, from patients perspective: A comparative study between Jordan and Saudi Arabia. African Journal of Business Management 2012;6:6516-6529.

[8] O'Shea RM, Corah NL, Ayer WA. Why patients change dentists: practitioners' views. The Journal of the American Dental Association 1986;112:851-854.

[9] Almalki M, FitzGerald G, Clark M. Health care system in Saudi Arabia: an overview. Eastern Mediterranean Health

Journal 2011;17:784-793.

[10] Mahrous MS, Hifnawy T. Patient satisfaction from dental services provided by the College of Dentistry, Taibah University, Saudi Arabia. Journal of Taibah University Medical Sciences 2012;7:104-109.

[11] Adhikary G, Shawon MSR, Ali MW, Shamsuzzaman M, Ahmed S, Shackelford KA, et al. Factors influencing patients' satisfaction at different levels of health facilities in Bangladesh: Results from patient exit interviews. PLoS ONE 2018;13:e0196643.

[12] Habib SR, Ramalingam S, Al Beladi A, Al Habib A. Patients' satisfaction with the dental care provided by dental Studnets. Journal of Ayub Medical College Abbottabad 2014;26:353-356.

[13] Balhaddad AA, Alshammari A, Alqadi A, Nazir MA. Patient Satisfaction with Dental Services and Associated Factors in a Saudi Dental Institution. Journal of Clinical Diagnostic Research 2018;12:36-39.

[14] Bedi R, Gulati N, McGrath C. A study of satisfaction with dental services among adults in the United Kingdom. British dental journal 2005;198:433-437.

[15] Hossain MZ, Fageeh HN, Elagib MFA. Prevalence of periodontal diseases among patients attending the outpatient department at the college of dentistry, King Khalid University, Abha, Saudi Arabia. City Dental College Journa 2013;10:9-12.

[16] Othman N, Razak IA. Satisfaction with school dental service provided by mobile dental squads. Asia Pacific Journal of Public Health 2010;22:415-425.

[17] Alshammari F. Patient satisfaction in primary health care centers in Hail City, Saudi Arabia. American Journal of Applied Sciences 2014;11:1234-1240.

[18] Stepurko T, Pavlova M, Groot W. Overall satisfaction of health care users with the quality of and access to health care services: a cross-sectional study in six Central and Eastern European countries. BMC Health Services Research 2016;16:342.

Original article

Epidemiological Profile of Common Mental Health Disorders in Outpatient Psychiatry Clinics of Two Military Hospitals in Riyadh

Fares F Alharbi[1], Samar F Alharbi[2], Ettab G Alsubaie[3], Muath A Alkhunizan[4], Khaled Al-Surimi[5]

1. King Abdullah International Medical Research Center; College of Medicine,
King Saud Bin Abdulaziz University for Health Sciences;
Ministry of the National Guard Health Affairs, Riyadh, Saudi Arabia.
2. Department of Pharmacy, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia.
3. College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia.
4. Department of Family Medicine, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia.
5. Department of Health Systems Management, College of Public Health and Health Informatics,
King Saud bin Abdulaziz University for Health Sciences,
Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia.

Received on 17.1.2020, accepted for publication on 2.6.2020 , (Doi : dx.doi.org/10.5455/mjhs.2020.03.014)

Correspondence author:
Fares F Alharbi
King Abdulaziz Medical City, P.O. Box 22490 Riyadh 11426, Saudi Arabia.
E-mail: faris137@hotmail.com

Abstract

Background and aims:
Data about the mental health profile of military personnel and their families are needed to establish evidence-based intervention programs in military hospitals. This study aims to determine the epidemiological profile of common mental health disorders in the psychiatric clinics' attendees in military hospitals.

Methods:
A cross-sectional study in psychiatric outpatient clinics in two tertiary-care military hospitals in Riyadh, Saudi Arabia. Data were collected from the psychiatric outpatients and their electronic health records by trained physicians.

الملخص

الخلفية و الأهداف:
هناك حاجة إلى بيانات الصحة النفسية للأفراد العسكريين وأسرهم لإنشاء برامج علاجية مبنية على البراهين في المستشفيات العسكرية. تهدف هذه الدراسة إلى تحديد الملف الوبائي للاضطرابات النفسية الشائعة في عيادات الطب النفسي في المستشفيات العسكرية.

طريقة البحث:
دراسة مقطعية في العيادات الخارجية للطب النفسي في مستشفيين عسكريين بالرياض. تم جمع البيانات من مرضى العيادات الخارجية وملفاتهم الإلكترونية من قبل أطباء مختصين.

النتائج:
من بين ٩٣٤ مشاركًا، ٢٠٢ (٥,٦٤٪) كانوا من الذكور، ٩٥٢

Results:
Of the 439 participants, 202 (46.5%) were male, 259 (64.6%) were in the 26 to 50-year-old age group, and 270 (63.7%) were married. More than 50% were unemployed. The majority (73.3%) of the sample were either overweight (29.8%) or obese (43.5%). The most common mental disorder among psychiatric outpatients in military hospitals was depression (44.4%), followed by anxiety (35.1%), psychosis (25.7%) and bipolar disorder (7.1%). A regression analysis confirmed a significant association between depression, anxiety and psychosis and age, gender, educational level, marital status, and body mass index (BMI).

Conclusions:
The majority of patients attending psychiatric clinics in military hospitals have depression, followed by anxiety, psychosis, and bipolar disorder respectively. Around 75% of the participants had increased BMI which requires further studies to assess the reasons; moreover, weight reduction programs can be beneficial.

Key Words:
Psychiatry, outpatients, depression, anxiety, Saudi Arabia.

(٦,٤٦٪) كانوا في الفئة العمرية من ٦٢ إلى ٥٠ عامًا، و٠٧٢ (٧,٣٦٪) كانوا متزوجين. أكثر من ٥٠٪ من المرضى عاطلون عن العمل. كانت أغلبية العينة (٣,٣٧٪) لديهم إما زيادة في الوزن (٨,٩٢٪) أو سمنة (٥,٣٤٪). كان الاكتئاب (٤,٤٤٪) أكثر الاضطرابات النفسية شيوعًا بين مرضى عيادات الطب النفسي الخارجية في المستشفيات العسكرية، يليه القلق (١,٥٣٪) والذهان (٧,٥٢٪)، ثم الاضطراب الوجداني ثنائي القطب (١,٧٪). أكد تحليل الانحدار وجود ارتباط كبير بين الاكتئاب والقلق والذهان والعمر والجنس والمستوى التعليمي والحالة الاجتماعية ومؤشر كتلة الجسم (IMB).

الخلاصة:
يعد الاكتئاب أكثر الأمراض شيوعاً بين المرضى الذين يرتادون عيادات الطب النفسي الخارجية في المستشفيات العسكرية، يليه القلق، ثم الذهان، والاضطراب الوجداني ثنائي القطب. حوالي ٥٧٪ من المرضى كانوا يعانون من زيادة بمعدل كتلة الجسم، مما يتطلب المزيد من الأبحاث لتقييم الأسباب. بالإضافة إلى ذلك، يمكن أن تكون برامج تخفيض الوزن مفيدة لهؤلاء المرضى.

الكلمات المفتاحية:
الطب النفسي؛ العيادات الخارجية؛ الاكتئاب؛ القلق؛ المملكة العربية السعودية.

Introduction:

The life of military personnel is different from the one of civilians in many aspects given their exceptional nature of work [1]. These include living in isolated environment, endurance of life-threatening conditions, losing friends in battlefields, and being separated from their families for long periods of time [1]. Although these stressors can have a major impact on mental health, it is still questionable whether military personnel are a high-risk group for mental disorders compared to other populations [2].

A study in the United Kingdom aimed to assess the prevalence of common mental health disorders in military personnel compared to the general population with a sample size of approximately 14090 military personnel and 15623 civilians found that military soldiers have double the chance of having symptoms of mental disorders [3]. In contrast, a study on the United States military personnel with a large sample size (77,047) found that the prevalence of mental disorders in those personnel is similar to the general population as 18.3% of the participants met the criteria for a mental disorder [4]. However, some military subgroups including single, females, younger, less educated, shorter service were found to have higher chances for some mental disorders in that study [4]. Similarly, a German study that compared the prevalence of mental disorders between 1023 civilians, 1439 deployed soldiers, and 779 non-deployed soldiers found that the prevalence of a 12-month mental illness did not differ in deployed soldiers compared to civilians, and, surprisingly, it was lower in non-deployed soldiers [2]. Nevertheless, deployed soldiers with high warfare exposure had elevated rates of agoraphobia and post-traumatic stress disorder [2].

Due to recurrent relocations, prolonged separations, the potential injury or death of the family member, and the burden of managing civilian life as a single parent, military work also has a stressful impact on soldiers' families [5-7]. A study on 642,397 children found that there is an increase of 19% in behavioural disorders, 18% in stress disorders, and 11% in outpatient psychiatric visits when a military parent is deployed [5]. A study on the effects of deployments on the utilization of mental-health outpatient services among US army personnel' partners found that wives of deployed personnel had more diagnoses of depressive disorders (27.4 more cases per 1000 spouses), anxiety (15.7 more cases per 1000 spouses), and sleep disorders (11.6 more cases per 1000 spouses) [6]. Even before being deployed, military soldiers and their families might endure anxiety while waiting for expected deployment [7].

Despite growing in psychiatric literature, there is scarce data addressing the mental health of Saudi Arabia or other Middle Eastern countries' military personnel or their families. This could be attributed to security reasons and/or the negative stigma associated with psychiatric disorders in the Middle East [8]; this stigma could be more exaggerated in sensitive groups such as army forces [9]. However, data about the mental health profile of military personnel and their families are needed to establish evidence-based intervention programs to

ensure good mental health among our soldiers. Thus, the aim of this study is to determine the profile of mental disorders and the characteristics of patients attending psychiatric clinics in two military hospitals that provide care for military personnel and their families in Riyadh, Saudi Arabia.

Materials and Methods:

Study design and settings:

This is a cross-sectional study of psychiatric patients attending adult psychiatry clinics at two tertiary-care military hospitals: King Abdulaziz Medical City (KAMC) and Security Forces Hospital (SFH) in Riyadh, Saudi Arabia. The two hospitals provide health care for military soldiers and their families. There are 20 adult psychiatry clinics per week in King Abdulaziz Medical City (KAMC), providing mental health services for approximately 100 patients per week. The adult psychiatry clinics in this hospital provide care for patients above 14 years-old, complying with the hospital regulations which transfer the care for those who are above 14 from pediatric to adult clinics. For Security Forces Hospital (SFH), psychiatrists provide care for approximately 80 patients per week by running 15 adult clinics. The age of transference from pediatric to adult care at Security Forces Hospital (SFH) is also 14. Both adult psychiatry clinics in the two hospitals see male and female patients.

Study Participants and sample size

This study included patients attending the adult psychiatric outpatient clinics from the 1st of January until the 1st of December 2018. Using Raosoft with margin of error 5%, confidence level 95%, and an estimated population size of 20000, the minimum recommended sample size for this study was 377.

Data collection method:

The study was approved by the Institutional Review Board and Ethical Committee of the King Abdullah International Medical Research Center (KAIMRC). All participants signed an informed consent and were informed in advance of the objectives of the study. Data were collected from the 1st of January until the 1st of December 2018. Psychiatric patients attending the adult outpatient clinics at the two military hospitals (KAMC and SFH) in the study period and who were willing to participate were included after making sure that they fulfilled the inclusion criteria. The study included new and follow-up patients aged 18 years and above. Aggressive or severely mentally ill patients, who were unable to give consent were excluded as well as patients with unclear/ uncertain diagnosis. For a sampling method, the data were collected 5 days a week (from Sunday to Thursday).

Data were obtained from every other patient attending the psychiatry clinics in these days after his/her permission, with a response rate of approximately 85%. Data was obtained only once for patients with multiple visits during the study period; we obtained the data only during the first visit. Demographic information was collected from the patients and their electronic health records by trained physicians.

The diagnosis of participants was based on Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV). Patients were divided into 6 categories according to their diagnosis: depression, anxiety, psychosis, bipolar, other disorders, and two or more disorders. Disorders included under the depression category were major depressive disorder, dysthymia, and depression due to medical illness. Moreover, disorders under the anxiety category include generalized anxiety disorder (GAD), obsessive compulsive disorder (OCD), post-traumatic stress disorder (PTSD), and phobias (including social phobia, agoraphobia, and other types of phobia). Also, the diagnosis of psychosis includes schizophrenia, brief psychotic episode, schizophreniform, schizoaffective disorder, substances induced psychosis, and psychotic disorder not otherwise specified (NOS), while the diagnosis of bipolar disorder includes bipolar I disorder, bipolar II disorder, bipolar disorder not otherwise specified, cyclothymia, substance induced mania, and manic episode. Other disorders include dementia, Alzheimer, conduct disorder, attention deficit hyperactivity disorder (ADHD), autism, intellectual disability, substance abuse, substance dependence, and personality disorders.

Data management and analysis:

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 21. Categorical variables were described using frequency and percentages. For evaluating the association between the study variables and four psychiatric disorders (depression, anxiety, psychosis, and bipolar), a Pearson's Chi-square test was used and odds ratios (specific disorder vs. other disorders) were calculated. For observing the independent association of the prevalence of the diagnostic categories with the study variables, multivariate binary logistic regression was used. To test the goodness of fit of the models, the Hosmer and Lemeshow test was used. A P-value of less than .05 and 95% confidence intervals were considered statistically significant.

Results:

Demographics:

Of the 439 participants, 202 (46.5%) were male, 259 (64.6%) were in the 26 to

50-year-old age group and 270 (63.7%) were married. The educational status of the participants was evenly distributed and more than 50% were unemployed. Almost 75% of the participants were either overweight (29.8%) or obese (43.5%) (Table1).

Table 1: Distribution of Socio-demographic characteristics of the study participants (n=439)

Characteristics	No. (%)
Age groups (in years) (n=401)	
≤ 25	65(16.2)
26-50	259(64.6)
> 50	77(19.2)
Gender (n=434)	
Male	202(46.5)
Female	232(53.5)
Marital status (n=424)	
Single	109(25.7)
Divorced	24(5.7)
Married	270(63.7)
Widowed	21(5.0)
Education (n=423)	
Illiterate	71(16.8)
Secondary	161(38.1)
Primary	89(21.0)
University & higher	102(24.1)
Occupation (n=425)	
Employee	66(15.5)
Student	34(8.0)
Unemployed	221(52.0)
Military	104(24.5)
Body Mass Index (n=426)	
Underweight	20(4.7)
Normal	88(20.7)
Overweight	127(29.8)
Obese	191(43.5)

The prevalence of psychiatric disorders (depression, anxiety, psychosis and bipolar disorder) among the psychiatric outpatient clinics' attendees in the two military hospitals is available in Table 2.

Table 2: The Prevalence of Psychosis, Depression, Bipolar disorder and anxiety disorder among psychiatric outpatient clinics' attendees (n=439)

Psychiatric disorders	No. (%)	95% confidence interval
Depression	195 (44.4)	39.7 - 49.2
Anxiety disorder	154 (35.1)	30.6 - 39.8
Psychosis	113 (25.7)	21.7- 30.1
Bipolar disorder	31 (7.1)	4.9 - 9.9
Other disorders	19 (4.3)	2.6-6.64
Two or more disorders	69 (15.7)	12.42-19.45

Associated factors with the common psychiatric disorders:

Psychosis:

The bivariate analysis shows a statistically significant association between psychosis and gender, age group, marital status, educational level, and occupation. Compared to the other groups, the odds of suffering from psychosis were higher among males (OR: 2.54), ≤ 25-year-old age group (OR: 11.47), single (OR: 28.44), secondary education (OR: 4.43), and students (OR: 3.92). BMI level was not significantly associated with having psychosis.
(Table 3 and Table 4).

Depression:

Depression was significantly associated with gender, age group, marital status, educational level, and BMI. Odds of suffering from depression were higher among females (OR: 1.97), > 50-year-old age group (OR: 3.97), widowed (OR: 5.19), illiterate (OR: 2.30), underweight and obese people (OR: 2.90 and 2.10) than the other groups. In contrast, occupation was not significantly associated with depression
(Table 3 and Table 4).

Anxiety disorder:

Anxiety disorders did not show an association with gender or occupation but was significantly associated with age (26-50 years-old, OR: 2.86), marital status (married, OR: 3.62), and education (University and higher, OR: 2.20). Also, people with normal and overweight BMI had slightly higher odds of having anxiety than the other groups (OR: 5.67 and 5.47)
(Table 3 and Table 4).

Bipolar disorder:

Bipolar disorder was not statistically and significantly associated with any of the study variables.

Other disorders and two or more disorders:

Due to the low prevalence of "other disorders" and "two or more disorders", there was no evidence of a significant association with the study variables.

Table 3: The Associated factors of Psychosis, Depression, Bipolar disorder and Anxiety disorder

Associated factors	Psychosis		Depression		Bipolar disorder		Anxiety disorder	
	Yes	p-value	Yes	p-value	Yes	P-value	Yes	p-value
Gender								
Male	70(34.7)	<.0001	72(35.6)	.001	13(6.4)	.593	67(33.2)	.450
Female	40(17.2)		121(52.2)		18(7.8)		85(36.6)	
Age in years								
≤25	32(49.2)	<.0001	17(26.2)	.001	3(4.6)	.429	13(20.0)	.002
26-50	66(25.5)		114(44.0)		14(5.4)		108(41.7)	
>50	6(7.8)		45(58.4)		7(9.1)		22(28.6)	
Marital status								
Single	64(58.7)	<.0001	26(23.9)	<.0001	6(5.5)	.622	19(17.4)	<.0001
Divorced	6(25.0)		14(58.3)		3(12.5)		6(25.0)	
Married	35(13.0)		138(51.1)		21(7.8)		117(43.3)	
Widowed	1(4.8)		13(61.9)		1(4.8)		5(23.8)	
Education								
Illiterate	9(12.7)	<.0001	41(57.7)	.024	5(7.0)	.880	21(29.6)	.018
Secondary	63(39.1)		60(37.3)		10(6.2)		49(30.4)	
Primary	23(25.8)		43(48.3)		6(6.7)		30(33.7)	
University & higher	15(14.7)		42(41.2)		9(8.8)		49(48.0)	
Occupation								
Employee	9(13.6)	.042	32(48.5)	.134	8(12.1)	.339	27(40.9)	.083
Student	13(38.2)		11(32.4)		1(2.9)		9(26.5)	
Unemployed	61(27.6)		106(48.0)		15(6.8)		67(30.3)	
Military	28(26.9)		39(37.5)		7(6.7)		44(42.3)	

Table 4: The Independent factors associated with Psychosis, Depression, and Anxiety disorder

Associated factors	Psychosis		Depression		Anxiety disorder	
	Unadjusted OR (95%CI)	Adjusted OR (95%CI) of significant factors	Unadjusted OR (95%CI)	Adjusted OR (95%CI) of significant factors	Unadjusted OR (95%CI)	Adjusted OR (95%CI) of significant factors
Gender						
Male	2.54(1.63,3.98)	3.77(1.83,7.78)	1.0	1.0	1.0	1.0
Female	1.0	1.0	1.97(1.34,2.90)	1.76(1.11,2.79)	1.16(0.78,1.73)	2.70(1.38,5.26)
Age in years						
≤ 25	11.47(4.37,30.11)	--	1.0	--	1.0	--
26-50	4.05(1.68,9.74)		2.22(1.21,4.07)		2.86(1.48,5.51)	
>50	1.0		3.97(1.94,8.12)		1.60(0.73,3.50)	
Marital status						
Single	28.44(3.68,219.68)	--	1.0	1.0	1.0	1.0
Divorced	6.67(0.73,60.81)		4.45(1.77,11.25)	5.95(2.1,16.85)	1.58(0.55,4.50)	0.97(0.29,3.30)
Married	2.98(0.39,22.89)		3.34(2.02,5.51)	4.0(2.16,7.47)	3.62(2.09,6.28)	2.75(1.27,5.93)
Widowed	1.0		5.19(1.94,13.89)	6.1(1.92,19.54)	1.48(0.48,4.53)	1.13(0.27,4.77)
Education						
Illiterate	1.0	1.0	2.30(1.30,4.06)	--	1.0	--
Secondary	4.43(2.06,9.54)	3.82(1.19,12,22)	1.0		1.04(0.57,1.92)	
Primary	2.40(1.03,5.59)	2.28(0.68,7.61)	1.57(0.93,2.66)		1.21(0.62,2.37)	
University & higher	1.19(0.49,2.88)	1.31(0.36,4.82)	1.18(0.71,1.96)		2.20(1.16,4.18)	
Occupation						
Employee	1.0	1.0	1.97(0.83,4.68)	--	1.92(0.78,4.76)	--
Student	3.92(1.46,10.51)	1.74(0.45,6.66)	1.0		1.0	
Unemployed	2.41(1.13,5.17)	3.98(1.31,12.10)	1.93(0.90,4.14)		1.21(0.53,2.73)	
Military	2.33(1.02,5.33)	1.64(0.52,5.12)	0.64(0.34,1.19)		2.04(0.87,4.79)	
BMI						
Underweight	1.26(0.43,3.67)	--	2.90(1.1,7.86)	5.3(1.60,17.66)	1.0	1.0
Normal	1.86(1.05,3.26)		1.0	1.0	5.67(1.24,25.98)	6.56(1.30,33.10)
Overweight	1.27(0.75,2.16)		1.25(071,2.21)	1.56(0.78,3.10)	5.47(1.21,24.61)	3.95(0.80,19.63)
Obese	1.0		2.10(1.23,3.51)	1.96(1.03,3.76)	4.86(1.09,21.60)	3.60(0.74,17.61)

Discussion:

In this study, we found that the most frequent diagnosis among the subjects in psychiatric outpatient clinics in military hospitals was depression (44.4%), followed by anxiety (35.1%), psychosis (25.7%), and bipolar disorder (7.1%) (table 3). This is similar to the prevalence of mental disorders found in a study published in 2013 on patients attending military outpatient psychiatric clinic in the US in which the most common mental disorder was post-traumatic stress disorder (23.6%), followed by

major depressive disorder (19.1%), generalized anxiety disorder (9%), panic disorder (4.5%), depressive disorder not otherwise specified (3.4 %), alcohol dependence (3.4%), and then bipolar II disorder (2.2%) [10]. Mood disorders were the most common in military outpatient clinics in both studies. In contrast, schizophrenia (30.5%) followed by alcohol dependence (18.21%), major depressive disorder (10.75%), generalized anxiety disorder (6.88%), panic disorder (6.13%) were the most common mental health disorders in those attending outpatient clinics in a military hospital in Thailand [11]. A major difference between our study and these two studies conducted in the USA [10] and Thailand [11] is that they included only military personnel whereas our study included military personnel and their dependents. Also, these studies showed higher prevalence of alcohol dependence compared to our study (Thailand (18.21%) [11], USA (3.4%) [10]), which could be attributed to legal, religious, and social reasons. Alcohol is known to be illegal in Saudi Arabia, forbidden in Islam, and also socially unacceptable in the Saudi society. The prevalence of mental disorders in this study is contradictory to a recent study by Alosaimi et al [12] that looked into the pattern of psychiatric disorders in six different civilian hospitals; authors in that study reported that the most frequent psychiatric diagnoses in outpatients following in public tertiary hospitals were depression (29.3%), psychosis (28.9%), anxiety (15.6%) and bipolar (11.5%) [12]. The Percentage of mood disorders and anxiety are much higher in this study (86.6%) compared to (56.4%) in Alosaimi's et al[12]. Another public-hospital based study that assessed the prevalence of depressive disorders among psychiatric outpatients in eastern Saudi Arabia found that the prevalence of depression was 19.3% [13], which is lower than the percentage that was found in the present study in military hospitals (44.4%), and more similar to the percentage that was found by Alosaimi et al in other public hospitals (29.3) [12].

When comparing the prevalence of mental disorders in male subjects in military hospitals to male subjects in public hospitals, men in military hospitals had a higher prevalence of depression and anxiety compared to men in public hospitals. The most common mental disorder in male outpatients in public hospitals was psychosis (40.4%), followed by depression and anxiety which had the same percentage (14.8%) [12]. However, the most common disorder among men in military hospitals was depression (35.6%), followed by psychosis (34.7%), and anxiety (33.2%) (table 3). The higher levels of depression and anxiety in male outpatients in military hospitals

could be attributed to them being military personnel or members of military families, which makes them face special stressors such as deployment and the potential injury or death of oneself or a family member. Another possible explanation to the high mood disorders in military hospitals is malingering, which could have been done by some soldiers to avoid deployment or other military duty or even to get an early retirement from military service. According to previous studies, malingering is more common among young men that are single and with a low military rank [14]. However, we did not find any previous study that addressed this issue in Saudi Arabia.

In this study, when mental disorders were investigated only in people who work as military soldiers (n=104, 24.5%) (table 1), it was found that the most common mental disorders in military soldiers were anxiety (42.3%) and depression (37.5%)

(table 3). This is similar to a previous study in the US in which the most common mental disorder was post-traumatic stress disorder (23.6%), major depressive disorder (19.1%), generalized anxiety disorder (9%), and panic disorder [10]. However, this finding cannot be generalized to all military personnel and the true prevalence of mental disorder among military personnel might be higher as only outpatients were investigated. Military personal is a sensitive group and some of them might prefer to be followed outside their own institution for different reasons which were addressed previously in the literature such as stigma, fear of being perceived weak or incompetent by colleagues, and fear of being medically downgraded [9].

Regarding similarities between military and civilian hospitals, depression was found to be the most common disorder among female outpatients in both types of hospitals

(military: 52.2%, public: 30.3%[12]). This similarity could be due to the fact that all military personnel in Saudi Arabia are men, so women in both studies had similar demographics although women in military hospital usually are spouses or first-degree related to military personnel. Also, unemployment was common (military: 52.0%, public: (68.1% [12] and 70% [13]) among the outpatients in both types of hospitals. Although this prevalence of unemployment appears high when considering that 80.8% of the participants in this study are in the age group 18-50 years-old (≤ 25 (16.2%), 26-50 (64.6%)) (table 1), it become more understandable when realizing that only 24.1% of the study participants have a university degree or higher and 53% are females which could affect their opportunity of employment (table 1).

Another similarity between the psychiatric

outpatients in military and public hospitals was the high rates of overweight and obesity (military:73.3%, public: 69.9% [12]). Strikingly, three-quarters of subjects in this study fit into overweight and obesity categories which is much higher prevalent than other local studies on Saudi population (table 1) [15]. Although previous evidence found that obesity is linked to an increase in anxiety and mood disorders [16], the use of medications in management of mood and anxiety disorders might contribute to this finding, and a directional causality cannot be indicated. This finding could also be due to the lack of physical activity among psychiatric patients, which could be supported by a previous study that was conducted on 796 psychiatric outpatients and 389 psychiatric inpatients in five different regions across Saudi Arabia and found that approximately 87% of these patients were physically inactive with higher levels of physical activity among men compared to women (15.9% versus 9.6%, $p<0.001$) [17].

There was a remarkable age-specific mental illness prevalence among psychiatric outpatients in this study, among younger age group (≤25), psychosis was most prevalent. Anxiety disorders were highly prevalent in middle age group (26-50), while in older age group (>50) depression was the commonest (table 3,4). The results share similar conclusions with the ones of other previous studies [14, 18-20]. The wide variation of the age specific mental illness prevalence imposes a great challenge on mental health services and healthcare system in Saudi Arabia where there is a lack in specialized clinic for specific population like adolescence and geriatric.

The findings also showed that there is a significant association between higher education and anxiety; it is assumed that higher education could introduce stress by itself which might be a confounding factor. Although there is inconclusive data about true association of education with anxiety, some of the studies linked low education to anxiety which contradicts the finding of this study [21].

This study showed that widowed status was the highest risk factor among all other marital status for depression (table 3). Widowhood is an overwhelming state that needs support in many aspects like the spiritual, social, and medical ones. While this finding is not surprising, emphasis is still put on the importance of addressing widowhood as a significant risk for depression in primary care and psychiatric settings.

Psychosis in this study was associated with unemployment, younger age, and being single. This finding is alarming as these are crucial stages in life and social sup-

port is needed the most, especially, in the presence of mental illness, although family support in Saudi Arabia anticipated to have a positive effect [22].

Limitations

The current research study can be summarized as follows: No available data on mental disorders in Saudi or Middle Eastern military personnel was found. Consequently, there are no other findings to compare with the ones of the present study. Not all the participants in this study were military personnel; thus, further studies are needed to establish a more precise profile of mental disorders among military soldiers, and the outpatient followers, even if they were all military, it does not provide an accurate representation of military personnel mental health due to some barriers to mental health treatment in military population. Thus, exploring private clinics is essential as private mental health services are growing in Saudi Arabia, and a significant percentage of patients might prefer private clinics over public ones for several reasons like fear of stigmatization and fast service.

Conclusions

the majority of patients attending psychiatric clinics have depression, then anxiety, psychosis, and bipolar disorder respectively. More data is needed to develop effective measures for military personnel and their families to ensure good mental health for them. The high rates of obesity and overweight warrant further studies to identify the possible reasons. Also, weight reduction and physical exercise programs, if added to the treatment plan, could be beneficial. A national wide survey is needed including private and governmental sectors as empowering primary mental health is a national priority along with establishing specialized clinics for special population.

Acknowledgment

The authors declare that they have no conflicts of interest. This study was funded by the King Abdullah International Medical Research Center (KAIMRC).

References:

[1] Prabhu HRA. Military psychiatry in India. Indian J Psychiatry. 2010; S314–S316.

[2] Trautmann S, Goodwin L, Höfler M, Jacobi F, Strehle J, Zimmermann P, et al. Prevalence and severity of mental disorders in military personnel: a standardised comparison with civilians. Epidemiol Psychiatr Sci. 2017;26(2):199-208.

[3] Goodwin L, Wessely S, Hotopf M, Jones M, Greenberg N, Rona RJ, et al. Are common mental disorders more prevalent in the UK serving military compared to the general working population? Psychol Med. 2015;45(9):1881-91.

[4] Riddle JR, Smith TC, Smith B, Corbeil TE, Engel CC, Wells TS, et al. Millennium Cohort: the 2001-2003 baseline prevalence of mental disorders in the U.S. military. J Clin Epidemiol. 2007;60(2):192-201.

[5] Gorman GH, Eide M, Hisle-Gorman E. Wartime military deployment and increased pediatric mental and behavioral health complaints. Pediatrics. 2010;126(6):1058-66.

[6] Mansfield AJ, Kaufman JS, Marshall SW, Gaynes BN, Morrissey JP, Engel CC. Deployment and the use of mental health services among U.S. Army wives. N Engl J Med. 2010;362(2):101-9.

[7] Verdeli H, Baily C, Vousoura E, Belser A, Singla D, Manos G. The Case for Treating Depression in Military Spouses. J Fam Psychol. 2011; 25(4): 488–496.

[8] Zolezzi M, Alamri M, Shaar S, Rainkie D. Stigma associated with mental illness and its treatment in the Arab culture: A systematic review. Int J Soc Psychiatry. 2018;64(6):597-609.

[9] Gardiner F, Gardiner EC. Similarities between military and medical service: stigma of seeking mental health assistance. J R Army Med Corps. 2018; 2018-000975.

[10] Bryan, C, Morrow C, Etienne N, Ray-Sannerud B. Guilt, shame, and suicidal ideation in a military outpatient clinical sample. Depression and Anxiety. 2012; 30(1), 55–60.

[11] Rukskul I, Leelahanaj T, Hirunviwatgul N, Pholboonyaruk A. The prevalence of common mental disorders among outpatient Thai army personnel. J Med Assoc Thai. 2009 Feb;92 Suppl 1:S60-6.

[12] Alosaimi F, Alzain N, Asiri S, Fallata E, Alzain N, Abalhassan M , et al. Patterns of psychiatric diagnoses in inpatient and outpatient psychiatric settings in Saudi Arabia. Arch Clin Psychiatr. 2017;44(3):77-83.

[13] Abumadini M. Depressive disorders in psychiatric outpatient clinic attendees in eastern Saudi Arabia. J Family Community Med. 2003; 10(2): 43–47.

[14] Lande RG, Williams LB. Prevalence and characteristics of military malingering. Mil Med. 2013 Jan;178(1):50-4.

[15] Al-Nozha MM, Al-Mazrou YY, Al-Maatouq MA, Arafah MR, Khalil MZ, Khan NB, Al-Marzouki K, Abdullah MA, Al-Khadra AH, Al-Harthi SS, Al-Shahid MS: Obesity in Saudi Arabia. Saudi Med J 2005; 26: 824–829.

[16] Simon GE, Von Korff M, Saunders K, Miglioretti DL, Crane PK, van Belle G, et al. Association between obesity and psychiatric disorders in the US adult population. Archives of General Psychiatry. 2006;63:824–830.

[17] Alosaimi F, Abalhassan M, Alhabbad A, Fallata E, Haddad B, AlQattan N, et al. Prevalence and determinants of physical activity in a mixed sample of psychiatric patients in Saudi Arabia. Saudi Med J. 2018; 39(4): 401–411.

[18] Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. Dialogues in Clinical Neuroscience. 2015;17(3).

[19] Luppa M, Sikorski C, Luck T, Ehreke L, Konnopka A, Wiese B et al. Age- and gender-specific prevalence of depression in latest-life – Systematic review and meta-analysis. Journal of Affective Disorders. 2012;136(3):212-221.

[20] Al-Shammari SA, Al-Subaie A. Prevalence and correlates of depression among Saudi elderly. Int J Geriatr Psychiatry. 1999;14(9):739-47.

[21] Blanco C, Rubio J, Wall M, Wang S, Jiu C, Kendler K. Risk factors for anxiety disorders: common and specific effects in a national sample. Depression and Anxiety. 2014;31(9):756-764.

[22] Hickey J, Pryjmachuk S, Waterman H. Mental illness research in the Gulf Cooperation Council: a scoping review. Health Research Policy and Systems. 2016;14(1).

Guidelines for Manuscript Preparation

A. TYPES OF MANUSCRIPTS

I. ORIGINAL MANUSCRIPTS

Manuscripts submitted in this category are expected to be concise, well organized, and clearly written.
The maximum length is 5000 words, including the abstract, references, tables, and figure legends. The maximum length is 5000 words, including the abstract, references, tables, and figure legends.

- The structured abstract must not exceed 250 words.
- The title must not exceed 130 characters.
- A maximum of 4 tables and 4 figures is allowed.
- References should not exceed a maximum of 100.
- The abstract must be organized as follows:
- Background & Aims
- Methods
- Results
- Conclusions
- Do not use abbreviations, footnotes or references in the abstract.
- An electronic word count of the abstract must be included.
- Three to ten key words at the end of the abstract must be provided.

The manuscript must be arranged as follows:

- Title page
- Abstract
- Introduction
- Materials and methods (or Patients and methods)
- Results
- Discussion
- Acknowledgements
- References
- Tables
- Figure legends
- Figures

Acceptance of original manuscripts will be based upon originality and importance of the investigation. These manuscripts are reviewed by the Editors and, in the majority of cases, by two experts in the field. Manuscripts requiring extensive revision will be at a disadvantage for publication and will be rejected. Authors shall be responsible for the quality of language and style and are strongly advised against submitting a manuscript which is not written in grammatically correct English. The Editors reserve the right to reject poorly written manuscripts even if their scientific content is qualitatively suitable for publication. Manuscripts are submitted with the understanding that they are original contributions and do not contain data that have been published elsewhere or are under consideration by another journal.

II. REVIEW ARTICLES

Review articles on selected clinical and basic topics of interest for the readers of the Majmaah Journal of Health Science will be solicited by the Editors. Review articles are expected to be clear, concise and updated.

- The maximum length is 5000 words, excluding the summary, references, tables, and figures.
- References should not exceed a maximum of 150.
- The inclusion of a maximum of 4 high-quality tables and 4 colored figures to summarize critical points is highly desirable.
- Review articles must be accompanied by a title page and a summary.

- Reviews should include at least one Key Point Box, with a maximum of 5 bullet points, that briefly summarizes the content of the review.

Review articles are reviewed by the Editors and may be sent to outside expert reviewers before a final decision for publication is made. Revisions may be required.

III. EDITORIALS

This section consists of invited brief editorial comments on articles published in the Majmaah Journal of Health Science

The length of an editorial should not exceed 1500 words, excluding references.

- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 20.
- A title page must be provided.

IV. CASE REPORTS

Case reports would be only accepted if they represent an outstanding contribution to the Etiology, pathogenesis or treatment of a specific condition.

- The maximum length is 3000 words, including the summary and references.
- A maximum of 2 tables and 2 figures is allowed.
- References should not exceed a maximum of 15.
- A title page must be provided.

V. LETTERS TO THE EDITOR

Letters to the Editor will be considered for publication if they are related to articles published in recent issues of Majmaah Journal of Health Science. Occasionally, Letters to the Editor that refer to articles not published in Majmaah Journal of Health Science will be considered.

The length of a Letter to the Editor should not exceed 800 words.

- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 10.
- No more than 4 Authors may appear in the author list.

VI. COMMENTARIES

International commentaries will be solicited by the Editors only.

- Commentary articles should not exceed a maximum of 800 words, excluding tables or figures.
- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 10.
- A title page must be provided.

B. MANUSCRIPT SUBMISSION

ORGANIZATION OF THE MANUSCRIPT

- The submitted manuscript must be typed double-spaced throughout and numbered (including references, tables and figure legends). Preferably using a "standard" font (we prefer Times/Arial 12).
- For mathematical symbols, Greek letters, and other special characters, use normal text. The references must be in accordance with the Vancouver reference style (see References).
- Approved nomenclature for gene and protein names and symbols should be used, including appropriate use of italics (all gene symbols and loci, should be in italics) and capitalization as it applies for each organism's standard nomenclature format, in text, tables, and figures.
- Full gene names are generally not in italics and Greek symbols are not used. Proteins should not be italicized.
- Improperly prepared manuscripts will not be entered into the peer review process and will be sent back to the author for correction.

TITLE PAGE MUST CONTAIN:

- A title of no more than 130 characters.

- Running title (not to exceed 60 characters)
- Names of the Authors as it should be published (first name, middle initial, last name)
- Affiliations of all authors and their institutions, departments, or organizations (use the following symbols in this order to designate authors' affiliations: *, †, ‡, §, ¶, ||, #, **, ††, ‡‡, §§, ¶¶, || ||, ##).
- Name, address, telephone and fax numbers, and electronic mail address of the corresponding Author.
- Electronic word count.
- Number of figures and tables.
- List of abbreviations in the order of appearance.
- Conflict of interest.
- Financial support.

Animal trials: Manuscripts reporting experiments using animals must include a statement giving assurance that all animals received human care and that study protocols comply with the institution's guidelines. Statistical methods used should be outlined.

Human trials: Manuscripts reporting data from research conducted on humans must include a statement of assurance in the methods section of the manuscript reading that:

1. Informed consent was obtained from each patient included in the study and
2. The study protocol conforms to the ethical guidelines of the 1975 declaration of helsinki as reflected in a priori approval by the institution's human research committee.

Randomized controlled trials: Any paper that is a randomized control trial should adhere to the guidelines that can be found at the following web-site: www.consort-statement.org. The checklist should be printed out and faxed to the Editorial office at the time of submission. The trial registration number must be included on the title page of the manuscript reporting a registered clinical trial. Failure to do so will prevent entry to the peer review process.

Drugs and chemicals: Drugs and chemicals should be used by generic name. If trademarks are mentioned, the manufacturer's name and city should be given. All funding sources supporting the work, either public or private, especially those from pharmaceutical companies, must be provided.

Genetic Sequence data: In papers reporting a novel DNA or amino sequence, verification that the data have been or will be submitted either to Gen-Bank or EMBL is required. Please provide this verification and the accession number in the covering letter.

REFERENCES

References must be in accordance with the Journal of Hepatology reference style. References are ordered as they appear in the text and citation numbers for references are placed between "brackets" ("[ ]") in the text as well as in the reference list.

Authors should be listed surname first, followed by the initials of given names (e.g. Bolognesi M). If there are more than six authors, the names of the first six authors followed by et al. should appear.
Titles of all cited articles are required. Titles of articles cited in reference list should be in upright, not italic text; the first word of the title is capitalized, the title written exactly as it appears in the work cited, ending with a full stop. Journal titles are abbreviated according to common usage, followed by Journal years, semicolon (;) before volume and colon (:) before full page range (see examples below).

All articles in the list of references should be cited in the text and, conversely, all references cited in the text must be included in the list.

Personal communications and unpublished data should be cited directly in the text by the first Author, without being numbered. Please make sure you have the latest, updated version of your reference management software to make sure you have the correct reference format for Majmaah Journal of Health Science.

An example of how references should look within the text:

"HVPG was measured by hepatic vein catheterization using a balloon catheter according to a procedure described elsewhere [14, 15] and used as an index of portal hypertension [16]."

An example of how the reference list should look:

[14] Merkel C, Bolognesi M, Bellon S, Zuin R, Noventa F, Finucci G, et al. Prognostic usefulness of hepatic vein catheterization in patients with cirrhosis and esophageal varices. Gastroenterology 1992;102:973-979.
[15] Groszmann RJ, Wongcharatrawee S. The hepatic venous pressure gradient: anything worth doing should be done right. Hepatology 2004;39:280-282.

FIGURES

A maximum of 4 figures is allowed
(This can be modified if needed by Editorial board).

- Figures will be often, but not always, re-designed by graphic designers. By signing and transferring the Copyright Agreement to MJHS, the author gives permission to the graphic designers to alter the visual aspect of any figures, tables, or graphs. The scientific content of figures will not be altered. Please provide this information with your covering letter.
- All graphics submitted to Majmaah Journal of Health Science should be sent at their actual size, which is 100% of their print dimension and in portrait orientation.
- Two standard widths are used and figures should fit in one (8.5 x 23.5 cm) or two (17.5 x 23.5 cm) columns
- Figures should be supplied in the following preferred file formats: PDF (*.pdf), Power Point (*.ppt), Adobe Illustrator (*.ai, *.eps), Photoshop (*.psd) files in grayscales or in RGB color mode. It is highly recommended that figures not be sent in JPG (*.jpg) format.
- Photographs (scans, immunofluorescences, EM, and histology images) should be submitted as: 1. TIFF (*.tif) with a resolution of at least 300 pixels per inch, or
- Illustrator compatible EPS files with RGB color management (*.eps),
- Photoshop (*.psd) or PDF (*.pdf) files (grayscales or RGB) at the appropriate resolution, which is:

1. 300 dpi for color figures
2. 600 dpi for black and white figures
3. 1200 dpi for line-art figures

- For all photomicrographs, where possible, a scale should appear on the photograph. Photographs of identifiable patients should be accompanied by written permission to publish from patient(s).
- • Furthermore, panel lettering should be in Arial bold 14 pt, capitalized and no full stop (A, B) while lettering in figures (axes, conditions), should be in Arial 8 pt, lower case type with the first letter capitalized and no full stop. No type should be smaller than 6 pt.

TABLES

A maximum of 4 tables is allowed
(This can be modified if needed by Editorial board)

- Tables should be provided as Word files (*.doc) or Illustrator/InDesign (*.ai, *.eps, *.indd) compatible files. No TIFF and JPG files are acceptable for table submission.
- When submitting tables in Microsoft Word table function, no tab, space or colors should be used. Tables should contain a maximum of 10 columns.
- Tables submitted in landscape orientation will not be accepted. Tables should include a title, table legend, and if necessary footnotes.
- Include tables in the submitted manuscript as a separate section.

FIGURE LEGENDS

- Figure legends should be listed one after the other, as part of the text document, separate from the figure files.
- Please do not write a legend below each figure. Each figure legend should have a brief title that describes the entire figure without citing specific panels, followed by a description of each panel, and the symbols used.
- Enough information should be provided in the figure legend text to permit interpretation of figures without reference to the text; but should not contain any details of methods, or exceed 100 words.
- The abbreviated word for figure "Fig." should be typed and bolded, followed by the figure number and a period

(i.e. "Fig. 1."). Every figure legend should have a Title written in bold.
- If a figure contains multiple sections (i.e. A, B, C, D) the letter for these subsections should be in capital letters. Within the figure legend text the capital letters should be surrounded by parenthesis [i.e. (A)(B)(C)(D)].
- Figures should be numbered according to the order of citation.

Supplementary material: Supplementary material, not for review, is acceptable. Supplementary material can be submitted as (*.mov), (*.avi), (*.mpeg), or (*.gif) files. Please note that the size limit for these items is 10 MB per file.

ENGLISH

Authors may be asked to contact professionals regarding the correction of the English content of manuscripts either before or after acceptance. This expense will be the responsibility of the Authors.

C. REVIEW PROCESS

Authors should be aware that manuscripts will be screened upon submission. Only the manuscripts which fully comply with the submission requirements outlined and in which the level of English is of an acceptable standard will enter the peer review process.

First submission

Once successful submission of a manuscript has taken place, an acknowledgement will be sent by e-mail to the Corresponding Author on the manuscript. All subsequent correspondence will be with the designated Corresponding Author. The number of the manuscript should be used by the Authors in all communications with the Editorial Office. All the manuscripts will be reviewed by the Editors and, and in some cases, by other expert reviewers. After review, the corresponding Author will be notified by letter of the decision taken by the Editor(s). This letter will be accompanied in most, but not all, cases by the comments of the reviewers. This letter will be sent via e-mail.

Resubmission of manuscripts

In some cases, Authors will be invited to submit a revised version of the manuscript for further review. This invitation does not imply, in any case, that the revised version will be accepted for publication. In general, revised manuscripts must be received in the Editorial Office within four months of the date of the first decision. Authors should submit the resubmitted manuscript with all changes underlined. The resubmitted manuscript should be accompanied by a cover letter stating that the manuscript has been revised according to the comments made by the Editor and the Reviewers. Figures and tables must be uploaded. Please ensure that a separate point by point response to the reviewers is included with the covering letter. Please do not send revised manuscripts to the Editorial Office via e-mail. Revised manuscripts should mailed to site of Majmaah Journal of Health Sciences at mjhs@mu.edu.sa

PROOFS

Proofs will be made available to the author(s) to be checked. It is the responsibility of the author(s) to make sure that the quality and accuracy of the manuscript, figures, and tables in the proofs is correct. Authors should return their proofs within 48 hours, by fax or e-mail if the corrections are minor, to expedite publication. Further changes or additions to the edited manuscript after these corrections cannot be accepted.

COVER ILLUSTRATIONS

Cover illustrations will be chosen by the Editors. Authors are highly encouraged to submit high quality color figures and images suitable for publication on the cover at the time of submission of the manuscript.

REPRINTS

Reprints must be ordered in advance. An order form indicating the cost of the reprints is sent from the Publisher with page proofs. Reprint orders, payments, and inquiries must be forwarded to the Publisher, not to the Editorial Office.

ADVERTISEMENTS

Information about advertisements in Majmaah Journal of Health Science can be obtained from the Publisher.

Copyright assignments, financial disclosures, and Institutional Review Board/Animal Care Committee Approval. Upon article acceptance, the corresponding author will be contacted and asked to submit the above forms. It is the author's responsibility to make sure these forms are signed and duly returned to the editorial office via fax. If these forms are

not received the manuscript will NOT be published.

Drug Declaration/Conflict of Interest Form

This form should be printed out and the suitable statement chosen among the listed ones (A-G). It should then be signed by the corresponding author and faxed to the Editorial Office at +41 22 510 24 00. If this form is not received the paper will NOT be published.

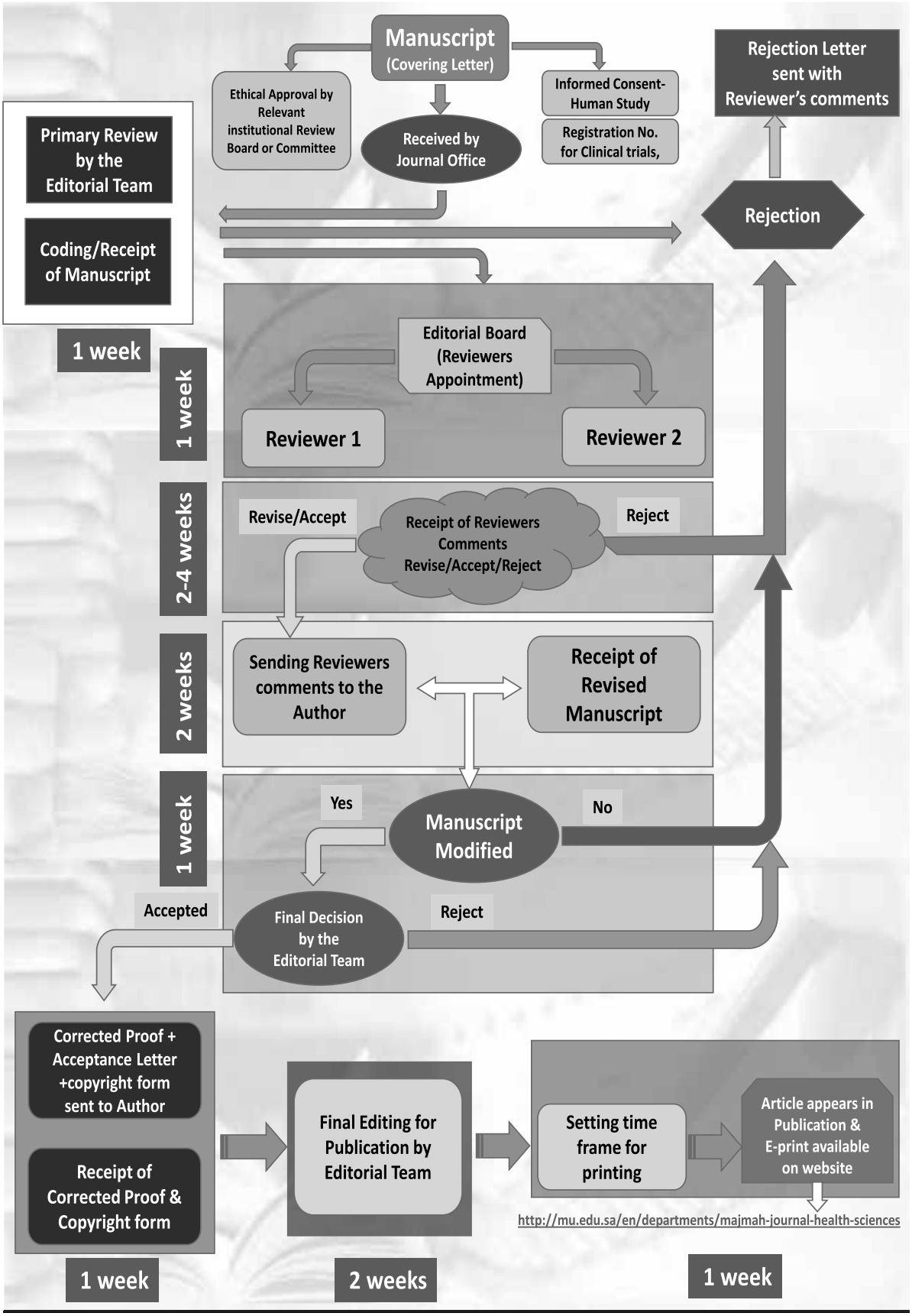
Methodological & Statistical instructions for Authors submitting manuscripts to the Majmaah Journal of Health Science

The manuscripts should include a complete and detailed description of what was done. This includes a description of the design, measurement and collection of data, the study objective and major hypotheses, type and source of subjects, inclusion and exclusion criteria and measures of outcome, number of subjects studied and why this number was chosen. Any deviation from the study protocol should be stated. The baseline characteristics of any compared groups should be described in detail and -if necessary -adjusted for in the analysis of the outcome.

For randomized clinical trials the following should also be clearly documented: treatments, sample size estimation, method of random allocation and measures taken for maintaining its concealment including blinding, numbers treated, followed-up, being withdrawn, dropping out, and having side effects (numbers and type). The statistical methods used should be relevant and clearly stated. Special or complex statistical methods should be explained and referenced.

Complex analyses should be performed with the assistance of a qualified statistician. Unqualified use of such analyses is strongly discouraged. The underlying assumptions of the statistical methods used should be tested to ensure that the assumptions are fulfilled.

For small data sets and if variable distributions are non-normal, distribution free (non-parametric) statistical methods should be used. The actual p values - whether significant or not - should always be presented (not NS). Confidence intervals convey more information than p values and should be presented whenever possible. Continuous variables can always be summarized using the median and range which are therefore preferred. Only in the infrequent case of a Normal distribution are the mean and standard deviation (SD) useful. Complex analyses (including Cox and logistic regression analysis) should be presented in sufficient detail: i.e. variable scoring, regression coefficients, standard errors and any constants. Odds-ratios or relative risks are not sufficient documentation of such analyses. The handling of any missing values in the data should be clearly specified. The number of statistical tests performed should be kept at a minimum to reduce spurious positive results. Explorative (hypothesis generating) analyses without confirmation using independent data are discouraged. Figures showing individual observations e.g. scatter plots are encouraged. Histograms may also be useful. Tables should indicate the number of observations on which each result is being based


Manuscript
(Covering Letter)
Ethical Approval by Relevant institutional Review Board or Committee
Informed Consent-Human Study
Registration No. for Clinical trials,
Received by Journal Office
Rejection Letter sent with Reviewer's comments
Rejection
Primary Review by the Editorial Team
Coding/Receipt of Manuscript
1 week
1 week
Editorial Board (Reviewers Appointment)
Reviewer 1
Reviewer 2
2-4 weeks
Revise/Accept
Receipt of Reviewers Comments Revise/Accept/Reject
Reject
2 weeks
Sending Reviewers comments to the Author
Receipt of Revised Manuscript
1 week
Yes
Manuscript Modified
No
Accepted
Final Decision by the Editorial Team
Reject
Corrected Proof + Acceptance Letter +copyright form sent to Author
Receipt of Corrected Proof & Copyright form
1 week
Final Editing for Publication by Editorial Team
2 weeks
Setting time frame for printing
Article appears in Publication & E-print available on website
http://mu.edu.sa/en/departments/majmah-journal-health-sciences
1 week

MJHS
مجلة المجمعة للعلوم الصحية
MAJMAAH JOURNAL OF HEALTH SCIENCES
A JOURNAL PUBLISHED BY MAJMAAH UNIVERSITY

MJHS Office

MAJMAAH JOURNAL OF HEALTH SCIENCES
Basic & Health Sciences Research Centre
Deanship of Research, Majmaah University
Ministry of Education,
Kingdom of Saudi Arabia
Post Box 66, Al Majmaah 11952
E-Mail: info@mjhs-mu.org

Website: http//mjhs-mu.org

INVITATION TO PUBLISH

Dear Authors,
Majmaah Journal of Health Sciences is accepting original articles, review articles and letters to editors for publishing in forthcoming issue. Kindly go through the guidelines for submission and submit your manuscripts online at mjhs-mu.org

مطابع جامعة المجمعة
Majmaah University Press
0537570646