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

جامعة المجمعة
Majmaah University

# MJHS

# Majmaah Journal of Health Sciences

**A Referred Academic Journal Published by the
Publishing and Translation Center at Majmaah University**

**Publishing & Translation Center - MU**

# 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 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 bring forth its third issue of Vol 7:2019 on the occasion of the National Day of Saudi Arabia. All of us renew loyalty and allegiance and show the love to our generous homeland and wise leadership. MJHS wishes all the stakeholders and readers a Happy 89th National Day.

The editorial team strives hard to publish the issues on time; I express my sincere thanks to the international panel of experts and new team of editorial assistants for their efforts to improve the publication process of MJHS office.

Authors who are submitting their research in MJHS are encouraged to enrich their scientific contributions by plagiarism checking and get their manuscripts professionally edited prior to submission; especially the authors for whom English is a second language. There are many editing services available that can help the authors improve the scientific and grammatical writing of their manuscripts. However, the language editing does not guarantee publication and any costs incurred are the sole responsibility of the author.

The editorial team would like to thank all authors, reviewers, readers for their continuous support for the success of MJHS.

**Dr.Khalid Mohammed Alabdulwahhab**

**Editor in Chief**
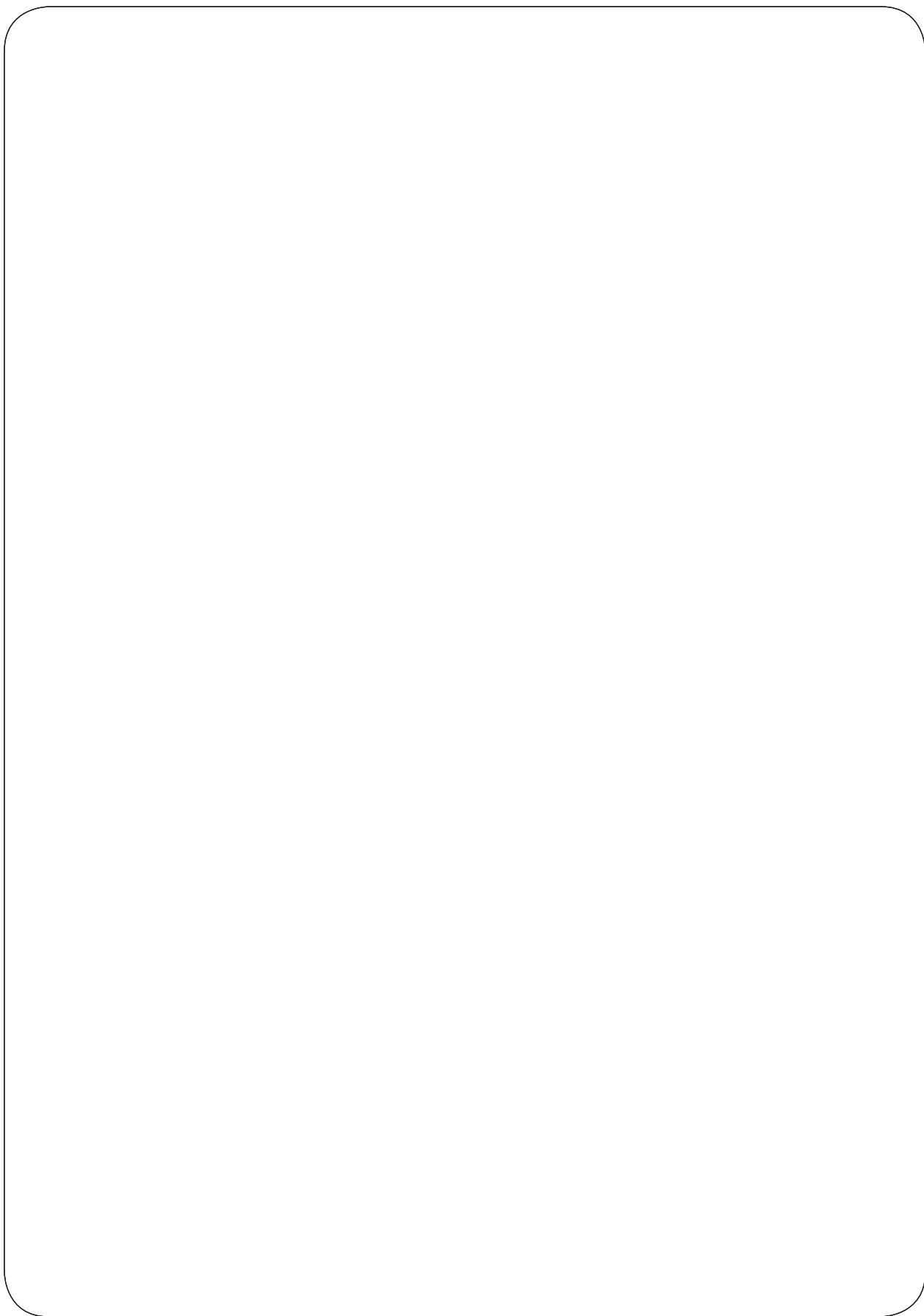
# Contents

# Contents

## Original Article

# High School Students' Knowledge on Tuberculosis Prevention: A Quantitative Survey in Bhaktapur of Nepal

Kshitij Karki[*1,3], Sharmila Gosai[1], Sanjeev Kumar Shah[4],

Devendra Raj Singh[1], Sushmita K.C.[2]

[1]Asian College for Advance Studies, Lalitpur, Nepal
[2]Faculty of Humanities and Social Sciences, Tribhuvan University, Kathmandu, Nepal
[3]Group for Technical Assistance, Lalitpur, Nepal,
[4]National Open College, Lalitpur, Nepal
Received on Dec 19, 2018, 08:04, Accepted 12 May 2019
Corresponding Author:
Kshitij Karki,
Asian College for Advance Studies and Group for Technical Assistance, Lalitpur, Nepal.
Email: Kshitijkarki@yahoo.com

**Abstract**

**Background:** Tuberculosis is a major disease worldwide. Low level of awareness, economic status, unemployment, and educational status is playing a vital role in causing tuberculosis in Nepal. The study was conducted to assess knowledge of preventive measures for tuberculosis among high school students at the Bhaktapur district of Nepal.

**Methods:** A cross-sectional study was carried out among 192 high school students. Pretested semi-structured questionnaire was applied to collect data from randomly selected students. Ethical approval and consent were obtained before data collection. The data were analyzed using SPSS 20v and interpreted as frequency, percentage and measured knowledge level.

**Results:** Among 192 participants, more than half (51%) were male. All the participants had heard about tuberculosis (TB), and 90.6% of the participants knew the meaning of tuberculosis. More than half (53.7%) of the participants told that smoking is the major risk factor for TB and 96.9% of participants agreed that TB is transmissible. Almost all (97.9%) participants expressed covering mouth and nose when coughing and sneezing, keeping house with proper ventilation and sunlight as preventive methods of tuberculosis. Similarly, more than half (63.5%) of the participants supported avoiding being close to the TB patient as a preventive measure. More than half of the participants (59.4%) had inadequate knowledge of preventive TB practices.**Conclusions:** It is to be concluded that more than half of the high school students had inadequate knowledge of preventive measures of tuberculosis. It shows that there is a need for planning and implementation of the awareness program on tuberculosis in high school students.

**Key words:** High school students, Tuberculosis, Preventive measures, Awareness

**الملخص**

**خلفية.** السل مرض ينتشر في جميع أنحاء العالم. يلعب انخفاض مستوى الوعي والوضع الاقتصادي والبطالة ومستوى التعليم دورًا حيويًا في الإصابة بمرض السل في نيبال. أجريت هذه الدراسة لتقييم المعرفة حول التدابير الوقائية لمرض السل بين طلاب المدارس الثانوية في منطقة باكتابور في نيبال.

**طريقة البحث:** هذه دراسة مقطعية اجريت بين 192 من طلاب المدارس الثانوية في نيبال. تم تطبيق الاستبيان لجمع البيانات من طلاب تم اختيارهم بشكل عشوائي. تم الحصول على الموافقة الأخلاقية قبل جمع البيانات. تم تحليل البيانات باستخدام برنامج التحليل الاحصائي والتعبير عنها في شكل نسب مئوية وترددات وقياس مستوى الوعي.

**النتائج:** من بين 192 مشاركًا، كان أكثر من نصفهم (51٪) من الذكور. كان جميع المشاركين قد سمعوا عن مرض السل و90.6 ٪ من المشاركين كانوا يعرفون معنى السل. أفاد أكثر من نصف المشاركين (53.7٪) أن التدخين هو عامل الخطر الرئيسي لمرض السل و96.9٪ من المشاركين وافقوا على أن مرض السل قابل للانتقال. أعرب معظم المشاركين (97.9٪) عن تغطية الفم والأنف عند السعال والعطس مع الحفاظ على التهوية الجيدة وأشعة الشمس في المنزل كطرق وقائية للسل. وبالمثل، أيد أكثر من نصف المشاركين (63.5 ٪) تجنب الوجود بالقرب من مريض السل كإجراء وقائي لمنع الإصابة بالمرض. كان لدى أكثر من نصف المشاركين (59.4٪) معرفة غير كافية بشأن ممارسات السل الوقائية.

**الخلاصة.** استنتجت الدراسة أن أكثر من نصف طلاب المدارس الثانوية ليس لديهم معرفة كافية بالتدابير الوقائية للسل. هنالك حاجة إلى تخطيط وتنفيذ برامج توعية حول مرض السل لطلاب المدارس الثانوية بنيبال.

**الكلمات المفتاحية:** طلاب المدارس الثانوية، السل، التدابير الوقائية، التوعية

## Introduction

Tuberculosis (TB) is a common and deadly infectious disease caused by Mycobacterium tuberculosis. It spreads from person to person through air, when infected patients cough, sneeze or spit[1]. The vast majority of tuberculosis deaths are occurring in developing countries with more than half of all deaths are occurring in Asia[2]. Weakened immune system is also a risk factor of tuberculosis[3]. Symptoms of tuberculosis of the lungs include cough for three or more weeks, bloodstained sputum and chest pain[4]. For the prevention of tuberculosis, protection against exposure to tuberculosis, encouraging diagnosis and treatment of patients with positive pulmonary tuberculosis, and proper ventilation are important parameters[5].

Globally, the TB mortality rate has decreased by nearly half between 1990 and 2013, and decreasing at around 3% per year with an overall reduction between 2000–2017 was 42%[6]. Over 95% of tuberculosis deaths occur in low and middle-income countries (LMICs), and it is among the top causes of mortality for women aged 15 to 44[7]. Every other person in the world is infected with tuberculosis[8]. Most of the human faces of the epidemic are adults of productive age group (15-49 year)[7].

A study in India revealed there were ignorance, wrong knowledge and wrong practices demonstrated by senior secondary students. Similarly, studies in India, Bangladesh, Italy, and Nigeria concluded that the poor knowledge of TB need to be addressed through health education and awareness among university students, individuals and spouses[9–11]. In developing countries, the knowledge on tuberculosis is generally poor, so, the researcher recommended additional efforts for educating public and clarifying the taboos about tuberculosis[12].

In Nepal, every year about 40,000 people get infection with tuberculosis, and among them, 20,000 develop infectious pulmonary disease[13]. Under the National tuberculosis program of Nepal, many positive cases of TB had been treated[14].

Several studies had focused on regular awareness program on causes, disease transmission and preventive measures of TB among students focusing one health[5,8,15–18]. Similarly, a study suggested that undergraduate medical students could also be involved to change the behaviors towards TB[19]. Likewise, a study in Nepal revealed lack of knowledge on effects of incomplete treatment and suggested to emphasize on providing education to the patients on the treatment[20]. Few studies suggested for more researches on older adolescents for investigating their knowledge and behavior is needed[21].

Adolescents are at high risk of increasing and spreading the tuberculosis infection as well as they are the message carriers to home. It would be beneficial to aware public and also reduces the disease rates by providing more information and knowledge about tuberculosis to adolescents.

The study aimed to assess the level of knowledge on tuberculosis and its preventive measures among high school level student of Bhaktapur district of Nepal.

## Methods

The cross-sectional study design was applied for conducting the research in the high school students in Bhaktapur district of Nepal. A total of 192 high school students present on the day of data collection were selected for the study. The samples (high school students of class 9 and 10) were selected from two purposively identified schools in Bhaktapur. Similarly, semi-structured questionnaires were developed and pretested before data collection through self -administered techniques.

Before data collection, ethical clearance was taken from the research committee of Asian College for Advance Studies and taken permission from the selected schools. Study participants were explained about the purpose of the study and assured of confidentiality through anonymity and privacy of data use. Written consent was taken from all the student participants.

The collected data were checked for the completeness and correctness, coded and entered in the database. Likewise, data analysis was done using SPSS 20v to measure frequency, percentage and chi-square tests for associations between knowledge on the preventive measures of tuberculosis and socio-demographic variables. Besides, the level of knowledge was categorized into adequate scoring above 75 percentages, moderate scoring 50 to 75 percentages and inadequate scoring below 50 percentages for the interpretation.

## Results

### Socio-demographic characteristics

The study participants were from the age13 to 17 years where the majority of participants were from 14 and 15 years. Among them, more than half (51%) of the participants were male and came from municipalities. Similarly, most of the participants (61.5%) were from the *Newar* ethnic community, and 88.5% were from the Hindu religion. Also, more than two third of the participants (76%) belonged to the nuclear family. Among the parents of all respondents, almost all of the fathers (97.9%) and more than two third of the mothers (75.0%) were literate respectively. Regarding the occupation of the parents, about one-third of the fathers (30.2%) were engaged in business, and more than half of the mothers (57.3%) were housemakers.

### Knowledge on Tuberculosis

Almost all participants (93.8%) had heard about tuberculosis and among them, maximum (85.4%) had received information from teachers followed by television (54.2%), radio (26.0%), newspaper (20.8%), health professionals (18.8%), family members (17.7%), friends (11.5%) and others (3.1%). Likewise, about one-tenth of family members (9.4%) of participants had suffered from tuberculosis in the past.

Most of the participants (90.6%) had known that tuberculosis is an infectious disease whereas the rest of the participants said it is hereditary, highly contagious and others.

**Knowledge on risk factors, symptoms and treatment of tuberculosis**

Most of the high school students have responded that smoking (53.7%) and bacteria (46.3%) are the risk factors, and other responses were lack of hygiene (18.9%), malnutrition (15.8%), overworking (15.8%), virus (12.6%) and curse of god (2.1%).
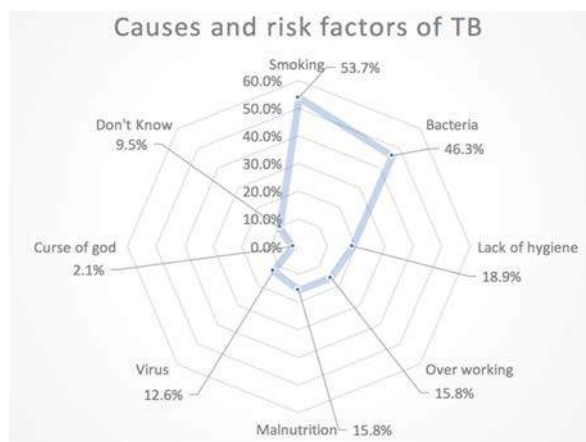


**Figure 1: Participants knowledge on risk factors of TB**

Likewise, most of the participants (96.9%) had agreed that TB is transmissible. Regarding the mode of transmission, mix thoughts were presented during the survey among high school students as it is transmitted through coughing and sneezing (21.3%), living with infected persons (21.3%), mother to child (21.3%), having meal together (12.8%), drinking in a same glass (12.8%) and sharing cloths (6.4%). Among the total participants, majority (68.9%) of the participants told that

coughing more than 2 weeks followed by chest pain (55.6%), blood in sputum (37.8%), loss of appetite (37.8%), weight loss (31.1%) and fever during night time (30%) as the symptoms of TB.

Similarly, for the diagnostic evaluation of TB, only about half of the high school students (49%) stated that sputum examination is used to diagnose TB. One-third of them had said skin test (31.2%) followed blood test (21.9%), chest X-ray (20.8%) and very few said urine test (1%) as the diagnostic evaluation of TB. The majority of participants (66.7%) told that TB could be treated by anti-TB drugs combination and other participants expressed antibiotics (28.1%), traditional medicine (2.1%), avoiding sex (2.1%) and others (1%). Furthermore, half of the participants had answered the complete treatment for TB will take six months and the majority of them (78.1%) heard about the DOTS.

**Knowledge of preventive measures of TB**

In average, most of the participants were aware of the preventive measures of TB such as covering mouth and nose when coughing and sneezing (97.9%), proper ventilation and sunlight (97.9%), eating balanced diet (95.8%), sputum discharge in special plastic container (90.6%), hand-washing after coughing and sneezing or touching in public places (88.5%) and BCG vaccination in newborn child (82.3%). However, more awareness is desirable about issues like avoiding close contact with TB patients (63.5%) and isolation of TB patients (69.8%).

**Table 1: Knowledge of preventive measures of TB**

| Preventive measures of TB (n=192) | Responses | Percentage |
|---|---|---|
| Eating a balanced diet to prevent TB | 184 | 95.8 |
| Encourage getting BCG vaccination in the newborn child | 158 | 82.3 |
| Seeking health service from health personnel | 176 | 91.7 |
| Going hospital when symptoms arise | 170 | 88.5 |
| Keeping house with proper ventilation and sunlight | 188 | 97.9 |
| Avoiding being close to the TB patient | 122 | 63.5 |
| Covering mouth and nose when coughing and sneezing | 188 | 97.9 |
| Handwashing after coughing and sneezing or touching in public places | 170 | 88.5 |
| Putting sputum discharge in special plastic container | 174 | 90.6 |
| Put face mask or proper tissue during coughing or sneezing | 188 | 97.9 |
| Isolation of the TB patient | 134 | 69.8 |

Among the total high school students, more than half of the participants (59.4%) had inadequate knowledge, one-third of the participants (36.5%) had moderate knowledge and least of the respondent (4.2%) had adequate knowledge. Likewise, almost all the participants (90.6%) had adequate knowledge on preventive measures of TB followed by moderate knowledge (9.4%).

**Table 2: Knowledge score of TB and its preventive measures among high school students**

| Knowledge level | Overall Knowledge | | Knowledge of preventive measures | |
|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent |
| Less than 50% (inadequate) | 114 | 59.4 | 0 | 0 |
| 50-75% (moderate) | 70 | 36.5 | 18 | 9.4 |
| More than 75% (adequate) | 8 | 4.2 | 174 | 90.6 |

The study also found that the students living in joint families had more knowledge of TB than the students living in nuclear families. Likewise, among different ethnicities, *Chhetri* ethnic groups had more inadequate knowledge of TB followed by *Tamang* and *Newar* ethnic groups. However, there are no associations (p>0.005) between knowledge on TB and ethnicity as well as family type.

**Discussion**

From the results of this study, it has been found that one-third of the participants were from 15 years of age and mostly belonged to the Hindu religion and attendant of class 10. All the participants had heard about tuberculosis whereas a similar study carried out in Kenya and Ethiopia showed 93.3% [21] and 94.9% [22] of the participants respectively

had heard about TB. Likewise, this study reveals that the maximum (85.4%) participants had information about TB through teacher and television (54.2%).

The study found that more than ninety percentages (90.6%) had known about the meaning of TB. Similarly, 25% expressed that the TB is contagious and 2.1% told it is a hereditary disease. In contradiction, the findings of the research conducted in the Kingdom of Saudi Arabia in 2015 [5] showed that around 63.0% recorded that TB was infectious, while only 5.0% thought TB is hereditary.

Most of the study participants (96.9%) had expressed that TB is transmitted while in another study[1], nearly three fourth (73.9%) of the study participants were aware of the disease. Moreover, regarding the risk factors, more than half of the participants (53.7%) had told that smoking is the risk factors while in contrast to a study at Kingdom of Saudi Arabia[5] provided only about one-fourth of the participants (27.7%) felt it. Other risk factors are also expressed by the participants including the misconception that TB is caused by a virus.

Most of the participants (90.4%) in this study had said that TB is transmitted through coughing, sneezing without covering whereas 15 percentage less found in a study conducted at Bangladesh [10] that is 75 percent. Similarly, a study at Kingdom of Saudi Arabia[5] showed the 44.9 percent had prolonged cough which is nearly 20 percent less than in this study (68.9%). Furthermore, majority of the

participants (66.7%) had agreed that TB is treated by anti- TB drugs combination while in another study [1], more than eighty percent (80.2%) had known the treatment. Half of the participants (50%) in this study knew the duration of drug intake; however, in a similar study, it was only 12.6%[5].

A study conducted by Rana et al. (2015)[10] revealed that 90% of the participants had heard about the DOTs while 78.1% had heard about DOTs in the present study. Similarly, in another study in Nepal, about 56% had heard DOTs[23]. All the participants agreed that the TB is curable whereas slightly less (84.1%) in a study conducted at Mongolia[1]. Almost all (97.9%) the participants were applying preventive measures such as covering mouth and nose when coughing and sneezing whereas in contrast to this study, only 42.9% were covering during coughing and sneezing[1].

In this study, only 4.2% of the student participants had adequate knowledge of TB, and 36.5% had a moderate level of knowledge while a similar study conducted in Ethiopia showed that 59.8% had good knowledge[24]. Likewise, almost all participants (90.6%) had adequate knowledge on preventive measures of TB in this study whereas a study conducted in Peru had shown less percentage (43.3%) had adequate knowledge[25]. Therefore, the researcher focused on the inclusion of tuberculosis education in the syllabus of upper-level school students[26]

## Limitations

The study had participants of the students of 9 and 10 class and had not discussed the family members' practice, knowledge, and attitudes. There are many areas to explore the knowledge and engage broad areas and participants for the study to be thought for the research questions in the future.

## Conclusions

Overall, least number of the high school students had adequate knowledge on TB whereas most participants had adequate knowledge regarding TB preventive measures. Despite the inclusion of TB in the school curriculum and awareness program from the media and government, students' knowledge level is still shallow. Moreover, the teachers should be trained in TB and its preventive measures and need to create a promising classroom environment for students. Therefore, this study is important for the school to plan the sessions and the government to focus the school level students for TB prevention and control.

## Acknowledgments

## References

[1]    WHO. Tuberculosis 2018. https://www.who.int/en/news-room/fact-sheets/detail/tuberculosis (accessed January 10, 2019).

[2]    Gasana J, Ravikumaran R, Westphal D, Mendy A. The Pandemic Nature of Reemerging Tuberculosis and the Role of Population Migration in its Spread. MOJ Public Heal 2017;6. doi:10.15406/mojph.2017.06.00180.

[3]    Stevens H, Ximenes RA, Dantas OM, Rodrigues LC. Risk factors for tuberculosis in older children and adolescents: a matched case-control study in Recife, Brazil. Emerg Themes Epidemiol 2014;11:20. doi:10.1186/s12982-014-0020-5.

[4]    Osonwa K, Eko J. Assessment of Knowledge, Attitude, and Tuberculosis-Related Social Stigma Among School Adolescent in a Semi-Urban Town in Cross River State, Nigeria. Int. J. Educ. Res., vol. 3, 2015.

[5]    Alsalem SB, Aleisa AM, Raslan IA, Binjawhar AS, Khouqeer AF, Gad A. Tuberculosis: Awareness among Students in a Saudi University. Health (Irvine Calif) 2015;7:175–82. doi:10.4236/health.2015.72020.

[6]    World Health Organization, Organization WH. Global tuberculosis report 2018. Geneva: 2018.

[7]    WHO. Global Tuberculosis Report 2014 - World | ReliefWeb. Geneva: World Health Organization; 2014. doi:10.1016/j.icrp.2009.12.007.

[8]    Tsankova G. Prevention of Tuberculosis At School Age-Awareness of Secondary School Students. J IMAB - Annu Proceeding (Scientific Pap 2011;17, 1:189–92. doi:10.5272/jimab.2011171.189.

[9]    Kulkarni P, Kudale A, Arasu K, Lab M, Darby W, Rangan S. Tuberculosis knowledge and awareness in tribal-dominant districts of Jharkhand, India: implications for ACSM. Public Heal Action 2014;4:189–94. doi:10.5588/pha.14.0036.

[10]    Rana M, Sayem A, Karim R, Islam N, Islam R, Zaman TK, et al. Assessment of knowledge regarding tuberculosis among non-medical university students in Bangladesh: A cross-sectional study. BMC Public Health 2015;15:716. doi:10.1186/s12889-015-2071-0.

[11]    Singh UP, Bala A. Knowledge about Tuberculosis in Senior School Students of Punjab. Indian J Community Med 2006;31:93–5.

[12]    Orrett FA, Shurland SM. Knowledge and awareness of tuberculosis among pre-university students in Trinidad. J Community Health 2001;26:479–85. doi:10.1023/A:1012563508763.

[13]    K.C SR.  Applied epidemiology in Nepalese Context. Kathmandu, Nepal: K.P Simkhada; 2013.

[14]    Hamlet N. Case Study of National Tuberculosis Programme Implementation in Nepal. Kathmandu, Nepal: World Bank; 2002.

[15]    Abebe DS, Biffa D, Bjune G, Ameni G, Abebe F. Assessment of knowledge and practice about tuberculosis among eastern Ethiopian prisoners. Int J Tuberc Lung Dis 2011;15:228–33.

[16]    Alemu J, Mamo G, Kandi V, Pal M. Prevalence of Tuberculosis in Gambella Regional Hospital, Southwest Ethiopia : A Retrospective Study to Assess the Progress towards Millennium Development Goals for Tuberculosis
( 2006-2015 ). Am J Public Heal Res 2017;5:6–11. doi:10.12691/ajphr-5-1-2.

[17]    Renuka M, Murali D. Knowledge and Awareness of Tuberculosis among High School Students of Mysore City. Al Ameen J Med Sci 2012;5.

[18]    Hadi MAE. Assessment of the Amount of Knowledge and Attitude of Tehran High School Students Regarding Tuberculosis. Tanaffos 2006;5:23–8.

[19]    Gothankar JS. Tuberculosis awareness program and associated changes in knowledge levels of school students. Int J Prev Med 2013;4:153–7.

[20]    Yoshiyama T, Shrestha B, Maharjan B. Risk of relapse and failure after retreatment with the Category II regimen in Nepal. Int J Tuberc Lung Dis 2010.

[21]    Yonge SA. Assessment of Knowledge, Attitude, and Practices Regarding Tuberculosis among Adolescents in Kisauni-Mombasa District, Kenya. Kenyatta University, 2009.

[22]    Tolossa D, Medhin G, Legesse M. Community knowledge, attitude, and practices towards tuberculosis in Shinile town, Somali regional state, eastern Ethiopia: a cross-sectional study. BMC Public Health 2014;14:804. doi:10.1186/1471-2458-14-804.

[23]    Sah JP. Knowledge on Tuberculosis among Students of Higher Secondary School, Lalitpur, Nepal. MOJ Public Heal 2016;4:133–41. doi:10.15406/mojph.2016.04.00091.

[24]    Tsegaw Hibstu D, Jikamo Bago B. Knowledge, Attitude and Practice of Tuberculosis and its Transmission among High School Students in Yirgacheffe Town, Gedeo Zone, Southern Ethiopia. J Anc Dis Prev Remedies 2016;04. doi:10.4172/2329-8731.1000142.

[25]    Hernandez Cordova JG, Failoc Rojas VE. Attitudes And Knowledge Regarding Tuberculosis In High School Students, A Cross-Sectional Survey In Northwest Peru. Paediatr Respir Infect Immunol 2017;50: PA552. doi:10.1183/1393003.congress-2017.PA552.

[26]    Montagna MT, Napoli C, Tafuri S, Agodi A, Auxilia F, Casini B, et al. Knowledge about tuberculosis among undergraduate health care students in 15 Italian universities: A cross-sectional study. BMC Public Health 2014;14:970. doi:10.1186/1471-2458-14-970.

**Original Article**

# Student Nurses' Quality of Life in Majmaah University:
# A Cross-Sectional Study

Emmanuel Dayao Paragas Jr, Jestoni D. Maniago,

Cris Adolfo, Majed Alamri

Department of Nursing, College of Applied Medical Sciences,
Majmaah University, Majmaah 11952, Saudi Arabia
Corresponding Author:
Jestoni D. Maniago, DNS, RN
Email: je.maniago@mu.edu.sa
Department of Nursing, College of Applied Medical Sciences,
Majmaah University, Majmaah 11952, Saudi Arabia

**Abstract**

**Background:** Despite the vast number of studies related to the student's quality of life (QoL), only a few were explicitly conducted in the nursing academe in Saudi Arabia.

**Aims:** This study aimed to determine the profile and QoL of student nurses in a baccalaureate degree program in Saudi Arabia.

**Settings and Design:** This study utilized a descriptive cross-sectional design and was conducted in the Department of Nursing at Majmaah University, Saudi Arabia.

**Methods and Material:** The demographics and adopted Arabic WHOQOL-BREF questionnaires were used to collect the data among the 100 nursing students between October and November 2016.

**Analysis used:** The descriptive statistics and multiple regression analyses were utilized to describe the demographics, and to establish its relationship to the four domains of QoL.

**Results:** Gender, distance from school, and monthly allowance (p >0.05) were found to have no significant association with the physical, psychological, social, and environment domains of QoL. However, marital status (p <0.05) was established to have a significant relationship, but only to the environment domain of QoL. Specifically, being married decreases the environment domain by 11.21 than being single.

**Conclusions:** The marital status is significantly associated with the QoL in nursing students, but only to the "environment domain". On the other hand, gender, distance from school, and monthly allowance were found to have no significant association to the four QoL domains.

**Keywords:** nursing, quality of life, Saudi Arabia, social factors, students

**الملخص**

**الخلفية:** على الرغم من ان هنالك العديد من الدراسات المتعلقة بنوعية حياة الطالب، لم يرتبط سوى عدد قليل منها بطلبة التمريض في المملكة العربية السعودية.

**الأهداف:** تهدف هذه الدراسة إلى تحديد الشخصية ونوعية الحياة لطلبة التمريض في برنامج البكالوريوس في المملكة العربية السعودية.

**منهجية الدراسة:** استخدمت هذه الدراسة المنهج الوصفي لتحديد الارتباط بين متغيرات الدراسة، والتي أجريت في قسم التمريض بجامعة المجمعة بالمملكة العربية السعودية.

**الأساليب:** استخدمت البيانات الشخصية والنسخة العربية المعتمدة من استبيان WHOQOL-BREF ، لجمع البيانات من ١٠٠ طالب وطالبة تمريض بين شهري أكتوبر ونوفمبر ٢٠١٦.

**التحليل:** استخدمت الإحصاءات الوصفية وتحليل الانحدار المتعدد لوصف البيانات الديمغرافية لإثبات العلاقه بالمجالات الأربعة لنوعية الحياة.

**النتائج:** الجنس، مكان السكن، والدخل الشهري ليس لها علاقة كبيرة مع المجالات المادية والنفسية والاجتماعية والبيئية لنوعية الحياة. الحالة الاجتماعية لها علاقة ذات دلالة احصائية، ولكن في مجال البيئة من نوعية الحياة فقط.

**الخاتمة:** يرتبط الوضع الاجتماعي بشكل كبير مع جودة حياة طلبة التمريض، ولكن فقط في «مجال البيئة». من ناحية أخرى، تم العثور على ان الجنس، مكان السكن، والدخل الشهري ليس لها أي ارتباط كبير بنطاقات جودة الحياة الأربعة.

## Introduction

In Saudi Arabia, student nurses have experienced a high level of stress during their academic and clinical preparation that could influence their quality of life (QoL) [1-4]. The identified primary sources of their stress were the huge number of assignments and workloads [4-7], and perceived lack of professional nursing knowledge and skills resulting to poor QoL specifically on their physical health, social functioning, and vitality [4,8-10]. Single students as compared to married have experienced the worse quality of life and poorer health [11-12]. Also, the distance of students going to school either by driving or commuting has been reported to affect the QoL as manifested by their lower attendance [13]. Despite this scenario, they conveyed to be more empowered to establish a good social relationship [14]. On the other hand, students who are receiving less allowance have frequently visited their school clinic that offers free health services, or they just tolerate minor illnesses to save time and avoid difficulty [15]. These pressing problems and challenges to the QoL of students imply that the schools particularly in the nursing field have the responsibilities to initiate specific curriculum change. This would ensure that the students' QoL is at its optimal level so that their academic and clinical performance will not be affected.

Based on the knowledge of the researchers, despite the vast number of studies related to the student's QoL only a few were explicitly conducted in the nursing academe. Also,

limited studies have particularly examined the association of demographic variables to the student's QoL. Therefore, this study aimed to determine the correlation of social factors such as gender, marital status, distance from school, and monthly allowance to the physical, psychological, social, and environment domains of student nurses' QoL. Results of the study are deemed opportunity for educators to consider factors that have an impact on students' QoL in planning extra-curricular and academic requirements particularly in the nursing academe in Saudi Arabia.

## Objective

This study aimed to determine the correlation of demographic factors and QoL of student nurses enrolled in the baccalaureate degree program at Majmaah University in Saudi Arabia.

## Methods

### Research design and participants

This study used a cross-sectional   design to determine the relationship of demographic factors and QoL among 100 nursing students in both male and female sections at Majmaah University using purposive sampling. A priori power analysis was utilized with medium effect size (0.15), significance level of 0.05, and statistical power of 0.80 using the G*Power version 3.17 software to determine the sample size in this study which required to have at least 100 participants. Those who are Saudi nationals, presently registered in the nursing

program, and able to read and write in Arabic were qualified to participate in this study.

## Instruments

A demographic questionnaire and adopted Arabic version of the World Health Organization Quality of Life (WHOQOL-BREF) were used in this study. The WHOQOL-BREF is a cross-culturally accepted instrument to assess the quality of life. The students independently answered the printed copies of the questionnaires in their classrooms for about 15-20 minutes between October to November 2016. It consists of 26 items that are offered in various languages for developed and developing countries. It has four domains, such as: the physical health, the psychological health, the social relationship and the environment. Physical health includes "dependence on medicinal substances and medical aids, activities of daily living, mobility, fatigue, pain and discomfort, sleep and rest, and work capacity while psychological health includes bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality, thinking, learning, memory, and concentration" [16]. The social relationship domain involves "the personal relationship, social support, and sexual activity" [16]. Furthermore, the environment domain involves "financial resources, freedom, physical safety, and security, health and social care, opportunities for acquiring new information and skills, home environment, participation in and opportunities for recreation, physical environment, and transport" [16]. Responses will be according to 5-point Likert scale. Also, raw scores on each domain can be converted from 0 being the least favorable to 100 being the most favorable using the established transmutation table, and higher scores denote higher level of QoL [16].

## Ethical Considerations

The study was approved by the dean of the College of Applied Medical Sciences, and the Ethics Review Board at Majmaah University, Saudi Arabia. Informed consent was obtained from the students with the guarantee of anonymity and confidentiality.

## Data Analysis

The descriptive statistics were used to describe the demographics of the participants. To establish the demographic predictors of the QoL in nursing students, multiple regression analyses were used using SPSS Statistics version 23.0 for Mac OS X.

## Results

### Demographics

Of the 105 distributed questionnaires to the nursing students in the male and female sections, 100 were successfully answered and retrieved with a response rate of 95.24%. The mean age of the nursing students was 21.36 ± 2.01 years, and the majority of them were male (66%). Almost all of them were single (90%), and only 10% were married. Furthermore, most of the respondents live >51 km from school (74%). Regarding monthly al-

lowance, 40% received 1,000-1,500 SAR, whereas only 27% obtained 501-999 SAR, 24% acquired >2,000 SAR, and only a minority (9%) have received <500 SAR.

**Table 1**. Socio-demographics of nursing (students (n=100

| Variables | Mean (SD/%) |
|---|---|
| Age | 21.36 ± 2.01 |
| Gender | |
|   Male | 66 (66) |
|   Female | 34 (34) |
| Marital Status | |
|   Single | 90 (90) |
|   Married | 10 (10) |
| Distance from School | |
|   <50 km | 26 (26) |
|   >51km | 74 (74) |
| Monthly Allowance | |
|   <500 SAR | 9 (9) |
|   501-999 SAR | 27 (27) |
|   1,000-1,500 SAR | 40 (40) |
|   >2,000 SAR | 24 (24) |

### The QoL scores in the four domains

The QoL scores has four domains such as physical health, psychological, social relationship, and environment as shown in table 2. Firstly, the mean psychological score was 20.55 (±3.77), while the environment mean score was 26. 99 (±5.17), and both of these acquired an equivalent score of 63 in a 100 scale transmutation which can be interpreted as an above average score. Secondly, social

relationship obtained a mean score of 10.28 (±2.85) which has an equivalence of 56 and can be interpreted as an average score. Lastly, physical health attained 20.54 (±3.32) which has an equivalence of 50 and can be inferred as average.

**Table 2**. The mean scores in the four domains of quality of life among nursing students (n=100)

| Domains | Mean | SD |
|---|---|---|
| Physical Health | 20.54 | 3.32 |
| Psychological | 20.55 | 3.77 |
| Social Relationship | 10.28 | 2.85 |
| Environment | 26.99 | 5.17 |

### The correlation between demographic factors and student nurses' QoL

As specified in table 3, it is noteworthy that gender ($p > 0.05$), marital status ($p > 0.05$), distance from school ($p > 0.05$), and monthly allowance ($p > 0.05$) were found to have no significant relationship to the physical, psychological and social domains of QoL. On the other hand, only marital status ($p < 0.05$) was established to have a significant relationship to the environment domain of QoL. Specifically, being married decreases the environment domain by 11.21 compared to being single. However, gender ($p > 0.05$), distance from school ($p > 0.05$), and monthly allowance ($p > 0.05$) attained no significant relationship to the environment domain.

**Table 3.** The relationship of the social factors and quality of life among nursing students using multiple linear regression (n=100)

| Variables | Quality of Life | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Physical domain | | Psychological domain | | Social domain | | Environment domain | |
| | β (SE) | P | β (SE) | p | β (SE) | p | β (SE) | p |
| Gender (Male) | 2.52 (2.61) | 0.34 | 2.41 (3.45) | 0.49 | 4.06 (5.21) | 0.44 | 1.63 (3.50) | 0.64 |
| Marital Status (Single) | -5.62 (4.31) | 0.20 | -1.73 (5.70) | 0.76 | -4.76 (8.60) | 0.58 | -11.21 (5.77) | <0.05 |
| Distance from school (<50 km) | -1.19 (2.82) | 0.68 | -3.60 (3.72) | 0.34 | -6.83 (5.62) | 0.23 | -2.09 (3.77) | 0.58 |
| Monthly Allowance (<500 SAR) | -1.15 (1.43) | 0.42 | 0.49 (1.88) | 0.80 | 0.98 (2.84) | 0.73 | 1.20 (1.91) | 0.53 |
| $R^2$ | 0.05 | | 0.02 | | 0.03 | | 0.05 | |

## Discussion

This study established the QoL scores and its relationship to the select demographic factors among the nursing students at Majmaah University. It is noteworthy that the nursing students obtained the highest score on both psychological and environment domain, while physical health was found to be the lowest among the four domains. This study supported the result conducted in the Philippines [17] where nursing students acquired a high score in the environment domain. However, the result in this study about the physical domain was contrary to the results conducted in Poland [18], Brazil [19], and others (Chile, Egypt, Greece, Hong Kong, India, Kenya, Oman, Saudi Arabia and United States of America) [20] where it was found that nursing students have a high score in physical domain. Thus, it is important to take note of the cultural, geographical, and educational system aspects with regards to the relationship of demographic factors in the QoL of the students.

Further, it is remarkable that no significant relationships were found in gender, distance from school, and the monthly allowance to the four domains of QoL. However, only the marital status obtained a significant association with the environment domain of QoL. There is a limited number of literature about

student's quality of life and its association with gender. However, this study supports some published studies that claim to have no significant association between gender and QoL [21-25]. There is a notable difference on how people responds to their social or cultural roles. This finding indicates the cultural acceptance of Saudi nationalities in their patriarchal society regardless of the privileges they possess regarding their gender. The school location away from home has been reported as a contributing factor to empower students and their social relationships [14]. The increased distance to the university, and the students living out of commuting distance is associated with lower attendance going to school [13,26]. However, it is interesting to note that although the majority of the students live far away from the university, this study established that distance has no significant association with their QoL. Due to the high prevalence of dangerous driving behaviors among Saudi Youths [27], it is vital that the safety concerns in the traffic danger must always be considered most especially to those who drive by themselves. Some studies revealed that students who have higher monthly allowance from their parents have reported a higher level of quality of life [14,28]. In this study, it is noteworthy that although the students are receiving the monthly allowance from the government aside from their parents, it attained no significant relationship to the QoL. This signifies that the students have the same level of quality of life regardless of the amount of money they received.

On the other hand, although a study found that married individuals had a greater satisfaction with life [28], this study established that marital status has no significant association to physical, psychological, and social domains of QoL. However, it acquired a significant relationship to the environment domain. Specifically, this study found that being married decreases the environment domain of QoL in nursing students. It is noteworthy that this finding is contrary to some studies that claim that single individuals are at risk for worse quality of life and poorer health [11-12]. Moreover, this study implies that married individuals have lesser advantages in terms of "financial resources, independence, safety and security, health and social care, home environment, opportunities for acquiring new information and skills, physical environment, and transport" [11] than single individuals, participation in and opportunities for recreation. Abundant considerations must be given to the married students in the universities in Saudi Arabia to encourage them to finish their degree despite the challenges they encounter in their married life.

The study was conducted in one university in Saudi Arabia using a purposive sampling and with a smaller sample size, thus, caution must be highly considered in the generalizability of its results with other universities. It is recommended that more studies must be accomplished in other universities to support the claims in this study.

## Conclusion

In conclusion, gender, distance from school, and monthly allowance were found to have no significant association to the four domains of QoL. However, marital status was found to have a significant relationship to the QoL, but only with the environment domain. Those who are married have a decreased environment QoL than the single individuals.

The findings suggest that the administrators and faculty members should consider the various dimensions of quality of life of nursing students most especially in planning their extra-curricular and academic requirements to help them maximize their learning as well as to enhance their satisfaction. Moreover, the academic requirements must not overburden the students which can lead to lack of sleep and too much stress most especially for those who are married.

## References

[1]     Timmins F, Kaliszer M. Aspects of nurse education programmes that frequently cause stress to nursing students–fact-finding sample survey (Internet). Nurse education today. 2002 Apr 1;22(3):203-11. Available from DOI: 10.1054/ nedt.2001.0698

[2]     Jimenez C, Navia-Osorio PM, Diaz CV. Stress and health in novice and experienced nursing students (Internet). Journal of Advanced Nursing. 2010 Feb;66(2):442-55. Available from DOI: 10.1111/j.1365-2648.2009.05183.x

[3]     Forouzandeh N, Aslani Y, Mehralian H, Deris F. The association between academic stress and quality of life in students (Internet). Journal of Shahrekord University of Medical Sciences. 2016;18. Available from: http://journal.skums.ac.ir/article-1-2374-fa.html

[4]     Alsaqri SH. Stressors and Coping Strategies of the Saudi Nursing Students in the Clinical Training: A Cross-Sectional Study (Internet). Education Research International. 2017;2017. Available from DOI: 10.1155/2017/4018470

[5]     Shaban IA, Khater WA, Akhu-Zaheya LM. Undergraduate nursing students' stress sources and coping behaviours during their initial period of clinical training: A Jordanian perspective (Internet). Nurse education in practice. 2012

Jul 1;12(4):204-9. Available from DOI: 10.1016/j.nepr.2012.01.005

[6]     Eswi AS, Radi S, Youssri H. Stress/stressors as perceived by baccalaureate Saudi nursing students (Internet). Middle-East Journal of Scientific Research. 2013 Apr;14(2):193-202. Available from DOI: 10.5829/idosi.mejsr.2013.14.2.734

[7]     Zhao FF, Lei XL, He W, Gu YH, Li DW. The study of perceived stress, coping strategy and self-efficacy of Chinese undergraduate nursing students in clinical practice (Internet). International journal of nursing practice. 2015 Aug;21(4):401-9. Available from: https://doi-org.sdl.idm.oclc.org/10.1111/ijn.12273

[8]     Chan CK, So WK, Fong DY. Hong Kong baccalaureate nursing students' stress and their coping strategies in clinical practice (Internet). Journal of professional Nursing. 2009 Sep 1;25(5):307-13. Available from DOI: 10.1016/j.profnurs.2009.01.018

[9]     Aedh AI, Elfaki NK, Mohamed IA. Factors associated with stress among nursing students (Internt). IOSR Journal of Nursing and Health Science (IOSR-JNHS). 2015;4(6):33-8. Available from DOI: 10.9790/1959-04663338

[10]    Souza IM, Paro HB, Morales RR, Pinto RD, Silva CH. Health-related quality of life and depressive symptoms in undergraduate nursing students (Internet). Revista latino-americana de enferma-

gem. 2012 Aug;20(4):736-43. Available from: http://dx.doi.org/10.1590/S0104-11692012000400014

[11]    Luttik ML, Jaarsma T, Veeger N, van Veldhuisen DJ. Marital status, quality of life, and clinical outcome in patients with heart failure (Internet). Heart & Lung. 2006 Jan 1;35(1):3-8. Available from DOI: 10.1016/j.hrtlng.2005.08.001

[12]    Robards J, Evandrou M, Falkingham J, Vlachantoni A. Marital status, health and mortality (Internet). Maturitas. 2012 Dec 1;73(4):295-9. Available from DOI: 10.1016/j.maturitas.2012.08.007

[13]    Frenette M. Too far to go on? Distance to school and university participation (Internet). Education Economics. 2006 Mar 1;14(1):31-58. Available from: https://doi.org/10.1080/09645290500481865

[14]    Moritz AR, Marques-Pereira E, Pereira-de-Borba K, Clapis MJ, Gryczak-Gevert V, Mantovani MD. Quality of life of undergraduate nursing students at a Brazilian public university (Internet). Investigacion y educacion en enfermeria. 2016 Dec;34(3):564-72. Available from DOI:10.17533/udea.iee.v34n3a16

[15]    Pan H, Cui B, Zhang D, Farrar J, Law F, Ba-Thein W. Prior knowledge, older age, and higher allowance are risk factors for self-medication with antibiotics among university students in southern China (Internet). PloS one. 2012

Jul 20;7(7):e41314. Available from DOI:10.1371/journal.pone.0041314

[16]   World Health Organization. WHO-QOL-BREF: introduction, administration, scoring and generic version of the assessment: field trial version (Internet), December 1996. Geneva: World Health Organization; 1996. Available from: https://apps.who.int/iris/bitstream/handle/10665/63529/WHOQOL-BREF.pdf

[17]   Torres GCS, Paragas Jr ED. Social determinants associated with the quality of life of baccalaureate nursing students: A cross-sectional study. Nursing Forum. 2018; 54(2):137-143. https://doi.org/10.111/nuf.12306

[18]   Fidecki WM, Wysokiński M, Jakubiec I, Kulina D, Kuszplak K. Nursing students' quality of life. Journal of Education, Health and Sport. 2018 Aug 14;8(9):136-45. Available from http://dx.doi.org/10.5281/zenodo.1345114

[19]   Moura IH, Nobre RD, Cortez RM, Campelo V, Macêdo SF, Silva AR. Quality of life of undergraduate nursing students. Revista gaucha de enfermagem. 2016;37(2). Available from http://dx.doi.org/10.1590/1983-1447.2016.02.55291

[20]   Cruz JP, Felicilda-Reynaldo RF, Lam SC, Contreras FA, Cecily HS, Papathanasiou IV, Fouly HA, Kamau SM, Valdez GF, Adams KA, Colet PC. Quality of life of nursing students from nine countries: A cross-sectional study. Nurse education today. 2018 Jul 1;66:135-42. Available from https://doi.org/10.1016/j.nedt.2018.04.016

[21]   Paro HB, Morales NM, Silva CH, Rezende CH, Pinto RM, Morales RR, Mendonça TM, Prado MM. Health-related quality of life of medical students. Medical education. 2010 Mar;44(3):227-35. Available from DOI: 10.1111/j.1365-2923.2009.03587.x

[22]   Toomey RB, Ryan C, Diaz RM, Card NA, Russell ST. Gender-nonconforming lesbian, gay, bisexual, and transgender youth: school victimization and young adult psychosocial adjustment (Internet). Available from DOI: 10.1037/a0020705

[23]   Brajša-Žganec A, Merkaš M, Šverko I. Quality of life and leisure activities: How do leisure activities contribute to subjective well-being? (Internet). Social Indicators Research. 2011 May 1;102(1):81-91. Available from DOI:10.1007/s11205-010-9724-

[24]   Mahmoud JS, Staten RT, Hall LA, Lennie TA. The relationship among young adult college students' depression, anxiety, stress, demographics, life satisfaction, and coping styles (Internet). Issues in mental health nursing. 2012 Feb 28;33(3):149-56. Available from: https://doi-org.sdl.idm.oclc.org/10.1111/jcap.12109

[25]    Chraif M, Dumitru D. Gender differences on wellbeing and quality of life at young students at psychology (Internet). Procedia-Social and Behavioral Sciences. 2015 May 5;180:1579-83. Available from DOI:10.1016/j.sbspro.2015.02.310

[26]    Frenette M. Access to college and university: Does distance to school matter? (Internet). Canadian Public Policy/Analyse de Politiques. 2004 Dec 1:427-43. Available from DOI: 10.2307/3552523

[27]    Memish ZA, Jaber S, Mokdad AH, AlMazroa MA, Murray CJ, Al Rabeeah AA. Peer reviewed: Burden of disease, injuries, and risk factors in the Kingdom of Saudi Arabia, 1990–2010 (Internet). Preventing chronic disease. 2014;11. Available from DOI: 10.5888/pcd11.140176

[28]    Holt-Lunstad J, Birmingham W, Jones BQ. Is there something unique about marriage? The relative impact of marital status, relationship quality, and network social support on ambulatory blood pressure and mental health (Internet). Annals of behavioral medicine. 2008 Mar 18;35(2):239-44. Available from DOI: https://doi-org.sdl.idm.oclc.org/10.1007/s12160-008-9018-y

**Original Article**

# Analysing Undergraduate Medical Curricula: Experience from a Saudi Medical College

Ahmad Saleh Alamro

Medical Education Department, College of Medicine, Qassim University

Corresponding Author:

Ahmad S. Alamro

Email: ah.alamro@qu.edu.sa    Mobile Number: +966561013111

Postal Code: 51452; P.O. Box: 6655

**Abstract**

**Background:** Curriculum analysis refers to the exploration of different components of the educational process in order to analyse those components and highlight strengths as well as opportunities for improvement. Curriculum analysis examines the curriculum using a multi-faceted approach.

This study aimed to analyse the curriculum of Qassim University College of Medicine (QUCOM); explore its strengths, weaknesses, and areas for improvement; and share a medical curriculum analysis performed in the Saudi context.

**Methods:** For this study, a qualitative descriptive study was used based on document analysis. All the college's documents from 2001 to 2018 were reviewed. The analysis used Harden's ten questions framework for curriculum development. Thematic analysis was then used to categorise the findings following Harden's ten questions framework.

**Results:** This study showed that the curriculum was built to meet the needs of the Saudi community and increase the ratio of Saudi to expatriate doctors. The contents of the curriculum were appropriate for medical education, and the methodology was likely to foster life-long learning. A clear path for communication of the curriculum and management of programme provision existed, and the learning environment was found to be motivating. However, no clear representation of improving professionalism, patient safety, or research was found in the curriculum.

**Conclusion:** The QUCOM curriculum showed great compliance with the student-centred, problem-solving, integrated, community-based, elective, and systematic (SPICES) model. However, many areas for improvement were identified. Adoption of the Saudi Medical Education Directives (SaudiMED) competency framework would achieve excellence in medical education and keep with the aspirations of the Saudi community.

**Keywords:** Analysing curriculum, Curriculum analysis, Harden's ten questions, Qassim University, QUCOM curriculum

**الملخص**

**خلفية:** تحليل المنهج يعني استكشاف المكونات المختلفة للعملية التعليمية بغرض تحليل تلك المكونات وتوضيح نقاط القوة والضعف بغرض إيجاد فرص التحسين. تحليل المنهج يتم باستخدام الطرق ذات الأوجه المتعددة. تهدف هذه الدراسة الى تحليل منهج كلية الطب بجامعة القصيم، المملكة العربية السعودية لاستكشاف نقاط القوة والضعف وطرق التحسين ومشاركة التحليل في الإطار السعودي.

**طريقة البحث:** لأغراض هذا البحث تم اعتماد البحث الوصفي الكيفي للمستندات. تمت مراجعة المستندات الخاصة بالمنهج للأعوام ٢٠٠١ وحتى ٢٠١٨. اعتمد التحليل على إطار هاردين ذو العشرة أسئلة لتطوير المنهج (جدول ١). تم اعتماد التحليل المبني على المتشابهات لتصنيف المخرجات طبقا لإطار هاردين ذو العشرة أسئلة لتطوير المنهج.

**النتائج:** أوضحت الدراسة أن المنهج تم تصميمه لمقابلة احتياجات المجتمع السعودي وزيادة نسبة الأطباء السعوديين مقابل الأجانب. محتوى المنهج مناسب للتعليم الطبي وتساعد منهجية التدريس على التعلم المستمر. هنالك مسار واضح لإنفاذ المنهج وتوجد إدارة جيدة للبرنامج التعليمي كما أن هنالك بيئة مناسبة وبناءة للتعلم الا انه لا يوجد خط واضح لتحسين المهنية الطبية وسلامة المرضى والبحث العلمي.

**الخلاصة:** أظهر تحليل منهج كلية الطب بجامعة القصيم توفقا تاما مع طريقة التعليم المرتكز على الطالب والتعليم المبني على حل المشكلات والمتداخل والمبني على المجتمع والاختياري والمنتظم، لكن هنالك مساحات للتحسين. اعتماد موجهات إطار التعليم الطبي السعودي يؤدي الى التميز في التعليم الطبي والذي يقود الى رفاه المجتمع السعودي.

## Introduction

Curriculum is defined as "the statement of the intended aims and objectives, content, experiences, outcomes, and processes of an educational programme, including the following: a description of the training structure, a description of expected methods of learning, teaching, feedback, and supervision" [1]. Additionally,

> a curriculum analysis refers to an effort to tease a curriculum separately into its parts. To analyse those parts and the way they fit together to make a whole, to recognize the beliefs and ideas to which the designers were dedicated and which either explicitly or implicitly shaped the curriculum, and to examine the implications of these commitments and beliefs for the quality of the educational experience. [2]

In other words, the process of analysis examines the curriculum from different approaches. Analysis is important, as areas of strength or weakness in the implemented curriculum are not always apparent to curriculum designers, faculty, or students [3].

Different tools are used in curriculum analysis [2]. Among these tools is Harden's ten questions framework for curriculum analysis, which was developed and proposed by Harden at Dundee University in Scotland in 1986 [4]. This tool has been utilized in several universities worldwide due to its high validity and reliability [5, 6] .

Qassim University College of Medicine (QUCOM) is the first medical school in the Kingdom of Saudi Arabia (KSA) to adopt the problem-based learning (PBL) approach as its prime educational strategy [7]. The college started providing a hybrid PBL and community-oriented medical education in 2001, and the curriculum of the college mainly follows the student-centred, problem-solving, integrated, community-based, elective, and systematic (SPICES) approach to curriculum design [8]. QUCOM was recognized by the World Federation of Medical Education (WFME) in 2014 and by the National Centre of Academic Assessment and Accreditation (NCAAA) in 2016.

This study aimed to analyse the curriculum of QUCOM by exploring its strengths, weaknesses, and areas for improvement and to share an analysis of medical education in the Saudi context.

## Methods

As part of a curriculum reform, QUCOM performed a curriculum analysis in April 2018. In this study, a qualitative descriptive study was used based on analysis of the college's documents from 2001 to 2018. The QUCOM curriculum was analysed using Harden's ten questions framework for curriculum development (Table 1). Thematic analysis was used to categorise the findings of the analysis resulting from Harden's ten questions framework.

To ensure the validity of the obtained data, the main curriculum documents were analysed

along with the student manual, programme and courses specifications, assessments regulations, previous self-study reports, reports of external evaluators and accreditors from WFME and NCAAA, and previous published studies from the college's faculty and students.

## Results:

| Table 1: Ten questions to be asked when planning a course or a curriculum [4] |
|---|
| What are the needs about the product of the training programme |
| What are the aims and objectives? |
| What *content* should be included? |
| How should the content be *organized*? |
| What educational *strategies* should be adopted? |
| What teaching *methods* should be used? |
| How should *assessment* be carried out? |
| How should details of the curriculum be *communicated*? |
| What educational *environment* or climate should be fostered? |
| How should the process be *managed*? |

**Table (2) learning Objectives of QUCOM**

| |
|---|
| • Utilize his skills in information management effectively to retrieve relevant information, analyze it critically, and apply it to the solution of clinical/health problems in a scientific reasoning manner |
| • Use an evidence-based approach to apply the most effective and up-to-date knowledge, skills, values, and attitudes in his medical practice and in his pursuit of postgraduate studies and life-long learning |
| • Identify, diagnose, evaluate and manage common or serious health problems competently in individual patients, families, and the community, with special reference to Saudi Arabia, including provision of care for high-risk groups and follow-up measures |
| • Educate and counsel patients and others (especially in the promotion of health and healthy life style, prevention of disease and securing consent) using effective communication skills |
| • Observe medical ethics strictly in his practice, in the efficient and optimum use of available resources and their equitable allocation especially for minority, disadvantaged and high-risk groups |
| • Help patients adjust to their condition when managing clinical problems with due consideration to the family and social environment, and the personal needs, limitations, and abilities of each patient; |

| |
|---|
| • Refer cases beyond his capacity whenever required and extend support, empathy, respect, and friendliness to the patient, family members and relatives without traversing the bounds of professionalism and medical ethics |
| • Diagnose and manage common emergencies and deal with unfamiliar situations |
| • Work effectively and harmoniously within a health team that includes physicians, other health and health-related personnel, and community members or agencies |
| • Participate in peer review activities and respond positively to constructive criticism |
| • Act as a change agent and contribute to community development with special reference to the development and success of health care programs and health institutions |
| • Conduct relevant health research to contribute to the solution of health problems and the evolution of medicine |

**Table (3) contents of QUCOM curriculum**

| |
|---|
| *Knowledge*: |
| • A comprehensive understanding of coherent manner normal structure and function of human body during the different stages of life<br>• Awareness of the various types of human diseases with their pathogenesis and clinical manifestations, and their impact on patient and community<br>• Principles of management of the various human diseases |
| *Patient encounter Skills* |
| • Appropriate professional communication with patients, and performance of physical examination and basic medical diagnostic and interventional procedures with consideration of patient safety as the core of the health care process |
| *Clinical Reasoning Skills,* |
| • Interpretation of data obtained through patient encounter, its integration with medical knowledge from relevant sources and critically-evaluating it for evidence-based decision making regarding health of individuals and community.<br>• Development of management plans for health problems of the individuals and community. |
| *Life-long learning skills* |
| • Empowering the potential for advancing personal learning and professional development through self-directed continuous medical education |

| *Research Skills* |
| --- |
| • Understanding the basic principles and steps of medical research, and apply relevant bio-statistical techniques in evidence based medical practice and research. |
| *Communication and Presentation skills* |
| • Written and oral communication skills with colleagues, patients and other stakeholders of health care settings |
| *Teamwork skills* |
| • Ethical and professional behavior in personal and professional relationships, effective participation in   health care team, and exercise leadership when appropriate |

**Table (4) Instructional methods used in QUCOM Curriculum**

| |
| --- |
| Problem-based learning |
| Bed-side teaching |
| Self-directed learning |
| Case-discussion sessions |
| Interactive lecture |
| Simulation-based education |
| laboratory sessions |
| Students-led Seminar |
| Community based learning activities |
| Online discussion forums |
| Students assignments |
| Students research |
| Team-based learning |
| Evidence-Based Learning Sessions |
| Medical audit |
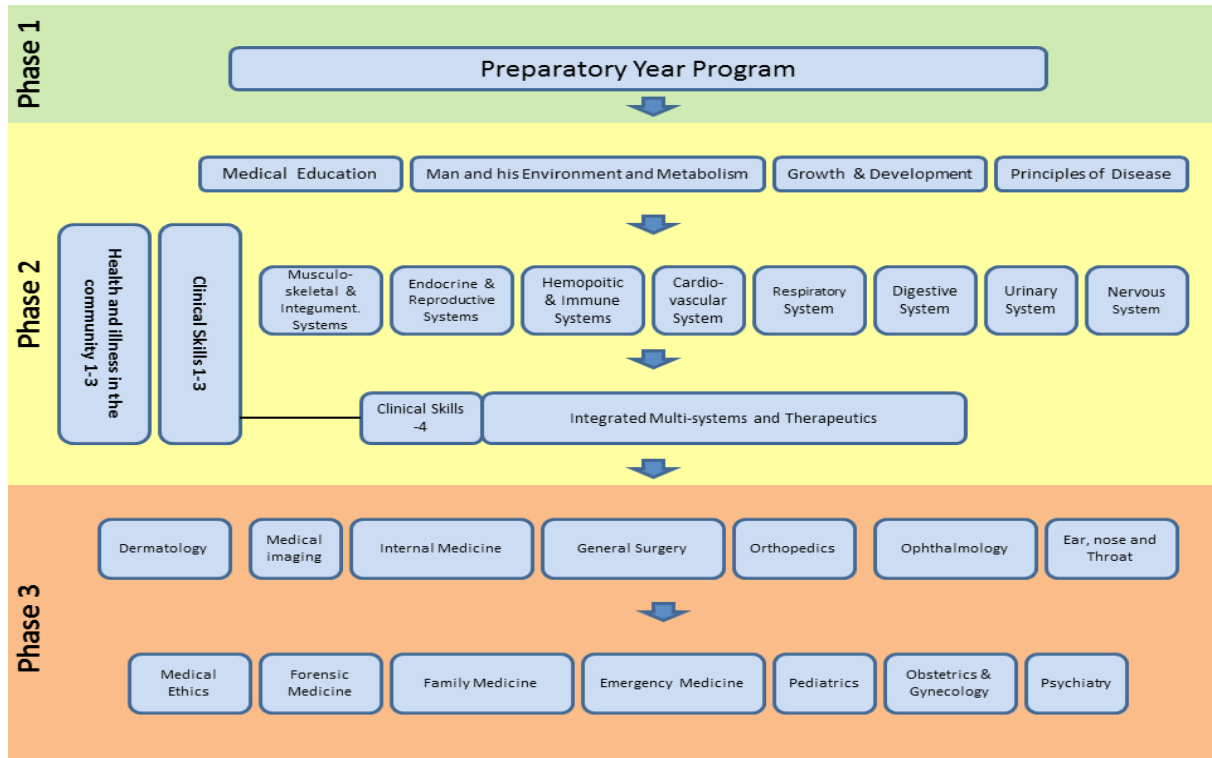
Figure (1) Organisation of QUCOM curriculum (Curriculum Map)
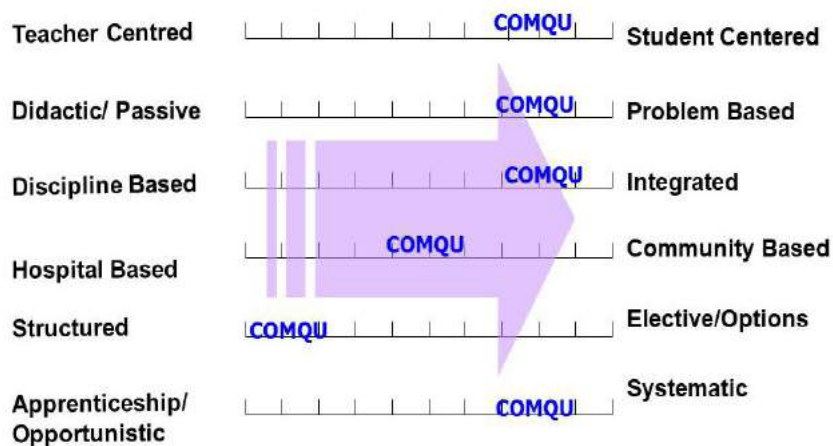


Figure (2) Evaluation of QUCOM at SPICES continuum by external reviewers 2014

Analysing Undergraduate Medical Curricula: Experience from a Saudi Medical College
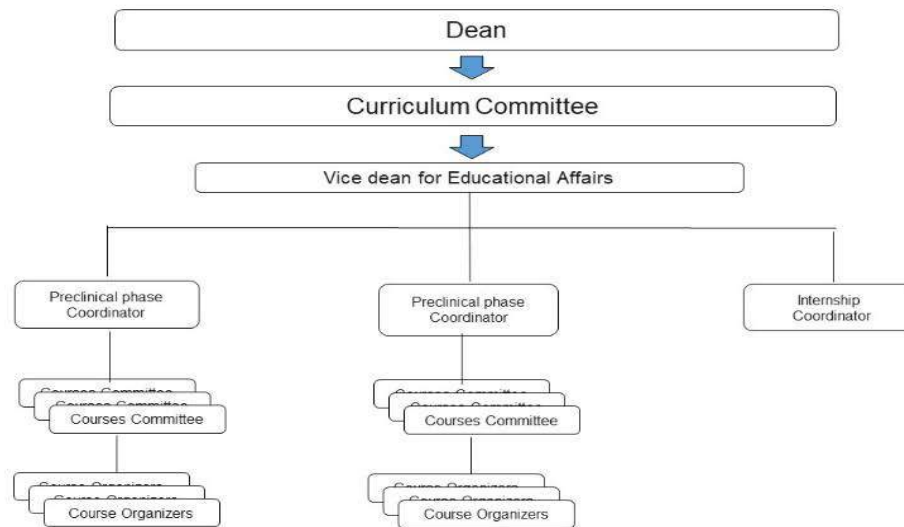
Figure (3) QUCOM Organisational Curriculum Management

The results of the present study are presented following the order of Harden's ten questions as listed in Table 1.

## Question 1: What are the needs about the product of the training programme?

The curriculum was designed to meet the national requirements for qualified Saudi physicians, to reduce the country's dependence on expatriate physicians [9], and to improve the physician-to-patient ratio, thus complying with the Strategic Plan for Higher Health Education of the KSA [10]. Curriculum designers adopted a multi-faceted approach to explore problem identification and needs assessment. The needs assessment was performed using the Wisemen approach and Delphi technique and considered community needs and expectations from medical graduates. The obtained data were reviewed considering more than 25 undergraduate medical curricula at national, regional, and international levels. After this assessment and review, the curriculum was developed.

## Question 2: What are the aims and objectives?

This curriculum aimed to graduate physicians capable of safely serving their community and continuing life-long learning and self-guided professional development. The curriculum objectives covered the knowledge, skills, and attitudes of the graduates; these objectives are shown in Table 2 [7,11].

## Question 3: What content should be included?

The current QUCOM curriculum was built on seven components, shown in Table 3: knowledge, patient interaction skills, clinical reasoning skills, life-long learning skills, research skills, communication and presentation skills, and teamwork skills.

**Question 4: How should the content be organized?**

The QUCOM curriculum was comprised of 35 medical courses in addition to six social and cultural courses. These courses were organised in three phases, as follows (Figure 1):

1.  **Phase 1** was comprised of a preparatory year programme, in which students were exposed to essential learning skills, communication skills, and medical ethics. In addition, the students' English language skills were improved during this time.

2.  **Phase 2** was composed of three stages that students were sequentially exposed to:

    a.  Introductory, contextual courses about the fundamentals of the human body and disease processes and social and cultural courses.

    b.  Trans-disciplinary body systems courses in which each body system was examined in both normal and disease circumstances. In parallel, students were exposed to longitudinal courses exploring health and disease in the community and providing clinical skills training in a controlled atmosphere.

    c.  A course targeting the integration and inter-relations of different body systems with a parallel skills course in which students met with patients under strict supervision.

3.  **Phase 3** was the clerkship phase in which bed-side teaching and patient interactions through different rotations comprised the core of the learning processes. During the fifth year, after studying Internal Medicine and/or General Surgery, students were exposed to the Family Medicine and Emergency Medicine rotations to emphasize common medical problems in the community and situations requiring early intervention.

After successfully passing all courses of the programme, the students began their internship year, which included three rotations each in Internal Medicine, General Surgery, Paediatrics, and Obstetrics and Gynaecology, in addition to optional specialities.

**Question 5: What educational strategies should be adopted?**

QUCOM adopted the SPICES educational strategies model [8] with minor modifications. The analysed curriculum contained no elective courses, and all courses were compulsory. Figure 2 shows the evaluation of QUCOM's educational strategies in relation to the SPICES model according to external reviewers.

**Question 6: What teaching methods should be used?**

A broad range of learning opportunities and learning methods were described in this curriculum. The analysis showed that these methods were fostering a student-centred learning approach and life-long learning and that they included effective guidance from the faculty (Table 4).

**Question 7: How should the assessment be carried out?**

The assessment strategy in the college included formative (assessment for learning) and summative (assessment of learning) components. A wide range of methods were utilized in this curriculum, including continuous assessment by the supervisor, logbooks, multiple-choice questions, problem-solving questions, objective-structured practical examinations (OSPE), objective-structured clinical examinations (OSCE), student presentations, and research projects. Additionally, QUCOM is the leading college in Saudi Arabia in the multi-institutional progress test (PT). From May 2012 to March 2018, 10 rounds of the PT have been conducted, with the participation of more than 25,000 students in 27 colleges of medicine.

**Question 8: How should details of the curriculum be communicated?**

The QUCOM curriculum details were communicated through the student manual, which included the course objectives, contents, teaching and learning methods, and assessment methods. In addition, a session was held at the beginning of each course in which the students were introduced to the course by the particular course coordinator. Additionally, all course materials were uploaded to the learning management system, and students were introduced to the college's curriculum and educational approach through their introductory medical education course.

**Question 9: What educational environment or climate should be fostered?**

The present analysis showed that QUCOM exerted great efforts to establish a motivating learning environment through strong academic guidance and support, clear communication channels with faculty, and comfortable learning resources. In 2012, Al-Mohaimeed evaluated the learning environment of QUCOM using the Dundee Ready Educational Environment Measurement (DREEM) [12]. In his study, student perceptions toward QUCOM's educational environment were positive; they expressed that the college was well organized, that the teaching was stimulating, and that the atmosphere was relaxed.

**Question 10: How should the process be managed?**

The preparatory year programme was managed by specific deanship under university supervision. During phases 2 and 3, the medical programme was managed by the QUCOM administration, the Dean and Vice Dean of Educational Affairs. The entire process was overseen by the Curriculum Committee. Phase coordinators, course committees, and course organizers were responsible for programme provision at relevant levels (Figure 3). The course committees and course organizers were responsible for communicating the detailed timetable and the implementation of specified courses. Phase coordinators were responsible for monitoring the curriculum implementation in the trans-disciplinary body system courses and the clerkship phase, and

they were supervised by the Vice Dean for Educational Affairs. Major curriculum modifications were proposed by the Curriculum Committee and were subject to the approval of the QUCOM Council and, eventually, the University Council.

## Discussion

Curriculum analysis in medical education is a vital process for identifying areas of strengths and weaknesses in the implemented curriculum that are not always apparent to curriculum designers, faculty, or students [2]. This study aimed to analyse the curriculum of QUCOM and explore its strengths, weaknesses, and areas for improvement. The tools used in this analysis have been used worldwide and have shown high validity and reliability (5, 6)

Analysis of the QUCOM curriculum showed that the current curriculum was designed to meet the national needs of the Saudi community. The methodology used in the curriculum design was scientific and followed the international standards (1, 13, 14). However, recent trends in medical education are moving toward competency-based medical education (15, 16). The SaudiMED competency-based framework was published in 2011 [17] and was approved as the national framework for medical education in Saudi Arabia [18]. By adopting this approach, the medical curriculum would fully address the needs of the community.

This present analysis also found that the existing curriculum aimed to graduate physicians capable of safely serving their community and continuing life-long learning and self-directed professional development. While the current curriculum map (Figure 1) did not specify how infection control, patient safety, or professionalism were learnt, analysis of other curriculum documents showed that these tenants were incorporated as integral parts of different courses. A growing body of literature has suggested increasing the incorporation of these competencies were incorporated into undergraduate medical curricula [19]–[22]. Therefore, these tenants should be more apparent and carry more weight in the QUCOM curriculum.

Training in research was also suboptimal in the current curriculum, as it was a part of health and illness courses. Undergraduate medical students should be trained in research in different ways, including research methodology courses, student research projects, and journal clubs [23, 24]. A standalone course for research methods should exist, followed by real practice, as an integral part of the curriculum. This was also recommended by QUCOM students in a previous study [25].

The SPICES model was well represented in the QUCOM curriculum, and the instructional methods used in the college were nearly all student-centred. However, a teacher-centred approach still existed in the curriculum. Great efforts were exerted by the college to improve the instructional methods through a faculty development programme, as well as through introducing new teaching methods, such as a flipped classroom. Flipped classrooms have

been shown to be effective for undergraduate medical education [26], [27].

Furthermore, the current study revealed the systematic, horizontal and vertical integration of the curriculum. As mentioned, there were no elective courses. Studies have shown that elective courses in undergraduate medical education provide unique opportunities for students to design and organize individualized educational experiences [28], [29]. The introduction of elective and optional courses should be considered in the reform process.

The current analysis revealed that training in community settings represented almost 10% of the entire curriculum. This was markedly low compared to other colleges in the region adopting community-based medical education, such as Faculty of Medicine Gezira University in Sudan and Faculty of Medicine of Suez Canal University in Egypt (25% and 20%, respectively) [30], [31]. Increasing the weight of community-based training is a main component of the SaudiMED competency framework [17].

The current analysis of the QUCOM curriculum indicated that it was built on seven objectives, including knowledge, patient interaction skills, clinical reasoning skills, life-long learning skills, research skills, communication and presentation skills, and teamwork skills. These competencies were in agreement with international competency frameworks worldwide, as well as the SaudiMED framework [18, 32–34].

The current analysis also revealed that the curriculum used both formative and summative assessment with a variety of assessment methods targeting all intended programme learning outcomes. However, the study also found that there was no exit exam at the end of the curriculum. The use of an exit exam is considered a part of quality assurance and was recommended by accreditors from the WFME and NCAAA. Recent studies have shown the significance of incorporating an exit exam for undergraduate medical education [35], [36].

One strength of this curriculum was the presence of the PT. QUCOM is the leading college in the region in designing and implementing the multi-intuitional PT. More than 25,000 students from 27 colleges have sat for this test through its 10 rounds from 2012 to 2018.

The analysis also revealed positive learning environment. The learning environment of QUCOM, as shown by Al-Mohaimeed's study in 2012, was positive compared to national and international colleges of medicine [12].

This current study had several strengths, including the method with which the study examined the curriculum and other related documents beginning with the establishment of QUCOM. Moreover, it included previous self-study reports and feedback from external evaluators and accreditors, providing a sort of triangulation of the obtained data. However, some limitations also existed, as the current study depended mainly on existing documents. Therefore, further qualitative and

quantitative studies are needed

**References:**

[1] J. Grant, "Principles of curriculum design," Underst. Med. Educ. evidence, theory Pract. ChichesterWiley Blackwell, 2010.

[2] G. Posner, "Analyzing the Curriculum. 3rd." Xi 'an: Shanxi Normal University Press, 2005.

[3] F. Laskaratos, D. Gkotsi, and E. Panteliou, "A critical review of the core medical training curriculum in the UK : A medical education perspective," vol. 5, no. 1, pp. 1–8, 2013.

[4] R. M. Harden, "Ten questions to ask when planning a course or curriculum," Med. Educ., vol. 20, no. 4, pp. 356–365, 1986.

[5] Ahmed YA, Alneel S. Article, "Analyzing the curriculum of the faculty of medicine, University of Gezira using Harden's 10 questions framework," vol. 5, no. 2, pp. 60–66, 2017.

[6] H. Arzuman, "Undergraduate Medical Curriculum of Universiti Sains Malaysia in terms of Harden ' s Ten Questions of Curriculum Development," vol. 5, no. 2, pp. 3–8, 2011.

[7] [7] A. S. Alamro and S. Schofield, "Supporting traditional PBL with online discussion forums: A study from Qassim Medical School," Med. Teach., vol. 34, no. sup1, pp. S20–S24, Apr. 2012.

[8] R. M. Harden, S. Sowden, and W. R. Dunn, "Educational strategies in curriculum development: the SPICES model," Med. Educ., vol. 18, no. 4, pp. 284–297, 1984.

[9] [9] SCFHS, "Saudi Commission for health specialities," Saudi Commission for Health Specialities. [Online]. Available: https://www.scfhs.org.sa/en/mesps/Pages/Default.aspx.

[10] A. Telmesani, R. G. Zaini, and H. O. Ghazi, "Medical education in Saudi Arabia: a review of recent developments and future challenges/Enseignement medical en Arabie saoudite: revue des recentes evolutions et des defis a venir," East. Mediterr. Heal. J., vol. 17, no. 8, p. 703, 2011.

[11] B. Shamsan, A. S.-I. journal of health sciences, and undefined 2009, "Evaluation of problem based learning course at college of medicine, Qassim University, Saudi Arabia," ncbi.nlm.nih.gov.

[12] A. Al-Mohaimeed, "Perceptions of the educational environment of a new medical school, Saudi Arabia.," Int. J. Health

Sci. (Qassim)., vol. 7, no. 2, pp. 150–9, Jun. 2013.

[13]    P. A. Thomas, Curriculum development for medical education: a six-step approach. JHU Press, 2015.

[14]    J. G. Grants, "Curriculum evaluation in medical and health-care education," 1985.

[15]    J. R. Frank et al., "Competency-based medical education: theory to practice," Med. Teach., vol. 32, no. 8, pp. 638–645, 2010.

[16]    R. M. Harden, "Trends and the future of postgraduate medical education," Emerg. Med. J., vol. 23, no. 10, pp. 798–802, 2006.

[17]    R. G. Zaini, K. A. Bin Abdulrahman, A. A. Al-Khotani, A. M. A. Al-Hayani, I. A. Al-Alwan, and S. D. Jastaniah, "Saudi Meds: A competence specification for Saudi medical graduates," Med. Teach., 2011.

[18]    The        Saudi        Deans Committee."SaudiMEDs    framework," Saudi Medical Education Directive , " pp.1-34, 2017.

[19]    J. R. Frank, R. Mungroo, Y. Ahmad, M. Wang, S. De Rossi, and T. Horsley, "Toward a definition of competency-based education in medicine: a systematic review of published definitions," Med. Teach., vol. 32, no. 8, pp. 631–637, 2010.

[20]    "Competency-based medical education An overview and application in pharmacology." .

[21]    D. Dath, W. Iobst, and I. C. Collaborators, "The importance of faculty development in the transition to competency-based medical education," Med. Teach., vol. 32, no. 8, pp. 683–686, 2010.

[22]    H. O'Sullivan, W. Van Mook, R. Fewtrell, and V. Wass, "Integrating professionalism into the curriculum," Med. Teach., vol. 34, no. 2, pp. 155–157, 2012.

[23]    C. Ringsted, B. Hodges, and A. Scherpbier, "'The research compass': An introduction to research in medical education: AMEE Guide No. 56," Med. Teach., vol. 33, no. 9, pp. 695–709, 2011.

[24]    L. N. Burgoyne, S. O'Flynn, and G. B. Boylan, "Undergraduate medical research: the student perspective.," Med. Educ. Online, 2010.

[25]    M. Alsuhaibani, A. Alharbi, S. N. B. Inam, A. Alamro, and M. Saqr, "Research education in an undergraduate curriculum : Students perspective," vol. 13, no. 2, 2019.

[26]    F. Chen, A. M. Lui, and S. M. Martinelli, "A systematic review of the effectiveness of flipped classrooms in medical education," Medical Education. 2017.

[27]    C. Tan, W.-G. Yue, and Y. Fu, "Effectiveness of flipped classrooms in nursing

education: Systematic review and meta-analysis," Chinese Nurs. Res., 2019.

[28]    A. Lumb and D. Murdoch-Eaton, "Electives in undergraduate medical education: AMEE Guide No. 88," Med. Teach., vol. 36, no. 7, pp. 557–572, 2014.

[29]    B. Kumwenda, J. Dowell, K. Daniels, and N. Merrylees, "Medical electives in sub-Saharan Africa: A host perspective," Med. Educ., 2015.

[30]    S. Elsanousi, M. Elsanousi, O. Khala-fallah, and A. Habour, "Assessment of the social accountability of the faculty of medicine at University of Gezira, Sudan," EMHJ-Eastern Mediterr. Heal. J., vol. 22, no. 4, pp. 258–266, 2016.

[31]    S. Hosny, M. Ghaly, and C. Boelen, "Is our medical school socially account-able? The case of Faculty of Medicine, Suez Canal University," Med. Teach., vol. 37, no. S1, pp. S47–S55, 2015.

[32]    P. Rubin and D. Franchi-Christopher, "New edition of Tomorrow's Doctors," Med. Teach., vol. 24, no. 4, pp. 368–369, 2002.

[33]    J. R. Frank, L. Snell, and J. Sherbino, "The draft CanMEDS 2015 physician competency framework–series IV," Ottawa R. Coll. Physicians Surg. Canada, 2014.

[34]    D. J. Schumacher, M. P. Frintner, A. Jain, and W. Cull, "The 2011 ACGME standards: impact reported by graduating residents on the working and learning environment," Acad. Pediatr., vol. 14, no. 2, pp. 149–154, 2014.

[35]    J. E. F. Fitzgerald, C. E. B. Giddings, G. Khera, and C. D. Marron, "Improving the future of surgical training and educa-tion: Consensus recommendations from the Association of Surgeons in Training," Int. J. Surg., 2012.

[36]    S. Craig, N. Tait, D. Boers, and D. McAndrew, "Review of anatomy educa-tion in Australian and New Zealand medi-cal schools," ANZ J. Surg., 2010.

# Original Article

# Assessing Physicians' Diagnostic Practices on Foodborne Illnesses in Saudi Arabia: A Cross Sectional Study

[1]Mohammed AL-Mohaithef

[1]Assistant Professor, Department of Public Health, College of Health Sciences,

Saudi Electronic University, Riyadh, Kingdom of Saudi Arabia.

Corresponding Author:

Mohammed AL-Mohaithef

Assistant Professor, Department of Public Health,

College of Health Sciences, Saudi Electronic University, Riyadh,

Kingdom of Saudi Arabia.

Email: m.almohaithef@seu.edu.sa  Mobile: +966504111933

## Abstract

**Background:** Foodborne illnesses are significant public health issues given they contribute to increasing the global burden of diseases. Incidents of Foodborne diseases are increasing due to the presence of newly emerging pathogenesis. Appropriate diagnostic practices among physicians reduce the magnitude of the problem nationally.  Therefore, the aim of the current study is to evaluate the diagnostic practices of Foodborne illnesses among public and private primary health care physicians in the Kingdom of Saudi Arabia.

**Methodology:** A cross-sectional study was conducted in thirty public and private primary health care centers in the city of Abha during the period of October 2017 to March 2018.  A structured questionnaire was developed based on the previously published literature and was used to collect the data related to the diagnostic practices among the physicians.

**Results:** One hundred and twenty-five physicians participated in this study. Approximately 49% of the physicians had 'adequate' diagnostic practicing skills. No significant difference in diagnostic practice of foodborne illness between the public and private health care physicians. However, the study found a positive correlation between the level of clinical practice, age, gender, area of speciality, years of experience and the number of patients per week.

**Conclusion:** Given that the diagnostic practice skills among physicians were 'adequate', there has been a recommendation for newly hired physicians to enroll in a diagnosis and management of Foodborne diseases training program to improve their diagnostic practices.

**Key Words:** Diagnostic Practices, Foodborne diseases, Primary health care, Saudi Arabia.

**الملخص**

**مقدمة:** تعتبر الأمراض التي تنتقل عن طريق الأغذية من القضايا الصحية العمومية الهامة نظراً لأنها تسهم في زيادة العبء العالمي للأمراض. حالات الاصابة الأمراض التي تنتقل عن طريق الأغذية آخذه بالإزدياد بسبب نشوء مسببات امراض حديثة. الممارسات التشخيصية المناسبة بين الأطباء تقلل من حجم المشكلة على الصعيد الوطني. ولذلك ، فإن الهدف من الدراسة الحالية هو تقييم الممارسات التشخيصية للأمراض التي تنتقل عن طريق الأغذية بين أطباء الرعاية الصحية الأولية العامة والخاصة في المملكة العربية السعودية.

**المنهجية:** أجريت دراسة مستعرضة على ثلاثين مركزًا للرعاية الصحية الأولية العامة والخاصة في مدينة أبها خلال الفترة من أكتوبر ٢٠١٧ إلى مارس ٢٠١٨. تم تطوير استبيان منظم بناءً على الدراسات المنشورة سابقًا وتم استخدامه لجمع البيانات المتعلقة بالممارسات التشخيصية بين الأطباء.

**النتائج:** شارك مائة وخمسة وعشرون طبيبًا في هذه الدراسة. ما يقارب من ٤٩ ٪ من الأطباء يمتلكون مهارات كافية في تشخيص هذه الأمراض. لا يوجد فرق كبير في الممارسة التشخيصية للأمراض التي تنتقل عن طريق الأغذية بين أطباء الرعاية الصحية العامة والخاصة. ومع ذلك ، اشارت الدراسة الى وجود علاقة إيجابية بين مستوى الممارسة السريرية والعمر والجنس ومجال التخصص وسنوات الخبرة وعدد المرضى في الأسبوع.

**الخلاصة:** نظراً لأن مهارات ممارسة التشخيص بين الأطباء كانت '' كافية''، فقد كان هناك توصية للأطباء المعينين حديثاً للتسجيل في برنامج تدريبي عن تشخيص وادارة الأمراض التي تنتقل عن طريق الأغذية لتحسين ممارساتهم التشخيصية.

## Introduction

Foodborne diseases are one of the major community health problems internationally.  However, all the diseases that arise due to contamination of food can be easily prevented [1]. Foodborne diseases are caused by the contamination of food items and by the presence of various Foodborne pathogens comprising of bacteria, viruses and parasites. The toxic substances present in food items also cause several diseases [2] . More often, symptoms associated with gastro-intestinal systems that include nausea, vomiting and diarrhea, are commonly reported among patients with Foodborne illnesses [3] . Given that the gastrointestinal symptoms are not specific to Foodborne diseases, clinicians should consider other factors like history and other objective findings in order to make an appropriate diagnosis [4].

According to the World Health Organization report on global estimates of foodborne diseases, approximately one in every ten people suffers from Foodborne illnesses globally, and the mortality rate due to Foodborne diseases are about 420,000 per year [5].  The Kingdom of Saudi Arabia started experiencing rapid industrialization, globalization and westernization. As a result, there has been a drastic change in life-style, which has sharply increased the intake of fast food, which ultimately increased the rate of Foodborne illnesses [6].

A study conducted by Al-Mazrou described food poisoning as being a very serious public health issue due to the increase in cases throughout the Kingdom [6] . The study also pointed out that a higher number of cases were reported during the Hajj season and summer months due to the increased consumption of meat and chicken by the population and due to the increase in temperature [6].

A study carried out in Jeddah by Iyer et al. reported an outbreak of Foodborne illness in several meat outlets [7].  This was diagnosed to be Salmonella and E. coli species, mainly due to the improper handling and inadequate storage of meats in the local butcheries [7]. Similarly, another study by Bharathirajan et al [8] described an increased number of cases of Foodborne illness due to Listeria and Salmonella species in the Kingdom of Saudi Arabia.

A report specific to the Ahad Rafidah, Asir region from the Saudi Epidemiology Bulletin, Kingdom of Saudi Arabia reported twenty seven cases of Foodborne diseases in the year 2009 [9]

An article related to the management of Foodborne illness also recommends the physicians to follow the primer developed by center for disease control and prevention for diagnosis and management of foodborne illness and also advocate the physicians to report the cases of foodborne illness to the local health authority in case of two or more patients present with a similar illness [10].

To our knowledge, this is the first population-based study that assesses the diagnostic practices of Saudi primary health care physicians

concerning Foodborne illness. Therefore the specific objectives of this study is to assess the diagnostic practices of Foodborne illness among both the public and private primary health care physicians and to evaluate the correlation between the diagnostic practices of Foodborne illnesses among the public and private primary health care physicians.

**Materials and methods**

**Study design:** This is a cross-sectional study.

**Study setting:** This study was conducted in the selected public and private primary health care centers in the city of Abha located in the south western region of Asir in the Kingdom of Saudi Arabia from October 2017 to March 2018.

**Participants:** The sample size was calculated by using the Raosoft sample size calculator. With a 5% margin of error confidence interval of 95%, a response distribution of 50% and a total population size of 180; the minimum sample size was 123 and the sample size was rounded to 125.

Multistage cluster sampling was used in the study to select participants. An official permission was obtained from the Ministry of Health-Asir region (REC# 2017-03-08) to conduct this study in the public and private primary health care centers in the city of Abha. A list of all public and private primary health care centers in Abha was compiled. There are approximately 45 government owned primary health care centers and 43 private primary

health care clinics.  Abha city was divided into the center, east, west, north and south administrative regions, and both the governmental and non-governmental primary health care centers were listed, based on the above mentioned five administrative regions. Fifteen public and fifteen private primary health care centers, based on these regions were selected by using the simple random sampling method. The selected public primary health care centers were contacted to participate.  A separate permission letter from the administration of the respective private primary health care clinics was acquired for collecting the data. The physicians from the particular public and private primary health care centers were enrolled in the study by using the simple random sampling technique.

**Ethical Permission:** Ethical permission was obtained from the research ethics committee, College of Medicine, King Khalid University, Abha, Kingdom of Saudi Arabia.

**Inclusion Criteria:** Physicians who agreed to participate in the study with written informed consent were included.

Tools for Data Collection: Each physician was interviewed using the structured questionnaire.

**Socio-demographic Questions:** There were seven questions in this section that included age, gender, physician specialty, primary setting of clinical practice, number of years' experience, number of patients seen per week and number of cases treated for Foodborne

illness (per week).

**Practice Questions:** This section comprised of ten questions and included history about eating, ordering stool culture, ordering stool culture for different species, reasons for not ordering the stool culture, prescription of antibiotics without ordering a stool culture, asking patients about food hygiene or prevention of foodborne illness. The questionnaire was administered in English.

**Reliability:** Test-retest reliability was conducted by Alpha (Cronbach's) test reliability for internal consistency and equaled 0.741. Test reliability was applied on a pilot of 15 public and private primary health care physicians before the study. 10% of the total sample of 13 physicians was rounded to 15 physicians, and these had all been administered with this questionnaire for the purpose of validation.

**Data Analysis:** The data analysis was carried out by using SPSS (Version 16.0, SPSS Inc. Chicago, IL, USA). Frequency tables were used to describe the diagnostic practices of Foodborne illness among the public and private primary health care physicians. Qualitative data was summarized in percentages and non-parametric tests of significance (Chi square test) were applied to nominal scales. Pearson Correlation between two variables was applied. The p-value was two-tailed and statistical significance was set at <0.05.

**Scoring system for practice:**

There were twenty questions scored; '1' & '0' for right and wrong answers respectively. The total scores ranged from 0 to 17. Each score was divided into three categories Inadequate Practice (<6), Adequate Practice (6-11) and Good Practice (12-17).

**Results:**

**Table 1: Demographics for study participants (n=125)**

| | | |
|---|---|---|
| Age | 25-34 | 18 (14.4%) |
| | 35-44 | 52 (41.6%) |
| | 45-54 | 42 (33.6%) |
| | >54 | 13 (10.4 %) |
| Gender | Male | 86 (68.8%) |
| | Female | 39 (31.2%) |

| Which of the following best describes your area of specialty? | Emergency medicine | 20 (16.0%) |
| | Family medicine | 44 (35.2%) |
| | Internal medicine | 17 (13.6%) |
| | Pediatric medicine | 23 (18.4 %) |
| | OB/GYN | 06 (4.8%) |
| | Others | 15 (12.0%) |
| What is the primary setting of your practice? | Public hospital | 62 (49.6%) |
| | Private hospital | 63 (50.4%) |
| How long have you been practicing your specialty? | <5 Years | 29 (23.2%) |
| | 6-10 Years | 38 (30.4%) |
| | 11-15 Years | 30 (24.0%) |
| | >15 Years | 28 (22.4 %) |
| On average, how many patients do you see per week? | 1-10 | 06 (4.8%) |
| | 11-25 | 17 (13.6%) |
| | 26-50 | 21 (16.8%) |
| | 51-75 | 13 (10.4 %) |
| | >75 | 68 (54.4 %) |
| Each week, approximately how many patients with a foodborne illness do you treat? | 1-5 | 68 (54.4%) |
| | 6-20 | 40 (32.0%) |
| | 21-50 | 13 (10.4%) |
| | 51-100 | 01 (0.8%) |
| | >100 | 03 (2.4 %) |

**Table 2: Physicians' responses for questionnaire regarding diagnostic practices about food borne illness (n=125)**

| Would you ask the history of eating when you make a diagnosis? | Always | 74 (59.2%) |
| | Sometimes | 40 (32.0%) |
| | Rarely | 08 (6.4%) |
| | Never | 03 (2.4 %) |
| A 40-year-old male presents with a 3-day history of diarrhea, fever, anorexia, and malaise. There is no history of bloody stools, and the patient is not significantly dehydrated. His symptoms are gradually improving. His occupation is listed as 'chef.' After addressing his clinical concerns, what recommendation would you make to him? | He may return to work if he observes strict hand hygiene | 46 (36.8%) |
| | He should stay home from work until his employer gives him approval to return | 13 (10.4%) |
| | He should stay home from work until diarrhea has completely resolved | 54 (43.2%) |
| | None of the above | 12 (9.6 %) |

| Do you order a stool culture when you diagnose a suspected case? | Always<br>Sometimes<br>Rarely<br>Never | 19 (15.2%)<br>61 (48.8%)<br>31 (24.8%)<br>14 (11.2 %) |
|---|---|---|
| Campylobacter | | |
| Clostridium difficile | Yes<br>No<br>Unsure | 47 (37.6%)<br>25 (20.0%)<br>53 (42.4%) |
| E. coli O157; H7 | Yes<br>No<br>Unsure | 46 (36.8%)<br>14 (11.2%)<br>65 (52.0%) |
| Gardia lambila | Yes<br>No<br>Unsure | 73 (58.4%)<br>17 (13.6%)<br>35 (28.0%) |
| Listeria | Yes<br>No<br>Unsure | 36 (28.8%)<br>26 (20.8%)<br>63 (50.4%) |
| Norovirus | Yes<br>No<br>Unsure | 38 (30.4%)<br>28 (22.4%)<br>59 (47.2%) |
| Rotavirus | Yes<br>No<br>Unsure | 14 (11.2%)<br>29 (23.2%)<br>82 (65.6%) |
| Salmonella | Yes<br>No<br>Unsure | 32 (25.6%)<br>21 (16.8%)<br>72 (57.6%) |
| Shigella | Yes<br>No<br>Unsure | 63 (50.4%)<br>13 (10.4%)<br>49 (39.2%) |
| Vibro | Yes<br>No<br>Unsure | 67 (53.6%)<br>08 (6.4%)<br>50 (40.0%) |
| Yersina | Yes<br>No<br>Unsure | 34 (27.2%)<br>21 (16.8%)<br>70 (56.0%) |
| | Yes<br>No<br>Unsure | 21 (16.8%)<br>29 (23.2%)<br>75 (60.0%) |

| State the reason for not ordering the stool culture. | Diagnosis is clear<br>Symptoms are slight<br>Patients are not willing to cooperate<br>high cost<br>Others | 69 (55.2%)<br>23 (18.4%)<br>25 (20.0%)<br><br>05 (4.0 %)<br>03 (2.4 %) |
|---|---|---|
| Do you prescribe antibiotics without ordering a stool culture? | Always<br>Sometimes<br>Rarely<br>Never | 33 (26.4%)<br>47 (37.6%)<br>27 (21.6%)<br>18 (14.4 %) |
| How often do your patients ask you about food safety or prevention of foodborne illness? | Always<br>Sometimes<br>Rarely<br>Never | 31 (24.8%)<br>57 (45.6%)<br>37 (29.6%)<br>0 (0.0 %) |
| Does anyone in your health center provide information on foodborne illness or prevention of foodborne illness to your patients? | Yes<br>No | 52 (41.6%)<br>73 (58.4%) |
| Who provides foodborne illness prevention information to your patients? | Yourself (physician)<br>Nurse or Nurse-practitioner<br>Dietician or Nutritionist<br>Other<br>Not sure | 92 (73.6%)<br>08 (6.4%)<br>11 (8.8%)<br>01 (0.8 %)<br>13 (10.4%) |
| How is information about foodborne illness provided to your patients? | Verbally, with an extensive discussion)<br>Verbally, with a brief discussion<br>Brochure/Patient fact sheet<br>Poster in office / waiting room<br>other self-help materials | 40 (32.0%)<br><br>67 (53.6%)<br>13 (10.4%)<br>02 (1.6 %)<br>03 (2.4 %) |

**Table 3: Distribution of physicians according to diagnostic practices about food borne illness (n=125)**

| Food Borne Illness<br><br>Practice Score | Total (Percentage) |
|---|---|
| Inadequate Practice (<6) | 55 (44%) |
| Adequate Practice (6-11) | 61 (48.8%) |
| Good Practice (12-17) | 09 (7.2%) |

**Table 4: Correlation between the diagnostic practice of physicians about food borne illness and general demographic variables (n = 125)**

| | | Practice Score | | | Total | P Value |
|---|---|---|---|---|---|---|
| | | Inadequate | Adequate | Good | (Percent) | |
| Age | 25-34 | 04 (3.20%) | 11 (8.80%) | 03 (2.40%) | 18 (14.40%) | <0.001* |
| | 35-44 | 28 (22.40%) | 22 (17.60%) | 02 (1.60%) | 52 (41.60%) | |
| | 45-54 | 16 (12.80%) | 22 (17.60%) | 04 (3.20%) | 42 (33.60%) | |
| | >54 | 07 (5.60%) | 06 (4.80%) | 0 (0.00%) | 13 (10.40%) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Gender | Male | 39 (31.20%) | 41 (32.80%) | 06 (4.80%) | 86 (68.80%) | 0.037* |
| | Female | 16 (12.80%) | 20 (16.0%) | 03 (2.40%) | 39 (31.20%) | |
| Area of Specialty | EM | 04 (3.20%) | 14 (11.20%) | 02 (1.60%) | 20 (16.0%) | <0.001* |
| | FM | 23 (18.40%) | 15 (12.0%) | 06 (4.80%) | 44 (35.20%) | |
| | IM | 08 (6.40%) | 08 (6.40%) | 01 (0.80%) | 17 (13.60%) | |
| | PM | 11 (8.80%) | 12 (9.60%) | 0 (0.00%) | 23 (18.40%) | |
| | OB/GYN | 02 (1.60%) | 04 (3.20%) | 0 (0.00%) | 06 (4.80%) | |
| | Others | 07 (5.60%) | 08 (6.40%) | 0 (0.00%) | 15 (12.0%) | |
| Settings | Public hospital | 23 (18.40%) | 34 (27.20%) | 05 (4.0%) | 62 (49.60%) | 0.291 |
| | Private hospital | 32 (25.60%) | 27 (21.60%) | 04 (3.20%) | 63 (50.40%) | |
| Years of Practice | <5 Years | 09 (7.20%) | 12 (9.60%) | 08 (6.40%) | 29 (23.20%) | <0.001* |
| | 6-10 | 23 (18.40%) | 14 (11.20%) | 01 (0.80%) | 38 (30.40%) | |
| | 11-15 | 15 (12.0%) | 15 (12.0%) | 0 (0.00%) | 30 (24.0%) | |
| | >15 | 08 (6.40%) | 20 (16.0%) | 0 (0.00%) | 28 (22.40%) | |
| Patients seen per week | 1-10 | 03 (2.40%) | 03 (2.40%) | 0 (0.00%) | 06 (4.80%) | <0.001* |
| | 11-25 | 03 (2.40%) | 11 (8.80%) | 03 (2.40%) | 17 (13.60%) | |
| | 26-50 | 09 (7.20%) | 10 (8.0%) | 02 (1.60%) | 21 (16.80%) | |
| | 51-75 | 08 (6.40%) | 05 (4.0%) | 0 (0.00%) | 13 (10.40%) | |
| | >75 | 32 (25.60%) | 32 (25.60%) | 04 (3.20%) | 68 (54.4%) | |
| Patients with Food borne illness seen and treated per week | 1-5 | 36 (28.80%) | 27 (21.60%) | 05 (4.0%) | 68 (54.40%) | <0.001* |
| | 6-20 | 14 (11.20%) | 22 (17.60%) | 04 (3.20%) | 40 (32.0%) | |
| | 21-50 | 01 (0.80%) | 12 (9.60%) | 0 (0.00%) | 13 (10.40%) | |
| | 51-100 | 01 (0.80%) | 0 (0.00%) | 0 (0.00%) | 01 (0.80%) | |
| | >100 | 03(2.40%) | 0 (0.00%) | 0 (0.00%) | 03 (2.40%) | |

*P<0.05, Statistically Significant

One hundred and twenty-five physicians from the selected 30 public and private primary health care centers participated in this study. Table 1 shows the demographic characteristics of the physicians.  41.6% of physicians were 35 to 44 years of age, and 33.6% of them belong to 45 to 54 years of age. 69% of the primary health care physicians were males. 35.2% of the physicians were practicing family medicine. 30.4% of the physicians in have been practicing for 6 to 10 years.

Physicians' responses to the questionnaire regarding the diagnostic practices of Foodborne illness are presented in Table 2. 59.2% of the physicians from both public and private primary health care centers reported that they always ask about the history of eating while making a diagnosis. 15.2% of the physicians from both public and private primary health

care centers ordered the stool culture test during diagnosis of the suspected cases. Half of the physicians, from both public and private primary health care centers, were unsure about ordering stool cultures for diagnosing the *Gardia lambila* pathogens. 30.4% of the physicians from both public and private primary health care centers ordered routine stool cultures for diagnosing *Listeria*. 65.6% and 57.6% of physicians from both public and private primary health care centers were unsure about ordering stool cultures for diagnosing the *Norovirus* and the *Rotavirus* respectively. 55.2% of the physicians from both public and private primary health care centers stated that the reason for not ordering the stool culture test as a diagnosis was clear. 37.6% of physicians, from both public and private primary health care centers, sometimes prescribed antibiotics without ordering the stool culture test. 45.6% of physicians from both public and private primary health care centers reported that the patients sometimes asked about food hygiene or prevention of foodborne illness.

Table 3 shows the distribution of physicians according to diagnostic practices about Foodborne illness. Only 7.2 % physicians from both public and private primary health care centers have good practice skills, in terms of the diagnosis of Foodborne diseases, 49% of physicians have 'adequate' practice skills for diagnosing Foodborne illness.

The correlation between diagnostic practice of physicians about Foodborne illness and general demographic variables is described in Table 4. The most important finding of this study is that the diagnostic practices related to Foodborne diseases do not vary between the public and private primary health care centers. A positive significant association was established between the practice score of physicians regarding Foodborne diseases and several general demographic characteristics such as age ($p<0.001$), gender ($p=0.037$), area of speciality ($p<0.001$), number of years of practice ($p<0.001$), the number of patients per week ($p<0.001$), and number of patients with Foodborne illness in a week ($p<0.001$).

## Discussion

This study was conducted in the fifteen public and private primary health centers in Abha, Kingdom of Saudi Arabia. Overall, one hundred and twenty-five physicians from both the public and private primary health care centers participated in this survey.

Almost half of primary health care physicians in both the public and private sectors in the current study usually ordered the stool culture test for suspected cases, much higher than in the study conducted by Paula Clogher et al in the United States. Their study found that only 10% of physicians regularly ordered the stool culture test [11].

Likewise, a study carried out by Lyn James et al. reported that approximately 67% of physicians believed that species like *Salmonella, Shigella and Campylobacter* were often ordered for a routine stool culture without special request from their health

center laboratory. This is similar to the results of the present study. However, the physicians in the above-mentioned study were unsure about the routine stool culture for *Gardia lambila, Norovirus* and *Rotavirus* which was also in accordance with the results of the current study [12] .

37.6% of physicians from both the public and private primary health care centers in the study, prescribed antibiotics without ordering the stool culture test at times. Similarly, the study carried out by Carpenter et al found that around 90% of the cases of antimicrobial infections were given antibiotics without the results of the stool culture test, which is much higher than the results of the current study [13] .

Embrical antibiotics such as fluoroquinolone, trimethoprim or sulfamethoxazole is generally recommended for the suspected cases of Foodborne illness if the patient is febrile and symptoms are persistent for more than one week and the choice of therapy depends on the pathogens that should be identified by a stool culture test. The drug resistance is often reported in the case of Foodborne diseases which is a consequence of inappropriate use of antibiotics [14].

Despite its effectiveness in treating the dehydration many physicians are unwilling to prescribe oral rehydration therapy which is highly recommended by the World Health Organization, the American Academy of pediatrics and the center for disease control and prevention for treating mild and moderate dehydration especially among infants and children. Oral rehydration therapy has also proven to be effective against dehydration among patients of all ages [15].

Several studies proved that probiotics can be used to improve the diarrheal symptoms among the patients with irritable bowel syndrome [16] , antibiotic- associated diarrhea among children [27], infectious diarrhea among infants and children [17] . The physicians in the study were the primary source of information regarding the Foodborne illness in the present study. A study conducted by Hiddink GJ et al [18] pointed out that dieticians were the primary source of information related to Foodborne diseases, which contrasts with the results of this study.

The results of this study showed that about 49% of the primary health care physicians had adequate practice which is comparatively less to that reported in the study conducted by AlAteeq in the Kingdom of Saudi Arabia, where 64% of primary health care physicians had favorable practices [19] .

The results of this study proved that practice varies according to the age of the physicians, which is also supported by a similar study that revealed tenured physicians in Saudi Arabia showed more favorable clinical practice when compared to younger primary health care physicians [19].

A study conducted in Riyadh among primary health care physicians by Al-Amri et al, found that the level of clinical practice differed based on the area of speciality. The above-

mentioned study reported that physicians with a family medicine speciality had better clinical practice in comparison to the other areas of speciality, which is similar to the results of the current study [21].

The current study showed that the level of practice varied according to the number of years of experience among the primary health care physicians. This strong positive association was established between the years of experience and the level of practice in a study carried out by Al-Amri et al [21] and AlAteeq [19] in the Kingdom of Saudi Arabia, which is in concurrence with the present study.

## Conclusion

The diagnostic practice level among public and private primary health care physicians about Foodborne diseases is not satisfactory. The study established a statistically positive correlation between the level of practice and the age, gender, area of speciality, number of years of experience and the number of patients per week. It is evident from this research that more experienced primary health care physicians had good clinical practice, so there is a need for a training program for the younger physicians working at primary health care centers, regarding the diagnosis and management of  food borne diseases.
The study also showed that there were no differences in the diagnostic practices in Foodborne illnesses between the public and private primary health care centers. There is a need for having transparent and much clearer procedures for the diagnosis and management of Foodborne diseases in both of these sectors.

## REFERENCES

[1] World Health Organization. Food safety and food-borne illness. Factsheet No 237. 2007; Available at: http://www.wiredhealthresources.net/resources/NA/WHOFS_FoodSafety Foodborne Illness.pdf. Accessed May 18 2018.

[2]  Al-Goblan AS, Jahan S. Surveillance for foodborne illness outbreaks in Qassim, Saudi Arabia, 2006. Foodborne Pathogens and Disease, 2010; 7:1559-1562.

[3] Arendt S, Rajagopal L, Strohbehn C, Stokes N, Meyer J, Mandernach S. Reporting of foodborne illness by US consumers and healthcare professionals. International journal of environmental research and public health. 2013; 10:3684-714.

[4] Switaj TL, Winter KJ, Christensen SR. Diagnosis and Management of Foodborne Illness. American family physician. 2015; 92:358-65.

[5] World Health Organization. WHO's first ever global estimates of foodborne diseases. 2015; Available at: http://www.who.int/mediacentre/news/releases/2015/foodborne-disease-estimates/en/ Accessed May 18 2018.

[6] Al-Mazrou YY. Food poisoning in Saudi Arabia: Potential for prevention? Saudi Medical Journal. 2004; 25: 11-14.

[7] Iyer A, Kumosani T, Yaghmoor S, Barbour E, Azhar E, Harakeh S. Escherichia coli and Salmonella spp. in meat in Jeddah, Saudi Arabia. The Journal of Infection in Developing Countries. 2013; 7: 812-818.

[8] Bharathirajan R, Gopinathan R, Prakash M . Microbial management of household cold storage exploratory study in Jeddah, Saudi Arabia. International Journal of Current Microbiology and Applied Sciences. 2012; 1: 50-55.

[9] Saudi Epidemiology Bulletin. Food-borne outbreak in Ahad Rafidah, Saudi Arabia. Saudi Epidemiology Bulletin, 2009;16:1 Available from http://fetp.edu.sa/downloads/articles/y2009/A2009-V16-2-00222.pdf.

[10] Sharma VK, Savalia CV and Darekar SD. Management of Foodborne illness. Veterinary World, 2008; 1:55-58.

[11] Clogher P, Hurd S , Hoefer D, Hadler JL , Pasutti L , Cosgrove S et al. Assessment of Physician Knowledge and Practices Concerning Shiga Toxin–Producing Escherichia coli Infection and Enteric Illness, Foodborne Diseases Active Surveillance Network (FoodNet). CID.2012; 54:446-452.

[12] James L, Roberts R, Jones RC, Watson JT, Hota BN, Kampe LM et al. Emergency Care Physicians' Knowledge, Attitudes, and Practices Related to Surveillance for Foodborne Disease in the United States. FOOD SAFETY • CID 2008;46:1264-1270.

[13] Carpenter LR, Pont SJ, Cooper WO, Griffin MR, Dudley JA, Arbogast P et al. Stool Cultures and Antimicrobial Prescriptions Related to Infectious Diarrhea. BRIEF REPORT .JID 2008;197:1709-1712.

[14] Phoon YW, Chan YY, Koh TH. Isolation of multidrug-resistant Salmonella in Singapore. Singapore Med J. 2015; 56:142–e144.

[15] Switaj TL, Winter KJ, Christensen SR.Diagnosis and Management of Foodborne Illness. American Family Physician. 2015; 92:358-365.

[16] Whelan K. Probiotics and prebiotics in the management of irritable bowel syndrome: a review of recent clinical trials and systematic reviews. Curr Opin Clin Nutr Metab Care 2011; 14:581–7.

[17]    Szajewska H, Mrukowicz JZ. Probiotics in the treatment and prevention of acute infectious diarrhea in infants and children: a systematic review of published randomized, double-blind, placebo- controlled trials. J Pediatr Gastroenterol Nutr 2001; 33:17–25.

[18]    Hiddink GJ, Hautvast JJ, van Woerkum CK, Fieren CJ, van't Hof MA. Nutrition guidance by primary-care physicians: LISREL analysis improves understanding. Prev Med 1997; 26:29–36.

[19]    AlAteeq M, Alrashoud AM, Khair M, Salam M. Smoking cessation advice: the self-reported attitudes and practice of primary health care physicians in Saudi Arabia. Patient Preference and Adherence 2016; 10:651-658.

[20]    Al-Hazmi Ahmad Homoud. Knowledge, attitude, and practice of primary health care physicians in the management of osteoarthritis in Al-Jouf province, Saudi Arabia. Niger Med J. 2012; 53:213–219.

[21]    Fahad Al-Amri, Ashry Gad, Dina Al-Habib, Ahmed Khair Ibrahim. Knowledge, Attitude and Practice Regarding Vitamin D Among Primary Health Care Physicians in Riyadh City, Saudi Arabia. World Journal of Food Science and Technology 2017; 1:47-55.

## Original Article

# Zika Virus: Knowledge, Attitudes, and its Prevention Approach Among Students of the Health Colleges at Qassim University, Saudi Arabia

Hanan Mohamed Tork[1] & Samah Alawady Basam[1]

[1] Associate Professor, Maternal and Child Health Nursing Department,

College of Nursing, Qassim University,

Corresponding author:

Hanan Mohamed Tork, MSc, PhD.

Maternal and Child Health Nursing Department, College of Nursing, Qassim University,
Qassim, Kingdom of Saudi Arabia, 51452. ORCID ID: orcid.org/0000-0001-8296-1814.
Mobil: +966565679066. Email: 3239@qu.edu.sa; hatork@yahoo.com

## Abstract:

**Background:** Zika virus (ZIKV), a flavivirus transmitted by Aedes species mosquitoes, was first identified in the Zika Forest in Uganda in 1947. There is a Saudi concern about Zika, and the Saudi health authority is trying to do their best to prevent any outbreak considering that people' precautions that are taken based always on their knowledge toward infectious diseases.
**Aim:** To assess the level of knowledge and attitudes towards Zika virus (ZIKV) and its prevention among Health Colleges' students at Qassim University (QU), Saudi Arabia. In addition, to identify factors associated with level of knowledge regarding ZIKV.
**Methods:** A stratified random sample of 343 students (male and female) participated in a cross-sectional study. The questionnaire consisted of 46 questions assessing the knowledge, attitudes, and prevention practices regarding ZIKV.
**Results:** Mean age of participants was 22 years old (SD ± 1.6) and the internet was the commonest source of information. Overall, most participants had poor knowledge regarding ZIKV (n = 274, 79.9%) and positive attitude (n= 294, 85.7%) regarding learning more about ZIKV. In terms of prevention practices, more than half of participants (n=191, 54.7%) confirmed using mosquito nets to prevent mosquito bites. Statistically significant differences were detected between participants' level of knowledge and their age (p < 0.037), colleges (p < 0.039), academic level (p < 0.001), and residence area (p < 0.001).
**Conclusion:** Findings revealed the lacuna of knowledge of participants regarding ZIKV. This finding arises the need for implementing ZIKA Virus health education program for university students.
**Keywords:** Zika virus, viral infections, knowledge, attitudes, prevention.

**الملخص**

**الخلفية:** فيروس زيكا هو فيروس فلافي ينتقل عن طريق بعوض الايدز وقد تم التعرف عليه لأول مرة في غابة زيكا في أوغندا عام ١٩٤٧. هناك اهتمام سعودي بشأن زيكا والسلطة الصحية السعودية تحاول بذل قصارى جهدها لمنع أي تفش للمرض آخذين في الاعتبار أن التدابير والاحتياطات التي يأخذها الناس تعتمد على معرفتهم ومواقفهم تجاه الأمراض المعدية.

**الأهداف:** تهدف الدراسة إلى تقييم معرفة واتجاهات طلاب الكليات الصحية تجاه فيروس زيكا والوقاية منه في جامعة القصيم بالمملكة العربية السعودية بالإضافة إلى تحديد العوامل المرتبطة بالمستوى المعرفي للطلاب.

منهج الدراسة: تم إجراء دراسة مقطعية مستعرضة بين ٣٤٣ من طلاب الكليات الصحية بجامعة القصيم. تم استخدام استبيان مكون من ٤٦ سؤالًا لتقييم معرفة واتجاهات الطلاب تجاه فيروس زيكا وكذلك ممارسات الوقاية منه.

**النتائج:** بلغ متوسط أعمار المشاركين في الدراسة ٢٢ عامًا انحراف معياري. (١,٦ ± وكان الإنترنت المصدر الأكثر شيوعا للحصول على المعلومات. بشكل عام كان هناك افتقار للمعرفة عن فيروس زيكا لدى معظم المشاركين (٧٩,٩٪ ,٢٧٤ =n) وسلوك إيجابي (n= ٢٩٤, ٨٥,٧٪) فيما يتعلق بالرغبة في معرفة المزيد عن فيروس زيكا. فيما يتعلق بممارسات الوقاية، أكد أكثر من نصف المشاركين (١٩١=n, ٥٤,٧٪) على استخدام الناموسيات لمنع لدغات البعوض. تم الكشف عن فروق ذات دلالة إحصائية بين مستوى معرفة المشاركين وأعمارهم (P >٠,٠٣٧) ، والكليات التي يدرسون بها (p>٠,٠٣٩) ، و المستوى الأكاديمي (P >٠,٠٠١) وكذلك مكان الإقامة ( .P >٠,٠٠١

**الخلاصة:** كشفت النتائج عن نقص معلومات الطلاب المشاركين فيما يتعلق بفيروس زيكا. تظهر النتائج الحاجة إلى تنفيذ برامج توعوية عن فيروس زيكا لطلاب الجامعة.

## Introduction

Recently, there were series of emerging infectious diseases worldwide and ZIKV is the last in this series of several outbreaks.[1] ZIKV was discovered first in 1947 in monkeys, and then in humans in Uganda.[2] In 2016, the Singapore Ministry of Health reported a cluster of new infections related to ZIKV.[3] In March 2017, the World Health Organization (WHO) reported that 84 countries found evidence of mosquito-borne transmission of ZIKV, while 61 countries reported human ZIKV cases.[4] ZIKV is a vector-borne disease transmitted by a biting mosquito of the Aedes species in the daytime, predominantly Aedesaegypti,[5-9] which has recently caused epidemics in many Latin American countries. However, during the outbreak, it was discovered that ZIKV infection is linked to adverse pregnancies and birth defects, notably microcephaly and other serious brain anomalies.[1] Nonvector borne transmission is through direct human to human transmission (i.e., sexual contact, breastfeeding, or contaminated blood transfusion);moreover, the infected mother can pass ZIKV to her fetus during pregnancy by RNA.[10] ZIKV infection tends to be mild, self-limited, and asymptomatic in approximately 80% of cases.[7,9,11] Symptomatic ZIKV infection is also usually mild with the main manifestations of low grade fever, fatigue, headache, and conjunctivitis.[12] ZIKV can cause severe neurological complications, including acute myelitis, meningitis, Guillain-Barré syndrome or encephalitis.[13-16] Vaccines are not yet available, while protection against mosquito bites, control of vector and reduction of sexual transmission are confirmed to prevent spread of the virus.[17,18] Recently, a pharmaceutical company in India claimed to manufacture a vaccine, such that clinical trials would soon be initiated.[19-21] WHO has declared ZIKV to be a Public Health Emergency of International Concern (PHEIC). Since this declaration, guidelines for testing and clinical management of ZIKV disease and associated complications have been issued by the WHO and the US Centers for Disease Control and Prevention (CDC).[22-23] Many studies were done around the world about knowledge, and attitudes regarding ZIKV among university students; one study done at a public university, USA among 613 undergraduate students, showed that most students (88.1%) had some basic knowledge of Zika virus.[24] Another study from university in Cebu city, Philippines revealed a moderate knowledge among university students regarding Zika virus.[25] In Saudi Arabia, a large-scale survey on medical students of King Abdullaziz University, Jeddah revealed that 77.5% of the participants had poor knowledge, 15% obtained fair level and 7.5% had satisfactory level of knowledge about ZIKV.[26]

In Saudi Arabia, the situation is complicated; The Kingdom of Saudi Arabia (KSA) hosts one of the largest annual mass gatherings in the world; around 7 million Muslims come for religious tourism (Umrah and Hajj annually), and thousands come from Latin America, where ZIKV is prevalent.[27,28] There is a high health alert in KSA concerning the

ZIKV infection; after a large outbreak of dengue in 2009 in Mecca, the Saudi Ministry of Health distributed pamphlets on ZIKV and its preventive measures to increase awareness of people.[29-30] While Saudi Arabia has advanced surveillance and serological testing, and a sophisticated epidemiology work force, the first responding health teams and facilities are yet to be formally educated in detecting and reporting ZIKV infection. Without comprehensive public health initiatives and aggressive education campaigns, the potential for unreported cases in KSA remains high. Health Colleges' students, as future practitioners, should have sufficient information regarding ZIKV. Thus, it is important for future healthcare teams to have sufficient knowledge in their own clinical settings. The present study aims to assess the level of knowledge and attitudes towards ZIKV and its prevention among Health Colleges' students at QU, Saudi Arabia. In addition, to identify factors associated with level of knowledge regarding ZIKV.

## Methods

### Design and setting

A cross-sectional study using a self-administered questionnaire took place between September and October 2018 among students at Qassim University.

### Study sample

Participants were recruited from the Health Colleges: Medicine, Nursing, Applied Medical Sciences, Pharmacy, and Dentistry. All colleges at university were represented, while the sample was calculated statistically; 10% of students from each college were included according to the number of students in each college. Eligibility criteria for students were as follows: (1) enrolled as an undergraduate student in one of the health colleges, (2) Affiliated as a sophomore, junior, or senior in academic level, and (3) signing the consent form for participation. A total of 343 students (Male and Female) were included by stratified random sampling method based on their academic level and college at the university.

### Structure questionnaire

Based on a review of the literature [8,27,31] an initial draft of the questionnaire was developed and content validity was assessed by a panel of academic staff members who are experts in survey research (n=4)[32]. The drafted version of the questionnaire was reviewed by experts who suggested changes to improve its relevance. After that, a pilot study (pretest) was performed with 20 students to determine test-retest reliability. In addition, Cronbach's alpha (a measure of internal consistency reliability) [33] was used for knowledge, attitudes, and prevention practice sections, which were 0.86, 0.79, and 0.76, respectively. The respondents were asked for feedback on difficulty and clarity of the questions. Based on the given responses, a few modifications were made to improve the clarity of the questionnaire. The final version included four major sections: the first section composed of 8 questions covering socio-demographic data and

participant characteristics (age, gender, college, residential area, academic level, mother's education, father's education, and their source of information regarding ZIKV). The second section assessed participants' knowledge related to ZIKV, which consisted of 28 items focused on whether there are cases of ZIKV in Saudi Arabia, population groups at risk for it, routes of transmission, and incubation period. In addition to statements related to symptoms, treatment, complications and availability of a vaccine against ZIKV. as other dangerous infectious diseases emerging in the KSA were known as Middle East Respiratory Syndrome (MERS). The third section focused on participant attitudes to ZIKV, based on 16 statements, answered with a 3-point Likert-scale "agree, I don't know and disagree". The fourth section concerned self-reported prevention practices against ZIKV; it consisted of six multiple choice questions (MCQs) focused on the availability for ZIKV prevention, as well as who was responsible for ZIKV prevention, what action should be taken to prevent mosquito bites, attitudes toward travelling to a country where ZIKV is found, preventive measures to protect people, and the reason to refraining from precautions to prevent ZIKV infection.

### Data collection

Data collection was carried out by distributing the questionnaires in the presence of the class teacher. Only students who offered complete responses to questionnaire items were included in the statistical analysis to ensure data quality. Collected data were coded, reviewed, and entered the SPSS software program for analysis (version16; SPSS Inc, Chicago, IL, USA). Frequency and percentages were calculated by descriptive analyses. A scoring system was used as follows: for knowledge (28 items), a score of "1" for the correct answer and "0" for the incorrect answer or "don't know the answer." The total knowledge score ranged from 0 to 28 and was categorized into satisfactory knowledge, which defined as correct answers to > 21items (>75% of the total score), fair knowledge was 14-21items (50-75% of the total score), and poor knowledge <14 items (<50% of the total score) [34]. A result with a p-value < 0.05 was considered statistically significant.

### Ethical considerations

The research protocol was approved by the Deanship of Scientific Research and ethical approval was obtained from the Research Ethics Committee of the nursing research center at Qassim University. Informed consent was obtained from all participants after given a cover letter with a detailed description of the study. Participants were informed regarding voluntary participation, privacy and confidentiality of data.

### Results

### Socio-demographic characteristics

Of 420 students approached, 368 responded to the survey, with a response rate of 87.6%. However, 25 questionnaires were excluded due to non-commitment during completing

the survey to the instructions. The final statistical analysis included 343 surveys, with 289 females (84.3%) and a mean age of 22 years. Most parents had a university degree or higher: 63.3% (n=217) of mothers and 58% (n= 199) of fathers. The main source of knowledge regarding Zika virus was the Internet, followed by TV, the university and interpersonal (Table 1).

## Table 1: Socio-demographic characteristics of the participants

| Characteristics | | Descriptive statistics |
|---|---|---|
| **Overall sample, *n* (%)** | | 343 (100%) |
| **Age** | Median (Range) | 22 (20–25) |
| | Mean (SD) | 22 (1.6) |
| **Gender, *n* (%)** | Male | 54 (15.7%) |
| | Female | 289 (84.3%) |
| **College, *n* (%)** | Medicine | 65 (19%) |
| | Nursing | 115(33.5%) |
| | Pharmacy | 47(13.7%) |
| | Dentistry | 69 (20.1%) |
| | AMS | 47 (13.7%) |
| **Academic level, *n* (%)** | Senior | 183 (53.4%) |
| | Junior | 117(34.1%) |
| | Sophomore | 43(12.5%) |
| ***Residence *n* (%)** | Rural | 6 (1.7%) |
| | Urban | 336 (98%) |
| **Mother education** | Elementary school | 43 (12.5%) |
| | Preparatory school | 26 (7.6%) |
| | Secondary school | 57 (16.6%) |
| | University and higher | 217 (63.3%) |
| **Father education** | Elementary school | 31 (9.1%) |
| | Preparatory school | 22 (6.4%) |
| | Secondary school | 91(26.5%) |
| | University and higher | 199 (58%) |

| | | |
|---|---|---|
| **Source of Zika information** | Internet | 273 (79.5%) |
| | University | 91(26.5%) |
| | Newspaper | 27 (7.9%) |
| | Posters | 31 (9.1%) |
| | TV | 111(32.4%) |
| | Healthcare professional | 64 (18.7%) |
| | Interpersonal | 69(20.1%) |
| | Others | 25 (7.3%) |

## Knowledge

Figure (1) illustrated students' knowledge regarding ZIKV's symptomatology; more than two-thirds of respondents (72%) correctly identified fever as an associated symptom, and many respondents succeeded in identifying significant symptoms, such as skin rash (42%) and conjunctivitis (39%), while around one-fifth (20.5%) incorrectly selected bloody diarrhea as a symptom of ZIKV. Furthermore, nearly half the participants (47%) were completely unaware of the significant symptoms of ZIKV and preferred the statement "I don't know".
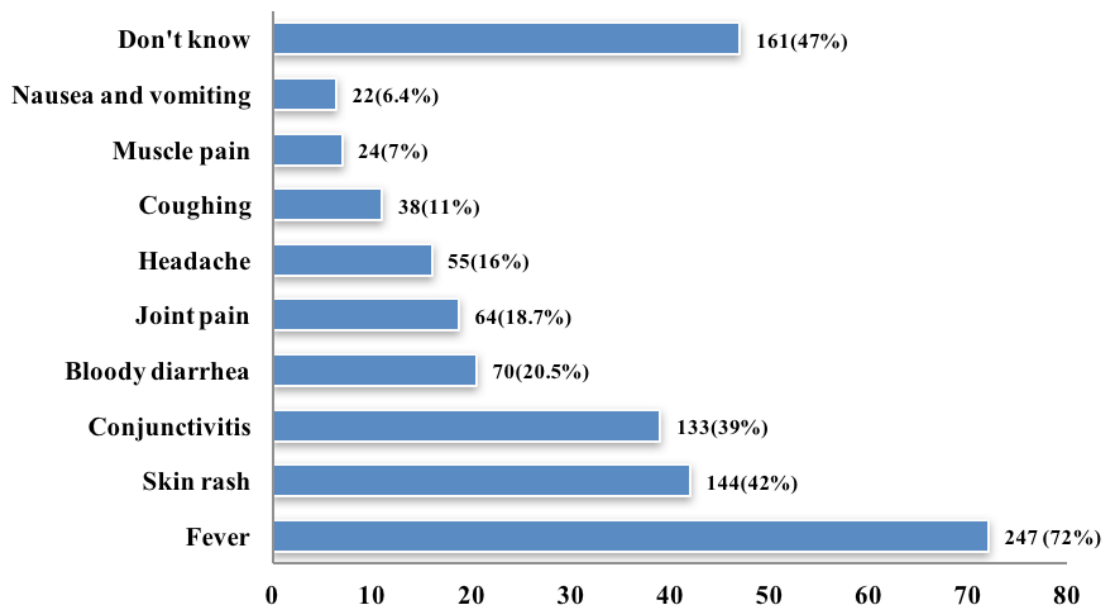


**Figure 1. Participants' knowledge of symptoms/signs of ZIKV (%)**

It is apparent from Table 2 that more than half the participants (51.3%) correctly recognized that infected mosquito bites and sexual relation with an affected person (53.1%) were among the modes of ZIKV transmission. However, only 9.6% of them correctly identified the usual incubation period of ZIKV, and less than a quarter (23.9%) knew that ZIKV could be transmitted through vertical routes, from an infected pregnant woman to her baby. Less than a quarter of participants (24.2%) identified there was no approved ZIKV vaccination until recently. Table 2 shows that the largest percentage of correct answers among participants (81.9%) was related to the most dangerous infectious disease emerging in Saudi Arabia, which is MERS.

**Table 2. Knowledge of item frequencies regarding Zika among Health Colleges' students (n=343)**

| Statement | Correct response | No. of correct responses (%) |
|---|---|---|
| Knowledge score (Min-max) | (0-28) | |
| 1.  There are cases of Zika infection in Saudi Arabia | False | 65 (19.0) |
| 2.  Person can be infected with Zika through coughing and sneezing (n=340) | False | 174 (50.7) |
| 3.  Person can be infected with Zika by eating contaminated food (341) | False | 123 (35.9) |
| 4.  Pregnant mother with a ZIk V can transmit it to her fetus | True | 82 (23.9) |
| 5.  ZIKV can be transmitted to a woman through sexual relation with her affected husband | True | 182 (53.1) |
| 6.  The usual incubation period of ZIKV ranged from 3–12 days. (n=333) | True | 32 (9.6) |
| 7.  Zika disease is mild in adults | True | 159 (46.4) |
| 8.  If a pregnant woman has Zika, her baby is at risk of microcephaly | True | 144 (42.0) |
| 9.  ZIkV is thought to cause GuillainBarré syndrome | True | 75 (21.9) |
| 10. There is an approved Zika vaccination | False | 83 (24.2) |
| 11. A person can get ZIkV from infected mosquitoes | True | 176 (51.3) |
| 12. There is currently no cure for ZIKV | True | 132 (38.5) |
| 13. The most common treatment for ZIKV is antibiotics | False | 191 (55.7) |
| 14. The most dangerous infectious disease in KSA nowadays (Corona) | True | 281 (81.9) |

## Attitudes

The attitudes of Health Colleges' students towards ZIKV are presented in Table 3, with more than half of participants (53.9%) had positive attitude toward statement " population all over the world could control the ZIKV epidemic" and about two third of them (70.5%) also had positive attitude regarding statement that vaccination for ZIKV was very important. Nearly two-thirds of Health Colleges' students (68.8%) positively responded to the statement "ZIKV is a deadly infectious disease, while more than half of participants (58.9%) had positive attitude toward state-

ment "Saudi residents are at risk of contracting ZIKV". A highly positively attitude (85.7%) of students were detected regarding the interest in learning more about ZIKV. The same table showed a negative attitude of more than half of participants (n=174, 50.7%), (n=185 , 54.8%) (n=186, 54.2%) toward "The spread of ZIKV makes me worried about my family", "Zika patients need to be treated by an infectious disease specialist" and "The best way to prevent Zika infection is to protect against mosquito bites" respectively.

### Table 3. Response of the Health colleges' students of Qassim University to attitude questionnaire on ZIKV

| No. | Questionnaire statements | Positive Attitude n (%) | Negative Attitude n (%) |
|---|---|---|---|
| 1 | I am confident that the world's population can control ZIKV epidemic | 185 (53.9%) | 158 (46.1%) |
| 2 | Zika's infection is a deadly infectious disease | 236 (68.8%) | 107 (31.2%) |
| 3 | Saudi residents are at risk of contracting ZIKV | 202 (58.9%) | 141 (41.1%) |
| 4 | I think the vaccination for Zika is very important | 242 (70.5%) | 101(29.5%) |
| 5 | I am interested in learning more about Zika's disease | 294 (85.7%) | 49 (14.3) |
| 6 | I have a bad feeling about ZIKV | 175 (51%) | 168 (49.0%) |
| 7 | The spread of ZIkV makes me worried about my family | 169 (49.3%) | 174 (50.7%) |
| 8 | All pregnant women should be examined to make sure they do not get Zika | 212 (61.8%) | 131 (38.2%) |
| 9 | Zika disease can spread easily in Saudi Arabia | 308 (89.8%) | 35 (10.2%) |
| 10 | I think it is dangerous to travel to Zika's countries | 226 (65.9%) | 117 (34.1%) |
| 11 | There is no possibility of Zika happening in KSA | 329 (95.9%) | 14 (4.1%) |
| 12 | Zika patients should be treated in isolation because it is a very contagious disease | 315 (91.8%) | 28 (8.2%) |
| 13 | Zika patients need to be treated by an infectious disease specialist | 155 (45.2%) | 188 (54.8%) |
| 14 | The best way to prevent Zika infection is to protect against mosquito bites | 157 (45.8%) | 186 (54.2%) |
| 15 | The government should prohibit foreigners from entering Saudi Arabia if they have symptoms of Zika disease | 183 (53.4%) | 160 (46.6%) |
| 16 | Zika disease is a burden on health systems in the countries where it spreads | 282 (82.2%) | 61 (17.8%) |

### Prevention practices

Regarding prevention practices**,** as shown in figure 2, most participants (81%) confirmed that ZIKV can be prevented and regarding the responsibility of Zika' prevention, around half of participants (50.4%) emphasized individual responsibility in preventing Zika infection; alternatively, 46.9% saw health workers as responsible for ZIKV prevention. Considering the preventive measures that should be taken, more than half of participants (55.7%) confirmed using mosquito nets and 46.1% preferred using mosquito repellent to prevent mosquito bites (figure 3).

Figure 2: Participants' information about whose responsibility to prevent ZIKV
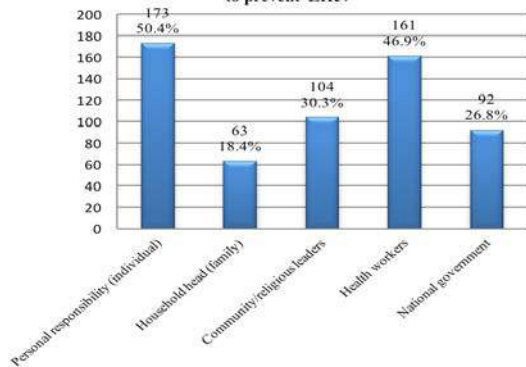


Figure 3: Participants' information about action should be taken to prevent mosquito bites
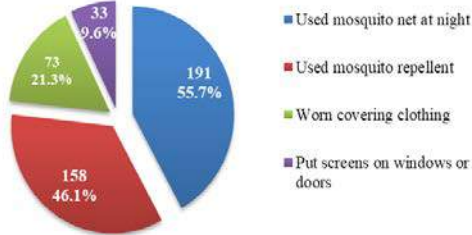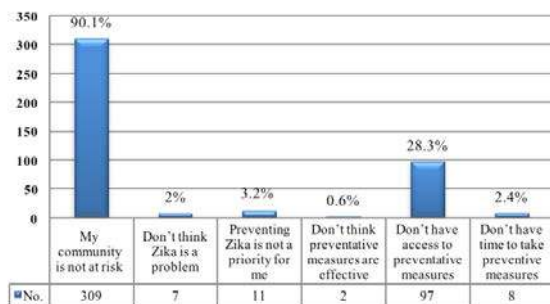


Figure 4: Participants' information about why they have not taken any action to prevent their community from getting Zika

As regards to actions taken to protect the community from ZIKV, most students (92.1%) took no action with 90.1% justifying this as their community not being at risk (figure 4). Table 4 showed that the participants' level of knowledge regarding Zika revealed that 79.9% had poor knowledge, 13.4% had a fair level of knowledge, and 6.7% had a satisfactory level of knowledge. The same table illustrated that 72.2% of participants 21 years and over compared to 95.6% of younger participants (less than 21 years), having obtained poor ZIKV knowledge scores, which rendered this difference statistically significant ($p < 0.037$). Gender difference regarding Zika knowledge was statistically insignificant among participants ($p < 0.132$), where 83.3% of males compared to 79.2% of females having poor ZIKV knowledge. The same table revealed that the percentage of those with fair and satisfactory knowledge scores increased with advancing academic level, with a highly statistically significant difference detected ($p < 0.000$). In addition, the ZIKV knowledge score differentiated significantly among participants regarding their colleges and residential area; ($p < 0.039$), ($p < 0.001$), respectively.

**Table 4. Factors associated with participants' level of knowledge**

| Variables | Characteristics | n (%) | Level of knowledge | | P-value |
|---|---|---|---|---|---|
| | | | Fair & Satisfactory (n = 69, 20.1%) n (%) | Poor (n = 274, 79.9%) n (%) | |
| Age group | Mean ±SD | 22 ±1.6 | | | |
| | <21 yrs | 113 (32.9) | 5 (4.4) | 108 (95.6) | 0.037 |
| | ≥ 21 yrs | 230 (67.1) | 64 (27.8) | 166 (72.2) | |

| Gender | Male | 54 (15.7%) | 9 (16.7) | 45 (83.3) | 0.132 |
|---|---|---|---|---|---|
|  | Female | 289 (84.3%) | 60 (20.8) | 229 (79.2) |  |
| College, n (%) | Medicine | 65 (19%) | 19 (29.2) | 46 (70.8) | 0.039 |
|  | Nursing | 115 (33.5%) | 8 (7.0) | 107 (93.0) |  |
|  | Pharmacy | 47 (13.7%) | 10 (21.3) | 37 (78.7) |  |
|  | Dentistry | 69 (20.1%) | 23 (33.3) | 46 (66.7) |  |
|  | AMS | 47 (13.7%) | 9 (19.1) | 38 (80.9) |  |
| Academic level | Senior | 183 (53.4%) | 51 (27.9) | 132 (72.1) | < 0.001 |
|  | Junior | 117 (34.1%) | 18 (15.4) | 99 (84.6) |  |
|  | Sophomore | 43 (12.5%) | 0 (0.0) | 43 (100) |  |
| *Residence n (%) | Rural | 6 (1.7%) | 0 (0.0) | 6 (100) | < 0.001 |
|  | Urban | 336 (98%) | 69 (20.5) | 267 (79.5) |  |

*One was missing**

## Discussion

Based on the declaration of WHO that ZIKV is a public health emergency of international concern,[35] it becomes important for healthcare personnel to constantly update their knowledge regarding ZIKV infection. According to the current results, most participants at all health colleges had been informed regarding ZIKA from the Internet. Although it is recently the most common source of information, especially for young adults, but they must be sure that these websites can be trusted and have complete knowledge. This is in accordance with a variety of previous studies, [36-39] which also reported that most of their respondents gained their knowledge from Internet and social media. Our findings exhibit knowledge gap among Health Colleges' students regarding Zika, which is similar to surveys conducted among undergraduate students at George Mason University in the USA.[34] This is similar among university students in Saudi Arabia[38] and doctors in Indonesia.[23] Another concern is participants' false

understanding regarding the availability of approved vaccines and the presence of a cure for ZIKV disease. This supports how similar results had been published in a previous study.[40] Approximately half of participants know that a mosquito bite is the most common mode of ZIKV transmission, but only 9.6% identified the incubation period. This discrepancy coincides with previous studies for medical students (n=426) in Jeddah, Saudi Arabia,[39] while better results were noted in healthcare students in a study conducted in four cities in Colombia (2015). Almost all participants knew the mode of transmission and incubation period; this dissimilarity is clear if it is known that those in Colombia attended a ZIKV symposium beforehand the study.[40]

Concerning the students' attitudes, more than half of participants were confident that the world's population could control the ZIKV epidemic and the majority of participants were interested in learning more regarding ZIKV disease, where results are in accord with pre-

vious researches.[35,40] One notable finding of the present study is the lack of participants' knowledge, yet the majority of participants avoided travelling to a country where ZIKV was found and more than half of them confirmed the use of mosquito netting as a measure to prevent mosquito bites; this exhibits better participant prevention practices, which is in accordance with a previous study reporting in sufficient evidence to correlate knowledge with improved practices.[39] Therefore, further studies should assess the link between knowledge and participant practices regarding ZIKV prevention.

## Limitations of the study:

The present study has certain limitations, in which potential areas uncover the beliefs of Health Colleges' students at QU toward ZIKV disease, and students' knowledge and attitudes from non-health colleges. Larger studies would comprehend students and the public in the KSA. Interventional studies, particularly educated ones, would increase student knowledge and that of the public on ZIKV infection. Another limitation is that all information in this study was self-reported and that any bias was due to having socially desirable attitudes. Follow-up studies, with knowledge and preventive measures, are vital to evaluate the effectiveness of these measures. There is a need to develop precaution strategies toward ZIKV, particularly in the KSA and the existence of large numbers of religious tourism during Hajj and Umrah.

## Conclusion

In conclusion, findings revealed a lack of knowledge regarding ZIKV among Health Colleges' students at QU, but positive attitudes on learning more regarding ZIKV. Therefore, there is a greater need for implementing a Zika symposium for university students, focused on arousing greater knowledge regarding the disease. Our study findings are useful for policy makers at QU, as well as other health professionals for planning, implementing, and evaluating Zika awareness programs.

## Conflict of interests

Authors declare no conflict of interest

## Funding

## Acknowledgements

## References

[1] Beckham JD, Pastula DM, Massey A, Tyler KL. Zika Virus as an Emerging Global Pathogen Neurological Complications of Zika Virus. JAMA Neurol2016; 73:875–879.doi:10.1001/jamaneurol.2016.0800.

[2] Dye C, Bartolomeos K, Moorthy V, Kieny P. Data sharing in public health emergencies: A call to researchers. Bulletin of World Health Organizaton 2016; 94(3):158.

[3] Joint MOH-NEA Media statement on Zika. Singapore: National Environment Agency; 2016 Available at http://www.nea.gov.sg/corporate-functions/newsroom/news-releases/category/zika/joint-moh-nea-media-statement-on-zika, Accessed on 11 March 2018.

[4] World Health Organization. Zika Situation Report: WHO 2017. Available at: http://www.who-     int/mediacentre/factsheets/fs117/en. Accessed on July 12, 2017.

[5]  Musso D, Gubler DJ. Zika Virus. ClinMicrobiol Rev 2016; (3):487-524.

[6]  Boeuf P, Drummer HE, Richards JS, Scoullar MJ, Beeson JG. The global threat of Zika virus to pregnancy: Epidemiology, clinical perspectives, mechanisms, and impact. BMC Med 2016; 14:112-113.

[7] Brown C. Zika virus outbreaks in Asia and South America. CMAJ 2016; 188:E34. 4.

[8] Petersen LR, Jamieson DJ, Powers AM, Honein MA. Zika virus. N Engl J Med 2016; 374:1552-1563.

[9] Paixao ES, Barreto F, Teixeira Mda G, Costa Mda C, Rodrigues LC. History, epidemiology, and clinical manifestations of Zika: A systematic review. Am J Public Health 2016; 106:606–612.

[10]     Alshammari S, AlamriY, Rabhan F, Alabdullah A, Alsanie N, Almarshad F, Alhaqbani A. Overview of dengue and ZIKV similarity, what can we learn from the Saudi experience with dengue fever? International J Health Sciences2018; 12(1): 77–82.

[11]     Plourde AR, Bloch EM. A literature review of Zika virus. Emerg Infect Dis2016; 22:1185-1192.

[12]     Harapan H, Aletta, A, Anwar S., Setiawan A, Maulana R, Wahyuniati N. et al. Attitudes towards Zika virus infection among medical doctors in Aceh province, Indonesia. J Infect Public Health 2018;11:99–104.

[13]     Niemeyer B, Niemeyer R, Borges R, Marchiori, E. Acute Disseminated Encephalomyelitis Following Zika Virus Infection. Eur Neurol2017; 77: 45–46. https://doi.org/10.1159/000453396 (2017).

[14]     Mecharles S,et al. Acute myelitis due to Zika virus infection. Lancet2016; 387: 1481–1481.

[15]    Soares, C. N. et al. Fatal encephalitis associated with Zika virus infection in an adult. J ClinVirol2016; 83: 63–65.

[16]    Carteaux G. et al. Zika Virus Associated with Meningoencephalitis. N EnglJMed2016; 374: 1595–1596.

[17]    World Health Organization. Zika virus infection: Global update on epidemiology and potentially associated clinical manifestations. Releve Epidemiologique Hebdomadaire 2016; 91:73–81.

[18]    Singh RK, Dhama K, Malik YS, Ramakrishnan MA, Karthik K, Tiwari R, Saurabh S, Sachan S, Joshi SK. Zika virus: Emergence, evolution, pathology, diagnosis, and control: current global scenario and future perspectives - A comprehensive review. Vet Q 2016; 36:150–75.

[19]    Shammas J. World's First Zika Virus Vaccine Now Ready, Say Scientists in India. 2016. Available at: http://www.mirror.co.uk/news/worldnews/worlds/firstzikavirusvaccine.Accessed on February 04 2017.

[20]    Mallikaarjun Y. Indian Firm Files Patent for Zika Vaccine Candidates. 2016. Available at: http://www.thehindu.com/business/bharat-biotech-tostartprelinicaltrialssoon.on-two-vaccine-candidates-for-zika-virus/article8188474.ece.    Accessed on February 03 2017.

[21]    Jaffe S. US responds to increase in Zika cases. Lancet 2016; 387:1801–1802.

[22]    Harapan H., Aletta A., Anwar S, Setiawan A, Maulana R, Wahyuniati N, et al. Healthcare workers' knowledge towards Zika virus infection in Indonesia: A survey in Aceh. Asian Pac J Trop Med 2017; 10: 189–194.

[23]    World Health Organization. Knowledge, Attitudes, and practice surveys of ZIKV disease and potential complications. Geneva: World Health Organization; 2016. Available from: http://www.who.int/csr/resources/publications/zika/kap-surveys/en/. Accessed on 17thMarch 2018.

[24]    Plaster AN, Painter JE, Tjersland DH·, Jacobsen KH. University Students' Knowledge, Attitudes, and Sources of Information About Zika Virus. Journal of Community Health 2018; 43:647–655.

[25]    Lozano EB. Knowledge, attitudes and practices on dengue and Zika viruses from four institutional divisions of Cebu normal university, Cebu city, Philippines. International Journal of Mosquito Research 2018; 5(4): 33-38.

[26]    Ibrahim NK, Al-Bar A, Kordey M, Al-Fakeeh A. Knowledge, attitudes, and practices relating to Dengue fever among females in Jeddah high. Journal of infection and Public Health 2009; 40:30–40.

[27]    Al-Tawfiq JA, Memish ZA. Mass gathering medicine: 2014 Hajj and Umra preparation as a leading example. Int J In-

fect Dis2014; 27: 26-31.

[28]    Elachola H, Gozzer E, Zhuo J, Memish ZA. A crucial time for public health preparedness: Zika virus and the 2016 Olympics, Umrah and Hajj. Lancet2016; 387: 630-632.

[29]    Alwafi OM, McNabb SJN, Memish ZA, Assiri A, Alzahrani SI, Asiri SI, et al. Dengue Fever in Makkah, Kingdom of Saudi Arabia, 2008–2012. Am J Res Comm 2013; 1: 123-139.

[30]    Rasooldeen Mohammed. Kingdom alive on Zikavirus threat. Arab News. 2016, available at URLhttp://www.arabnews.com/saudi-arabia/news/874211. Accessed on 20 May 2016.

[31]    Katler Q, Godiwala P, Macri C, Pineles B, Simon G, Chang A, Ahmadzia H. Evolution of Knowledge, Awareness, and Practices regarding Zika Virus from 2016 to 2017. Infectious Diseases in Obstetrics and Gynecology. 2017; 1-13.

[32]    Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. J Adv Nurs. 2000; 32(4):1008-15.

[33]    Streiner, D. L. (2003). Being inconsistent about consistency: When coefficient alpha does and doesn't matter. Journal of Personality Assessment, 80(3), 217-222.

[34]    World Health Organization. WHO Director-General summarizes the outcome of the Emergency Committee on Zika. Available at: http://who.int/mediacentre/news/statements/2016/emergency-committee-zika-microcephaly/en/.2016c. Accessed on 2ndFebruary 2018.

[35]    Gupta N, Mehta N, Gupta P, Arora V, Setia P. Knowledge regarding Ebola hemorrhagic fever among private dental practitioners in Tri-city, India: A cross-sectional questionnaire study. Niger Med J 2015; 56:138-42.

[36]    Gupta N, Randhawa RK, Thakar S, Bansal M, Gupta P.Arora V. Knowledge regarding Zika virus infection among dental practitioners of tri-city area (Chandigarh, Panchkula, and Mohali), India. Niger Postgrad Med J 2016; 23:33-7.

[37]    Apichaya S, Chaninat R, Theerin C, Supataradit B, Awapa P, Tongsreeneam N, et al. Knowledge, Attitude, and Practice of Pandemic H1N1 Influenza Prevention in Thailand. Available from: http://www.beid.ddc.moph.go.th/th/images/news/cheraton2122-10-52/poster/R  assa meeposter01.  Accessed on 20thFebruary 2017.

[38]    Ibrahima N, Moshref R, Moshref L, Walid J, Alsatia H. Knowledge and attitudes towards Zika virus among medical students at King Abdulaziz University, Jeddah, Saudi Arabia. Journal of Infection and Public Health2018; 11: 18–23.

[39]    Naing C, Ren WY, Man CY, Fern KP, Qiqi C, Ning CN, et al. Awareness of dengue and practice of dengue control among the semiurban community: A cross-sectional survey. Journal of Community Health 2011; 36:1044-49.

[40]    Sabogal-Roman JA, Murillo-Garcia DR, Yepes-Echeverri MC, Restrepo-MejiaJD, Granados-Alvarez S, Paniz-Mondolfi AE, et al. Healthcare students and workers' knowledge about transmission, epidemiology and symptoms of Zika fever in four cities of Colombia. Travel Med Infect Dis 2016; 14:52–54.

## Original Article

# Electronic Cigarettes Use Among Medical Students: Prevalence, Social Determinants and Purpose of Use

Abdulaziz T. Alshomrani[1], Abdulaziz S. Almalki[2], Bandar A. Aldosari[2], Naif S. Alnefaie[3],

Hala M. Alzaid[4], Nasser A. Alshamrani[5], Khalid I. Alqumaizi[6].

[1]Associate professor in clinical neuroscience department, College of Medicine, Al Imam Mohammad Ibn Saud Islamic University (IMSIU), College of Medicine at Bisha University and SABIC Psychological Health Research & Applications Chair, College of Medicine, King Saud University, Riyadh, Kingdom of Saudi Arabia
[2]Medical intern, College of Medicine, Al Imam Mohammad Ibn Saud Islamic University (IMSIU)
[3]College of Medicine, Al Imam Mohammad Ibn Saud Islamic University (IMSIU)
[4]Medical intern, College of Medicine, Princess Nourah bint Abdulrahman University.
[5]Medical intern, College of medicine, Almaarefa
[6]Assistant Professor, Family Medicine Department, College Of Medicine,
Al Imam Mohammad Ibn Saud Islamic University (Imsiu)
*Received on 28.11.2018, accepted for publication on 29.06.2019*
Corresponding author:
Abdulaziz T. Alshomran:
Associate Professor in Clinical Neuroscience Department, College of Medicine, Al Imam Mohammad Ibn Saud Islamic University (IMSIU), College of Medicine at Bisha University and SABIC Psychological Health Research & Applications Chair, College of Medicine, King Saud University, Riyadh, Kingdom of Saudi Arabia.
e-mail: azsham@hotmail.com, Tel: 0503298929

**Abstract**

**Background:** Electronic cigarettes (e-cigarettes) are new form of nicotine products that has become a worldwide trend. Not enough data about its prevalence, determinants and reason for use among medical college students are available. Our aim in this study was to estimate the prevalence, social correlates and purpose of use of e-cigarettes among medical students in Riyadh, Saudi Arabia.

**Methods:** A well-structured paper and electronic questionnaire distributed among 900 students of two government and one private medical college.

**Results:** A total of 636 out of 900 targeted students (71%) answered the questionnaire (female represent 33.3%). The prevalence of tobacco and e-cigarettes use among the participants was 20.7% and 3.3%, respectively, while 5.7% reported a previous trial of e-cigarette. E-cigarette smoking is more prevalent among males than female and is associated with more travel abroad. Most of the e-cigarette's smokers (88.1%) used it with other tobacco products and showed positive correlation with other tobacco products especially the water pipe and conventional cigarettes. Only 36% of e-cigarette smokers used them on a daily basis. Among e-cigarette users, 43% used it for fun and exploration, 26.4% to quit conventional smoking, 13.9% to minimize harm from other products, and 9% used it in places in which other types of smoking were prohibited.

**Conclusion**: The prevalence of e-cigarettes among college students is like national and Western World com-

**الملخص**

**خلفية:** السجائر الالكتروني عبارة عن شكل جديد من أشكال التبغ الذي أصبح استخدامه شائعا حول العالم. لا توجد هنالك معلومات كافية حول معدل الانتشار المحددات وأسباب استخدام السجائر الالكتروني لدى طلاب الكليات الطبية. تهدف هذه الدراسة الى تحديد معدل الانتشار وأسباب استخدام السجائر الالكتروني لدى طلاب الكليات الطبية بمدينة الرياض بالمملكة العربية السعودية.

**طريقة البحث:** تم استخدام استبيان محكم في شكل ورقي والكتروني على تسعمائة طالب من اثنين من الكليات الحكومية وواحدة من الكليات الخاصة.

**النتائج:** أجاب ٦٣٦ طالب من أصل ٩٠٠ على الاستبيان (٧١٪) منهم ٣٣,٣٪ من الاناث. يمثل معدل استخدام التبغ والسجائر الالكتروني ٢٠,٧٪ و٣,٣٪ على التوالي بينما افاد ٥,٧٪ من الطلاب استخدامهم السجائر الالكتروني من قبل. يستخدم الذكور السجائر الالكتروني بمعدل أعلى من الاناث ويرتبط ذلك بحالات السفر خارج البلاد. يستخدم معظم مستخدمي السجائر الالكتروني (٨٨,٨٪) التبغ مع أنواع أخرى منه خاصة الشيشة والسجائر العادي. يستخدم ٣٦٪ فقط من الطلاب السجائر الالكتروني يوميا. من ضمن المستخدمين، يدخن ٤٣٪ منهم لأغراض التسلية و٢٦,٤٪ ليساعدهم على الاقلاع عن التدخين العادي و١٣,٩٪ ليقلل من اضرار التبغ و٩٪ يستخدمونه في الأماكن التي لا يسمح فيها استخدام أنواع التبغ الأخرى.

**الخلاصة:** معدل انتشار السجائر الالكتروني لدى طلاب الكليات الطبية بمدينة الرياض بالمملكة العربية السعودية يماثل المعدل

munity figures. Raising awareness of its potential harm and medical consequences through curricular and extracurricular activities is of paramount importance for students' and their future patients' health.
**Key work:** e-cigarettes, medical students, medical college, Saudi Arabia

القومي والمعدل بالدول الغربية. رفع الوعي عن مخاطر استخدام السجائر الالكتروني واثاره الصحية عن طريق المناهج والأنشطة خارج المناهج له أهمية قصوى للطلاب والمرضى.

## Introduction

Electronic cigarettes (e-cigarettes) are battery-operated products designed to deliver nicotine and other chemicals. An internal heat source turns nicotine and other chemicals into a vapor that is inhaled by the user [1]. Despite limited data about short- and long-term health effects of e-cigarette exists, their popularity has been increasing [2, 3]. Currently, there are more than 500 brands of e-cigarette available, and they continue to be extensively promoted, primarily via the internet, shopping mall kiosks, and viral marketing. So, it is likely that consumer awareness and e-cigarette use will continue to increase. Results from different surveys conducted globally across different age groups indicate that the prevalence of e-cigarette is increasing and will continue to rise for many reasons, including their promotion, lack of selling and distribution regulation, controversies about their side effects, short-, mid-, and long- term complications, and lack of willingness to quit smoking among the current users [4]. Selling and marketing of e-cigarettes are prohibited in Saudi Arabia in accordance with the decision made by health ministers of the Gulf Region [5]. The Centers for Disease Control and Prevention has indicated that awareness of e-cigarette has doubled from 16.4% in 2009 to 32.2% in 2010, and the number of people report-

ing using e-cigarette (even just trying them) has more than quadrupled between 2009 and 2010 [6].

The use of e-cigarette is more prevalent among youth and adolescent. It has increased tremendously as a substitute for cigarettes or other form of smoking as represented by figures from United States (US), United Kingdom (UK), Poland, and Canada [7-10]. E-cigarette use is strongly correlated with traditional smoking [9]. In Saudi Arabia and the Gulf Cooperation Council [GCC] region, the prevalence of e-cigarette has not been well studied. Only three studies have examined this issue in Saudi Arabia; one of those studies examined e-cigarette smoking among university students [11-14].

This study was conducted to measure the knowledge, prevalence, purpose for using e-cigarette, and their determinants among medical students in Riyadh.

## Methods

**Sampling and Participants:** This is a cross sectional study in which a paper-based questionnaire was distributed to students in one government medical school, (Imam Mohammad Ibn Saud Islamic University (IMSIU) and one private medical school (Almarefah college) in Riyadh, while an electronic questionnaire distributed to a third government

medical school (Princess Nourah bint Abdulrahman University) due to feasibility matters. Nine-hundred male and female, senior and junior students were targeted by the questionnaire in April 2017. A pre tested questionnaire distributed to students who were available during break time between lectures, and targeted emails were sent to students' batches through their leaders. In each medical school, at least one senior trained student coordinated and supervised the distribution and gathering of questionnaires among his colleagues during breaks.

Two public health and research experts assessed its face validity and approved it after minor amendments. After that, questionnaire distributed to a pilot sample of twenty students.  We asked their opinions about any ambiguity, difficulties, editing, and/or layout corrections. Their responses were re-evaluated by the team in order to insure the quality of gathered data. Further minor modifications were made on the form and to the order of some of the questions accordingly.

Written consent was obtained from all participants. Their participation was voluntary, and no incentives were given or promised. These issues were emphasized by the data collector and written clearly in the questionnaire as a brief introduction. Anonymity of all respondents was insured by writing it clearly and by avoiding direct questions in the questionnaire that may disclose any person's identity. The study received the institutional review board approval from Imam Mohammad ibn Saud Is-

lamic University, # 024-2017.

**Data Analysis:**

We used the Statistical Package for Social Sciences (SPSS) version 22.0 to analyze our data [15]. Descriptive analysis was used to present means, standard deviations, frequency, and percentages. We used non-parametric tests, including the Mann-Whitney and Kruskal-Wallis to test for differences, and Spearman's correlation was used to assess the relationship between different variables. A p values <0.05 was set as a significant statistical difference.

**Results**

A total of 636 out of 900 targeted students in two government medical schools and one private medical school responded to our questionnaire. The response rate was 71%. Female respondents represent one third (33.3%) of the sample, and almost all participants' (94.5%) were <26 years old. Most of the participants had traveled abroad >4 (63.5%), while <16% reported no previous travel to other countries. Almost all of the participants (98.7%) admitted excellent or good financial status (see Table 1).

The prevalence of current nicotine use among the participants was 20.7 % (29% among males and 4.2% for females), and 12.3% were ex-smokers. Water-pipe smoking was the most common type ever used (53.8%) followed by conventional cigarettes (52.2%), while e-cigarette and chewing tobacco were used by 9% and 4.7% respectively.

When asked about first-used products, conventional cigarettes were the most first-tried (55.6%) followed by water-pipe (41.2%) and then chewable tobacco (2%) while 1% (two participants) reported using e-cigarette as their first used nicotine derivatives. One of them progressed to use other tobacco products, and the other one kept using only e-cigarette.

Among total participants in the study, 3.3%( 1.2% 4.2% for males and female, respectively) admit current e-cigarettes use while 5.7% reported a previous trial of e-cigarette. Most of our participants (87.7%) did not know anyone or only ≤4 e-cigarette users in comparison to 3.1%, who knew ≥10 e-cigarettes users. A considerable percentage (9.1%) stated that they knew 5–10 e-cigarettes users.

Most of the e-cigarette's smokers (88.1%) used it in combination with other tobacco products. Three fourths (75.4%) of them concurrently used a water pipe, 59.6% smoked conventional cigarettes, and 5.3% used chewing tobacco. Pearson's correlation test showed an association between e-cigarettes smoking and use of other nicotine types in general (r=0.322). Furthermore, this association was mild to moderate for water pipe (r=0.367) and conventional cigarettes (r=0.332). In contrast, the association was weak for chewing tobacco (r=0.149).

Thirty six percent of e-cigarettes smokers used it on daily basis, while 34% and 30% used it on weekly and monthly basis, respectively. Answers on the purpose of e-cigarettes usage are presented in Table 2.

The use of the e-cigarettes is significantly predominant among males over females (p = 0.036), and among those who traveled abroad (p = 0.001). Regarding e-cigarettes knowledge, many students admit knowing about the e-cigarettes to some extent (62%), and 16.8% had extensive e-cigarettes knowledge; however, one fifth of the students (21%) did not know anything about it. e-cigarettes smokers attributed their first exposure to e-cigarettes through friends (67%), internet (23%), and (10%) family members (10%).

### Table (1) Demographic correlates of responding students (n=636)

| Variables | | Smoking Electronic | | | Total |
|---|---|---|---|---|---|
| | | current E. Cig user | p. value | Non-E. cig. users | |
| Gender | Male | 18 (4.2%) | 0.036 | 406 (95.8) | 424 (100%) |
| | Female | 3 (1.4%) | | 209 (88.6%) | 212 (100%) |

| | | | | | |
|---|---|---|---|---|---|
| Age | 21-18 | 11(44.9%) | 0.608 | 234(45.1%) | 245(100%) |
| | 25-22 | 8 (22.5%) | | 348(77.5%) | 356(100%) |
| | ≥26 | 2 (5.7%) | | 33(94.3%) | 35(100%) |
| Type of college | Government | 16(3.0%) | 0.051 | 513(97.0%) | 529(83.2%) |
| | Private | 5(4.7%) | | 102(95.3%) | 107(16.8%) |
| Travel abroad | ≥4 | 18(4.5%) | 0.001 | 386(95.5%) | 404(63.5%) |
| | ≤3 | 2(1.5%) | | 131(98.5%) | 133(20.9%) |
| | 0 | 1(1.0%) | | 98(99.0%) | 99(15.6%) |
| Financial status | Excellent | 13(3.6%) | 0.654 | 353(96.4%) | 366(57.5%) |
| | Good | 8(3.1%) | | 254(96.9%) | 262(100%) |
| | Poor | 0(0%) | | 8(100%) | 8(100%) |

## Table (2) Purpose of using e-cigarettes

| Purpose of use | Percentage |
|---|---|
| Due to medical advice | 2.8% (n=1) |
| To help me quit other tobacco products | 26.4% (n=5) |
| Reduce harm caused by other tobacco products | 13.9% (n=3) |
| An opportunity to smoke in places that prevent cigarette and water-pipe smoking | 8.3% (n=2) |
| Peer pressure | 5.6% (n=1) |
| Fun and exploration | 43% (n=9) |

## Discussion

Our study is one of few studies that studied e-cigarette smoking in Saudi Arabia, and it is the first study to explore e-cigarette smoking phenomenon among medical students. Albaik and colleagues reported in study of an online public questionnaire that 33.5% of their sample (3000 respondents) admitted a previous trial of e-cigarette, and current users were estimated to be 2.5% [13]. Another study explored e-cigarette smoking among three health-science colleges, and one engineering college found that 25% of respondents admitted previous use of e-cigarette [12]. In the US, 12.6% admitted previous use, and 3.7% of the sample population were reported as current users [7]. Furthermore, 16.1% and 5.7% of youth and young Canadians reported previous and current use of EC, respectively while in the UK, 6.7% are current users and one-third admitted previous use [8]. The percent-

age of current e-cigarette users in our study (3.3%) was within the range of national and international figures (2.5%–6.7%) while the percentage of previous use was below registered ones in national and international studies. This discrepancy requires further study. Only 36% of e-cigarette users use e-cigarette on a daily basis in comparison to the US population, who use it daily or several days per week [7]. As in Albaik and colleagues' study, and similar to conventional tobacco smoking, e-cigarette smoking is more prevalent among males than females, which may be interpreted at least partly by the cultural values and stigmas related to female smoking. However, this phenomenon was not limited to the Saudi population [16, 17]. Although only 1% (two students) of e-cigarette users admitted using e-cigarette as their first nicotine product; however, the gate theory for progression to use other tobacco products when start e-cigarette smoking cannot be ruled in or out as the sample number was small and the history of e-cigarette smoking in Saudi population is too recent to be available to most of these students during their adolescence smoking exploratory period. Almost all e-cigarette users (99%) are current or previous conventional tobacco users, and 88% of them use e-cigarette concurrently with other tobacco products, which was found also in other national [12, 13] and to lesser extent in other international studies [7-9]. E-cigarette smoking has been associated with water-pipe usage, which may reflect the nature of exploring and intermittent usage pattern of these two products.

As in other national and international studies, most of students admit at least some e-cigarette awareness; however, 21% of them admit no previous e-cigarette knowledge, which may need to be further reconsidered in the medical school curriculum as these students represent future doctors. In a Saudi study, >66% of e-cigarette smokers had an e-cigarette user friend and admitted the friend's role for their e-cigarette trial [12]. From another point-of-view, we found that friends were the major e-cigarette knowledge more than internet and family, which emphasizes the effects of peers on an individual's behavior and attitude. Smoking e-cigarette was more common among those who travelled abroad regardless of their economic status, which may reflect cultural correlation or travelling to countries with different e-cigarette related attitudes and legal considerations or the exploratory and curiosity nature of these students.

Help with quitting conventional tobacco use is a claim advertised by manufacturing companies [4], however, it is clear from our findings and other two national studies that most of e-cigarette usage in Saudi Arabia is not performed with the aim of quitting conventional smoking as only less than one third of respondents reported that goal [12,13]. This could help when writing health and public policies related to e-cigarette. Although e-cigarette importing, selling, and adverting is not allowed in Saudi Arabia, no strict monitoring is applied, and internet advertisement is widely available.

## Conclusion

The picture of smoking e-cigarette among medical school is similar to that seen in other colleges, Saudi community, and to some extent to the Western World youth population. However, most e-cigarette usage is not related to the purpose of quitting; this finding is still debatable. Raising awareness of e-cigarette's harmful medical consequences should be emphasized through campaigns and by updating and enriching medical college's curriculum to involve these new trends of nicotine smoking in order for these future doctors to be good health advocates for their patients' health.

## Disclosure

Author has no conflict of interests, and the work was not supported or funded by any drug company.

## References

[1] Divya A. Vaping E-Cigarettes : Challenges. 2017;5(1).

[2] Farsalinos KE, Romagna G, Tsiapras D, Kyrzopoulos S, Voudris V. Characteristics, perceived side effects and benefits of electronic cigarette use: A worldwide survey of more than 19,000 consumers. Int J Environ Res Public Health. 2014;11(4):4356–73.

[3] Hajek P, Etter JF, Benowitz N, Eissenberg T, Mcrobbie H. Electronic cigarettes: Review of use, content, safety, effects on smokers and potential for harm and benefit. Addiction. 2014;109(11):1801–10.

[4] Conway BL. Advertising of e-cigarette products. 2017;(June):1–15.

[5] Hassounah S, Rawaf D, Khoja T, Rawaf S, Hussein MS, Qidwai W, et al. Tobacco control efforts in the gulf cooperation council countries: Achievements and challenges | Actions de lutte antitabac dans les pays du conseil de coopération du golfe: Défis et succès. East Mediterr Heal J. 2014;20(8).

[6] King BA, Patel R, Nguyen KH, Dube SR. Trends in awareness and use of electronic cigarettes among US adults, 2010-2013. Nicotine Tob Res. 2015;17(2):219–27.

[7] Schoenborn C, Gindi R. Electronic cigarette use among adults: United States, 2014. Natl Cent Heal Stat [Internet]. 2015;(217):1–7. Available from: http://www.cdc.gov/nchs/data/databriefs/db217.pdf

[8] Dockrell M, Morrison R, Bauld L, McNeill A. E-cigarettes: Prevalence and attitudes in great britain. Nicotine Tob Res. 2013;15(10):1737–44.

[9] Czoli CD, Hammond D, White CM. Electronic cigarettes in Canada: prevalence of use and perceptions among youth and young adults. Can J Public Health [Internet]. 2014;105(2):e97–102. Available from: http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed12&NEWS=N&AN=24886856

[10] Goniewicz ML, Gawron M, Nadolska J, Balwicki L, Sobczak A. Rise in electronic cigarette use among adolescents in Poland. J Adolesc Heal [Internet]. 2014;55(5):713–5. Available from: http://dx.doi.org/10.1016/j.jadohealth.2014.07.015

[11] Palipudi KM, Mbulo L, Morton J, Bunnell R, Blutcher-nelson G, Kosen S, et al. 2013 Global Adult Tobacco Surveys. 2016;18(4):501–7.

[12] Awan KH. Experimentation and correlates of electronic nicotine delivery system (electronic cigarettes) among university students – A cross sectional study. Saudi Dent J [Internet]. 2016;28(2):91–5. Available from: http://dx.doi.org/10.1016/j.sdentj.2015.12.002

[13] Albaik MZ, Abdrabulnabi AA, Aldahan SM, Alkhadhrawi NH. Electronic Cigarette in Saudi Arabia: An Online Survey. Int J Med Sci Clin Invent [Internet]. 2014;1(8):411–26. Available from: https://valleyinternational.net/ijmsci/v1-i8/4 ijmsci.pdf

[14] Karbouji MA, Abduldaem AM, Allogmani AM, Alharbi AS, Alnozha O, Al-Zalabani AH. Awareness and Attitude toward Smoking E-Cigarettes (Vape) among Smokers in Saudi Arabia 2017. Egypt J Hosp Med [Internet]. 2018;70(8):1346–51. Available from: 10.12816/0044646%0Ahttp://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=127874385&site=ehost-live

[15] IBM. IBM SPSS Statistics for Windows. Armonk, NY: IBM Corporation; 2011.

[16] Dawkins L, Turner J, Roberts A, Soar K. "Vaping" profiles and preferences: An online survey of electronic cigarette users. Addiction. 2013;108(6):1115–25.

[17] Etter JF, Bullen C. Electronic cigarette: Users profile, utilization, satisfaction and perceived efficacy. Addiction. 2011;106(11):2017–28.

## Original Article

# Competency In Electrocardiogram Interpretation Among Registered Nurses In Private And Government Hospitals In Nablus, Palestine

Jamal A.S. Qaddumi[1], Omar Almahmoud[2], Majed Alamri[3] , Jestoni D. Maniago[4]

[1]Assistant Professor. An-Najah National University, Faculty of medicine and health sciences
[2]Instructor - Pharmacy, Nursing and Health Professions College, Birzeit University, Birzeit, Palestine
[3]Associate Professor, Nursing Department, College of Applied Medical Sciences, Majmaah University, Majmaah, Saudi Arabia

[4] Assistant Professor, Nursing Department, College of Applied Medical Sciences, Majmaah University, Majmaah, Saudi Arabia

**Corresponding Author:**
Jamal A.S. Qaddumi
Assistant Professor, An-Najah National University, Faculty of Medicine and Health Sciences
PO box 7, Nablus, Palestine. E mail: Jamal9877@najah.edu

**Abstract**

**Background:** Competency in ECG interpretation is an important skill in nursing practice since it leads to the detection of cardiovascular disorders. Incorrect interpretation of ECG findings can result in adverse patient outcomes. There has been no study done to evaluate the competency in ECG interpretation among registered nurses in Nablus, Palestine. The study aimed to assess the basic skills in interpretation of ECG among registered nurses in private and government hospitals in Nablus, Palestine. The study also evaluated the ability of the registered nurses to recognize lethal and non-lethal ECGs arrhythmias.

**Method:** Cross-sectional design was used. ECG questionnaire contains two parts; the 1st part including demographic data, and the 2nd part including ECG parameters, common ECG's and lethal ECG. It was distributed to (154) registered nurses in Nablus private hospitals and (146) registered nurse in Nablus governmental hospitals.

**Result:** Registered nurses in government hospitals have much better ability than registered nurses in private hospitals to conclude the type of arrhythmia by the shape of the ECG figure, but their ability to interpret primary ECG parameters were lower than the ability of the registered nurses in private hospitals. In contrast, the registered nurses in private hospitals have a much better ability than registered nurses in interpreting the primary ECG parameters including heart rate and rhythm.

**Conclusion:** There is a gap between what had been practiced in private hospitals and in government hospitals regarding nurses' competency in ECG interpretation.

**Keywords:** competency; electrocardiogram (ECG); interpretation; registered nurses; Nablus

**الملخص**

**خلفية:** المهارة في تفسير تخطيط القلب الكهربائي مهارة هامة لممارسات التمريض كونها تؤدي الى اكتشاف حالات أمراض القلب. عدم صحة تفسير تخطيط القلب الكهربائي قد يؤدي الى نتائج كارثية على صحة المريض. لا توجد دراسة تتعلق بتقييم مهارات الممرضات المسجلات عن تخطيط القلب الكهربائي بالمستشفيات العامة والخاصة بمدينة نابلس بفلسطين. تهدف الدراسة الى تقييم المهارات الأساسية لتفسير تخطيط القلب الكهربائي للممرضين والممرضات المسجلات بالمستشفيات العامة والخاصة بمدينة نابلس بفلسطين.

**طريقة البحث:** تم استخدام الدراسة المقطعية. تم استخدام استبيان تخطيط القلب الكهربائي. يتكون الاستبيان من جزئين الأول عن معلومات ديموغرافية لعينة الدراسة بينما يحتوي الجزء الثاني على معلومات أساسية عن تخطيط القلب الكهربائي، التخطيط العام والتخطيط القاتل. تم توزيع الاستبيان على ١٥٤ ممرض وممرضة مسجل بمستشفيات القطاع الخاص و١٤٦ ممرض وممرضة مسجل بمستشفيات القطاع العام بمدينة نابلس.

**النتائج:** الممرضون بالمستشفيات العامة أفضل من نظرائهم بالمستشفيات الخاصة فيما يتعلق بمعرفة عدم انتظام ضربات القلب من شكل التخطيط الكهربائي للقلب، بينما تقل كفاءتهم عن نظرائهم بالمستشفيات الخاصة عن تفسير اساسيات تخطيط القلب الكهربائي. الممرضون المسجلون بالمستشفيات الخاصة أفضل من نظرائهم بالمستشفيات العامة فيما يتعلق بمقارنة تخطيط القلب الكهربائي الأساسي الذي يشمل سرعة ضربات القلب.

**الخلاصة:** هنالك فرق في الممارسة والمهارة المتعلقة بتخطيط القلب الكهربائي لدى المرضون والممرضات المسجلون بمستشفيات القطاع العام والخاص بمدينة نابلس بفلسطين.

## Introduction

Due to the technological advancement in medicine, the nursing profession demands gaining more knowledge and skills. One of the knowledge and skills that must be acquired among nurses in Critical Care Unit (CCU) and Intensive Care Unit (ICU) is electrocardiogram (ECG) interpretation competency [1]. Today's nursing profession in Palestine is expected to make independent decisions in everyday health care activities. The modern knowledge acquired by nurses gives them the ability to make those decisions, with the right attitude and experience that provide the needed skill, which together may be referred to as health care competency. Also accuracy in decision making about any health-related activity depends on elaborate health assessment, identifying specific health problems and analysis of the health parameters [2].

ECG is a valuable diagnostic tool for the healthcare provider whether they are a nurse, specialist or a doctor in cardiac disorders management. ECG is the most commonly used procedure for the diagnosis of heart disease [3]. Understanding the ECG enables the providers of the healthcare to treat and respond early and correctly to dangerous and potential deadly arrhythmias as efficiently and quickly as possible [4]. ECG interpretation is specifically essential for nurses as they are the first and the continuing one who monitors and cares patients that need an accurate and rapid acting decision making according to their assessment result. By considering

that the leading cause of death worldwide is the cardiovascular disease; it's considered as nearly one third of global deaths [5]. Abnormalities of the ECG might be one of the first indications of ischemia, life-threatening arrhythmia, or metabolic disturbance. And because of that it is very essential for the nurses (specifically CCU and ICU nurses) to be able to analyze ECG reading early and accurately, in order to assist in therapeutic process and to make independent but integrated decisions in the health care [6-7]. While the ECG is such an important health parameters and it's a powerful tool, prior studies have shown that inappropriate clinical decisions occur due to faulty interpretations. More often among nurses which alarm the need for more education and training in this area [8]. Also, there is not much known studies addressed the role of nursing in ECG interpretation and their competency especially in Palestine which raised the need for this study. The significance of this study is to measure the competency of registered nurses (RNs) in the interpretation of ECG because it is important to make rapid decision when faced in emergency situations and to prevent the sequential complication of the cardiac disorder detected with the client and to assess their ability to interpret lethal or non-lethal ECG's and the primary ECG parameters [4,9].

The study aimed to assess the knowledge and basic skills in the interpretation of ECG among registered nurses in private and government hospitals in Nablus, Palestine.

## Method

### Design

The study design is a cross-sectional.

### Study setting

This study is conducted in CCU and ICU in governmental hospitals (Rafediah hospital and Alwatani hospital) and private hospitals (Arab specialized hospital and Nablus specialized hospital).

### Population and sample of the study

The population of this study included all RNs. The study sample consisted of (154) RNs in Nablus private hospitals and 146 RNs in Nablus government hospitals.

### Data collecting tool of the Study

The questionnaire used for this study was developed by study authors based on literature. The questionnaire aimed to investigate the ECG interpretation knowledge and skills of RNs in private and government hospitals. The participants were observed individually to ensure single response by the same person. Before starting the questionnaire, participants were informed about the topic and the purpose of the study. They were also instructed how to complete the questionnaire.

The questionnaire has two parts: First part pertains to personal information (gender, age, year of study, year of graduation, name of the hospital where the participant is affiliated, and the duration he worked in each ward and the percentage of ECG and monitor usage daily). Second part contains (15) ECG rhythms (non-lethal and lethal ECG's figures) as categorized by (Keller and Raines, 2005). Each ECG record followed by 3 questions regards the heart rate, the rhythm and the conclusion of each. The ECG's figures used in this questionnaire are (atrial fibrillation, ST-depression, ventricular fibrillation, 1st degree AV heart block, supra ventricular tachycardia, sinus tachycardia, asystole, premature ventricular tachycardia, ST elevation, atrial flutter, ventricular tachycardia, normal rhythm, sinus bradycardia and 3rd degree AV heart block). Each question concerning the interpretation of a single ECG strip had a response time limit of (90) seconds.

### Data collection

Ethical approval was secured from An-Najah National university and Nablus Ministry of Health. Then, after explaining the study, every participant was assigned a consent form. Each participant was assigned with the questionnaire and observed individually to avoid any contamination in the answers of each participant.

### Data analysis

The data was analyzed using statistical package for social science (SPSS) mainly descriptive statistics methods such as percentage distribution. T-test to differentiate between two groups such as gender, and ANOVA for three groups and correlative coefficient for association were used as appropriate.

## Validity and reliability

The initial questionnaire was reviewed by three experts from An-Najah national university who recommended the change of three ECG strips with much clearer figures. And decrease the number of ECG strips to decrease the time required to complete the questionnaire. Piloting 10% of the sample led to selection of 15 RNs in private hospitals and 15 RNs in government hospitals whom were asked to answer the questionnaire and give feedback about relativity, consistency and sequence of questions. This piloting took no more than 10 minutes for each student and registered nurse, and all of them gave positive feedback, and recommended to view the results of the concerned parties in college and society. Internal reliability is measured by calculating Cronbach's alpha which was good and acceptable (0.886).

## Ethical consideration

Ethical approval was gained formally by Institutional Review Board (IRB) of An-Najah National University. Arabic consent form was read to each participant orally before starting exam, and the consent form emphasized that the data will be collected in anonymous, used for research goals only, and participants can withdraw from study at any time. The filled questionnaire didn't have any name (numbers will be used instead of names) and was kept in sealed bags. All data and information which was gathered was treated in confidentiality and wasn't accessed by any other without permission from the participants.

## Results

The result of the statistical analysis for the data collected by the study questionnaire, for a sample consist of (154) RNs in Nablus private hospitals and (146) RNs in Nablus government hospitals.

**Table 1.** Demographic data of the participants and ECG perform, perceived understanding and priority (N=300)

| Variables | Category | RN-Private (154) | | RN-Government (146) | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Frequency | Percent |
| Gender | Female | 61 | 39.6 | 47 | 32.2 |
| | Male | 93 | 60.4 | 99 | 67.8 |
| Age (years) | Mean (SD) | 21.4 (0.91) | | 24.17 (1.32) | |
| Do ECG per shift | 1-2 | 149 | 96.8 | 20 | 13.6 |
| | 3-4 | 3 | 1.9 | 63 | 43.2 |
| | 5-6 | 2 | 1.3 | 63 | 43.2 |
| Perceived ECG Understand | Nothing | 34 | 22.1 | 30 | 20.5 |
| | Little | 120 | 77.9 | 116 | 79.5 |
| Perceived ECG Priority | Yes | 101 | 65.6 | 93 | 63.7 |
| | No | 53 | 34.4 | 53 | 36.3 |

The mean age of the RNs in private hospitals is 22 years old and the percentage of male participants was 60.4% and the percentage of female participant was 39.6%. The mean age of RNs in government hospitals was 24 years and the percentage of male participants was 67.8%, and the percentage of female participant was 32.2%. The percentages of participating RNs by hospital were 27.4% (An-Najah), 23.3% (Rafedia), 8.2% (Arabi), 22.6% (Nablus) and 18.5% (Al-Watani). Furthermore, 96.8% of RNs in private hospitals are doing ECG's in their clinical practice,

approximately, one to two time per shift, 77.9% of them thought that they understand the ECG's and 65.6% of them consider the ECG interpretation as a priority for the nursing profession. On the other hand, 86.4% of the participating RNs in government hospitals are doing ECG's in their shift, approximately, 3-6 times per shift and 79.5% of them considered themselves as having little understanding of the ECG's interpretation. Only 63% of the participating RNs in government hospitals consider the ECG interpretation as a priority for the nursing profession.

**Table 2.** Lethal ECG interpretation competency of RN-Private and RN-Government (N=300)

| Variable | RN-Private | | | RN-Government | | |
|---|---|---|---|---|---|---|
| | HR | Rhythm | Conclusion | HR | Rhythm | Conclusion |
| | Correct n (%) | Correct n (%) | Correct n (%) | Correct n (%) | Correct n (%) | Correct n (%) |
| A. Fib | 121(78.6) | 145(94.2) | 85 (55.2) | 98(67.1) | 128(87.7) | 97(66.4) |
| V. Fib | 62(40.3) | 141(91.6) | 78 (50.6) | 72(49.3) | 112(76.7) | 86(58.9) |
| Asystole | 148(96.1) | 143(92.9) | 148(96.1) | 138(94.5) | 133(91.1) | 139(95.2) |
| V.Tachy | 115(74.7) | 120(77.9) | 100(64.9) | 99(67.8) | 87(59.6) | 116(79.5) |
| 3º AVB | 133(86.4) | 137(89.0) | 66(42.8) | 121(82.9) | 110(75.3) | 66(45.2) |
| SVT(1) | 134(87) | 137(89) | 106(68.8) | 115(78.8) | 115(78.8) | 109 (74.7) |
| SVT(2) | 129(83.8) | 135(87.7) | 93(60.4) | 118(80.8) | 107(73.3) | 94(64.4) |

HR: heart rate; AV: atrioventricular; SVT: supra ventricular tachycardia;
3º AVB: 3rd Degree AV Heart Block

The highest percentage of RNs in private hospitals were able to correctly identify the heart rate of asystole, SVT and 3rd degree heart block (96.1%, 87%, & 86.4%, respectively) , and the rhythm, if regular or not, of atrial fibrillation, asystole, & ventricular fibrillation(94.2%, 92.9%, & 91.6%, respectively), and the conclusion for type of arrhythmia of asystole (96.1%). On the other hand, the lowest percentage of RNs in private hospitals were able to correctly identify the heart rate of ventricular fibrillation, ventricular tachy-

cardia, and atrial fibrillation (40.3%, 74.7%, &78.6%, respectively), and the rhythm, if regular or not, of ventricular tachycardia (77.9%), and the conclusion for type of arrhythmia of 3rd degree heart block, ventricular fibrillation and atrial fibrillation (42.8%, 50.6%, 55.2%, 96.1%, respectively).

The highest percentage of RNs were able to correctly identify the heart rate of asystole, 3rd degree heart block and SVT (94.5%, 82.9%, & 80.8%, respectively), and the

rhythm, if regular or not, of asystole, atrial fibrillation and SVT (91.1%, 87.7%, & 78.8%, respectively), and the conclusion for type of arrhythmia of asystole (95.2%). On the other hand, the lowest percentage of RNs were able to correctly identify the heart rate of ventricu-

lar fibrillation and atrial fibrillation (49.3%, 67.1%), and the rhythm, if regular or not, of ventricular tachycardia (59.6%), and the conclusion for type of arrhythmia of 3rd degree heart block and ventricular fibrillation (45.2% & 58.9%).

**Table 3.** Non-lethal ECG interpretation competency of RN-Private and RN-Government (N=300)

| Variable | RN-Private | | | RN-Government | | |
|---|---|---|---|---|---|---|
| | HR | Rhythm | Conclusion | HR | Rhythm | Conclusion |
| | Correct n (%) | Correct n (%) | Correct n (%) | Correct n (%) | Correct n (%) | Correct n (%) |
| 1° AVB | 128(83.1) | 139 (90.3) | 106 (68.8) | 116 (79.5) | 115 (78.8) | 50 (34.2) |
| S.Tachy | 133 (86.4) | 115 (74.7) | 140 (90.9) | 118 (80.8) | 117 (80.1) | 110 (75.3) |
| PVC | 105 (68.2) | 103 (66.9) | 89 (57.8) | 88 (60.3) | 91 (62.3) | 92 (63.0) |
| A. Flutter | 128 (83.1) | 136 (88.3) | 117 (76.0) | 109 (74.7) | 103 (70.5) | 116 (79.5) |
| NSR | 132 (85.7) | 143 (92.9) | 89 (57.8) | 122 (83.6) | 122 (83.6) | 110 (75.3) |
| S. Brady | 143 (92.9) | 147 (95.5) | 131 (85.1) | 129 (88.4) | 118 (80.8) | 127 (87) |

A. Flutter: Atrial Flutter; NSR: Normal Sinus Rhythm; S. Brady: Sinus Bradycardia;
HR: heart rate; AV: atrioventricular; PVC: premature ventricular contraction.

The highest percentage of RNs in private hospitals were able to correctly identify the heart rate of sinus bradycardia (92.9%), and the rhythm, if regular or not, of sinus bradycardia (95.5%), and the conclusion for type of arrhythmia of sinus tachycardia (90.9%). On the other hand, the lowest percentage of RNs in private hospitals were able to correctly identify the heart rate of PVC (68.2%), and the rhythm, if regular or not, of PVC (66.9%), and the conclusion for type of arrhythmia of normal sinus rhythm (57.8%).

The highest percentages of RNs in government hospitals were able to correctly identify the heart rate of sinus bradycardia (88.4%), and the rhythm, if regular or not, of normal sinus rhythm (83.6%), and the conclusion for type of arrhythmia of sinus bradycardia

(87%). On the other hand, the lowest percentage of RNs in government hospitals were able to correctly identify the heart rate of PVC (62.3%), and the rhythm, if regular or not, of PVC (62.3%), and the conclusion for type of arrhythmia of 1st degree heart block (34.2%). RNs in private hospitals who said to have little understanding ECG interpretation and consider it as priority for nursing profession, are more competent to analyze the rhythm (r = .197, p= 0.014, r = .20 p= 0.012, respectively) and to correctly conclude arrhythmia type (r = .25, p= .002, r = .19, p= 0.017, respectively). On the other hand, RNs in government hospitals who use ECG and considered it as priority are more competent to conclude appropriately the arrhythmia (r= .22, p= .008, r = .21, p= .01, respectively).

**Table 4.** Comparison between RN-Private and RN-Government on ECG interpretation; HR, Rhythm, and Conclusion (N=300)

| Variable | | N | Mean | SD | t test | P value |
|---|---|---|---|---|---|---|
| **HR** | RN-Private | 154 | 11.8 | 2.7 | 1.7 | .084 |
| | RN-Government | 146 | 11.2 | 3.4 | | |
| **Rhythm** | RN-Private | 154 | 13.1 | 2.4 | 4.08 | .001 |
| | RN-Government | 146 | 11.5 | 4.2 | | |
| **Conclusion** | RN-Private | 154 | 9.3 | 3.4 | -2.3 | .019 |
| | RN-Government | 146 | 10.2 | 3.00 | | |

In contrast, there is a significant statistical difference between private hospital RNs and government hospital RNs' interpretation of rhythm (P= .001) and conclusion (P= .019) of ECG. RNs in private hospitals have higher mean in rhythm (mean=13.1) and lower mean in conclusion (mean= 9.3) comparing with government hospital RNs (mean=11.5 and 10.2, respectively).

## Discussion

This study shows that RNs in private hospitals have a much better ability than RNs in government hospitals in interpreting the primary ECG parameters including heart rate and rhythm; however, their ability to conclude the type of arrhythmia is lower than the ability of the RNs in government hospitals. Also, a study conducted by Goodridge [8] findings suggested that ICU nurses may need more education and training in ECG interpretation which we agree as proven by the result of this study.

In comparing with present study, Jablonover et al. [10] who assessed the competency in ECG interpretation among medical students, students in their clinical years have a good level of competency in interpreting the primary ECG parameters such as heart rate, the origin of heart rhythm, and electrical axis of the heart. However, their ability to recognize ECG signs of life threatening disorders and common heart abnormalities is low.

The above results could be explained as RNs in private hospitals adhere to the basic steps in the interpretation of the ECG's, which mean that they use heart rate and rhythm to conclude the type of arrhythmia. In contrast, the RNs in private hospitals is not exposed to ECG's or monitors as much as RNs in government hospitals. Furthermore, RNs in private hospitals are familiar with the parameters of the ECG's since it's required from them to utilize those parameters but the interpretation skills were regulated because most of the time, medical specialists perform this skill in private hospitals. Therefore, their experience in ECG interpretation conclusion is limited while RNs in government hospitals are much more experienced with the conclusion because they are familiar with ECG's figures and by time they will forget using the basic steps in the ECG's interpretation.

Another reason for dissipated the basic pa-

rameters interpretation of the ECG is lack of time and work overload which may away them from analyses each ECG [11].

This result of the study also shows that the RNs in private hospitals who thought themselves understand ECG and considered it as priority for nursing profession were more able to correctly analyze the rhythm and to give correct conclusion than those who did not thought themselves understand ECG and considered it as priority for nursing profession. On the other hand, RNs in government hospitals who did ECG frequently and considered it as priority are more able to appropriately conclude the type of arrhythmia, and this reflects the conclusion of Richardson [12] that "attitudes and beliefs are a subset of a group of constructs that name, define, and describe the structure and content of mental states that are thought to drive a person's actions". Furthermore, this result could be explained by that RNs who stated that they understand ECG and considered it as priority for the nursing profession try to improve their efforts on self-improvement in the area of the ECG interpretation, and by their considering the ECG interpretation as a priority, reflect their feeling of importance of the ECG as a part of their role as nurses and their willingness to get more experienced in ECG interpretation.

The study results also suggested that male RNs in private hospitals have higher mean correct answers in rate, rhythm and conclusion compared with female RNs which was similar to the conclusion that "highly competent males were rated more positively than highly competent females and males of low competence lower than similar females" [13]. On the other hand, performance by a male on a masculine task was more attributed to skill, whereas an equivalent performance by a female on the same task was seen to be more influenced by luck [13]. Contrary to prediction, the reverse did not hold true for performance on a feminine task. Overall, males were seen to be more skillful than females. That can be also explained by the fact that females in their nature prefer the tasks of caring and emotionally-related tasks, in contrast, male by their nature prefers the challenging tasks and the kind of complex and analytic tasks such as ECG interpretation.

We also found a study conducted by Varvaroussis [4] concluded that although a few primary care practitioners could diagnose the presence or absence of atrial fibrillation accurately on an electrocardiogram, but most could not, in similarities with Varvaroussis [4] statement, our result of the study suggest that the RNs have the ability to conclude the type of arrhythmia although it's not concluded from the heart rate or arrhythmia, but eventually its effective in fast detection and management of that arrhythmia and improve the patients outcome.

The joint commission required a validation of staff competency and specifies that hospitals must define and assess the competence of staff initially as part of orientation and as frequent-

ly as required by policy but no less than once every 3 years [14]. The minimum competency standard for this particular skill has not been defined in the literature. Previous attempts to substantiate competence in cardiac rhythm interpretation at the study site included short, matching style tests with computer-generated textbook rhythm strips as part of the practice of assessing competence annually. These tests failed to comprehensively evaluate the content area, and test security measures were inadequate. Nursing administrators and staff should work together to define minimum competency standards for nurses according to the patient population served. Acceptable validation methods, according to The Joint Commission, include testing, return demonstration, or use of simulation.

Based on the previous statement, there is no standard criterion to determine the competency but from the result of each party, we concluded the percentage of lack in knowledge and the percentage of the present knowledge in private and government hospital RNs in the area of ECG's interpretation.

n conclusion, Government hospital RNs demonstrated a much better ability than private hospital RNs to conclude the type of arrhythmia from the shape of the ECG figure although their ability to interpret primary ECG basic parameters were lower than the ability of the RNs in private hospitals, in contrast the RNs in private hospitals have a much better ability than RNs in government hospitals in interpreting the primary ECG basic param-

eters including heart rate and rhythm; however their ability to conclude the type of arrhythmia is lower than the ability of the RNs. Also, RNs in private hospitals who thought to understand ECG and consider it as priority for the nursing profession are more able to correctly analyze the rhythm and to give conclusion than the RNs in private hospitals who did not said to understand ECG or consider it as priority for the nursing profession. On the other hand, RNs in government hospitals who use ECG and considered it as priority are abler to conclude appropriately the type of arrhythmia.

Majority of the RNs in government hospitals use the ECG in their clinical practice and most of them understand it and consider it as a priority for the nursing profession, while there was a low usage of ECGs by the government hospital RNs in their working shift, and most of them demonstrated a little  amount of understanding for ECG interpretation  but there still remarkable percent of government hospital RNs that have lower amount of knowledge about ECG interpretation but the majority of them don't consider the ECG interpretation as a priority for the nursing profession.

There is a gap between what had been taught in nursing school and what actual at clinical setting regarding ECG interpretation. RNs lose their ability in utilizing basic parameters of ECG interpretation. The ministry of health should provide RNs a contentious teaching and training about the ECG interpretation. The curriculum of nursing must contain much

more material and using new evidence based educational methods related to the ECG interpretation with more exposure of RNs on intensive cases of ECG interpretation when teaching nursing students so basic steps in the ECG interpretation must be taught to the students in ways that can be retained and utilized after graduation.

The study recommends that, Ministry of Health is advised to provid the RNs contentious teaching and training about the ECG interpretation. The curriculum of nursing must contain much more material related to the ECG interpretation with more exposure of nursing students on intensive cases of ECG interpretation. New evidence based educational methods should be applied when teaching nursing students so basic steps in the ECG interpretation must be taught to the students in ways that can be retained and utilized after graduation.

**conflicts of interest**

The authors declare that they have no conflicts of interest.

**References**

[1] Bonuel N, Cesario S, Cabading AD. The need for critical care nursing skills in an acuity-adaptable care delivery system. Critical care nursing quarterly. 2010 Oct 1;33(4):356-60. Available from doi: 10.1097/CNQ.0b013e3181f649ef

[2] Drew BJ, Califf RM, Funk M, Kaufman ES, Krucoff MW, Laks MM, Macfarlane PW, Sommargren C, Swiryn S, Van Hare GF. Practice standards for electrocardiographic monitoring in hospital settings: an American Heart Association scientific statement from the Councils on Cardiovascular Nursing, Clinical Cardiology, and Cardiovascular Disease in the Young: endorsed by the International Society of Computerized Electrocardiology and the American Association of Critical-Care Nurses. Circulation. 2004 Oct 26;110(17):2721-46. Available from: https://doi.org/10.1161/01.CIR.0000145144.56673.59

[3] Swedberg K, Cleland J, Dargie H, Drexler H, Follath F, Komajda M, Tavazzi L, Smiseth OA, Gavazzi A, Haverich A, Hoes A. Guidelines for the diagnosis and treatment of chronic heart failure: executive summary (update 2005) The Task Force for the Diagnosis and Treatment of Chronic Heart Failure of the European Society of Cardiology. European heart journal. 2005 May 18;26(11):1115-40. Available from: https://doi.org/10.1093/eurheartj/ehi204

[4] Varvaroussis DP, Kalafati M, Pliatsika P, Castrén M, Lott C, Xanthos T. Comparison of two teaching methods for cardiac arrhythmia interpretation among nursing students. Resuscitation. 2014 Feb 1;85(2):260-5. Available from: https://doi.org/10.1016/j.resuscitation.2013.09.023

[5] MEMBERS WG, Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Blaha MJ, Dai S, Ford ES, Fox CS, Franco S. Heart disease and stroke statistics—2014 update: A report from the American Heart Association. Circulation. 2014 Jan 21;129(3):e28. Available from: https://doi.org/10.1161/01.cir.0000441139.02102.80

[6] Mant J, Fitzmaurice DA, Hobbs FR, Jowett S, Murray ET, Holder R, Davies M, Lip GY. Accuracy of diagnosing atrial fibrillation on electrocardiogram by primary care practitioners and interpretative diagnostic software: analysis of data from screening for atrial fibrillation in the elderly (SAFE) trial. Bmj. 2007 Aug 23;335(7616):380. Available from: https://doi.org/10.1136/bmj.39227.551713.AE

[7] Thomas TL. Who's watching the cardiac monitor? Does it matter?. Nursing2018. 2011 Apr 1;41:8-10. Available from doi: 10.1097/01.NURSE.0000394519.21592.53

[8] Goodridge E, Furst C, Herrick J, Song J, Tipton PH. Accuracy of Cardiac Rhythm Interpretation by Medical–Surgical Nurses: A Pilot Study. Journal for nurses in professional development. 2013 Jan 1;29(1):35-40. Available from doi: 10.1097/NND.0b013e31827d0c4f

[9] Kopeć G, Magoń W, Hołda M, Podolec P. Competency in ECG interpretation among medical students. Medical science monitor: international medical journal of experimental and clinical research. 2015;21:3386. Available from doi: 10.12659/MSM.895129

[10] Jablonover RS, Lundberg E, Zhang Y, Stagnaro-Green A. Competency in electrocardiogram interpretation among graduating medical students. Teaching and learning in medicine. 2014 Jul 3;26(3):279-84. Available from: https://doi.org/10.1080/10401334.2014.918882

[11] Qaddumi J, Khawaldeh A. Pressure ulcer prevention knowledge among Jordanian nurses: a cross-sectional study. BMC nursing. 2014 Dec;13(1):6. Available from: https://doi.org/10.1186/1472-6955-13-6

[12] Richardson V. The role of attitudes and beliefs in learning to teach. Handbook of research on teacher education. 1996;2:102-19. Available from: https://www.researchgate.net/profile/Virginia_Richardson2/publication/239666513_The_role_of_attitudes_and_beliefs_in_learning_to_teach/links/572cdb6f08aeb1c73d11b2e2.pdf

[13] Deaux K, Emswiller T. Explanations of successful performance on sex-linked tasks: What is skill for the male is luck for the female. Journal of personality and social psychology. 1974 Jan;29(1):80. Available from: https://psycnet.apa.org/doi/10.1037/h0035733

[14] International, J. C., & Organizations, J. C. O. A. O. H. Joint Commission International accreditation standards for hospitals: Joint Commission Resources. 2007. Available from: https://www.jointcommissioninternational.org/jci-accreditation-standards-for-hospitals-6th-edition/

**Case Report:**

# A Rare Case Of Mucoepidermoid Carcinoma Presenting As A Rare Longstanding Mucocele

Joseph Johny[1], Anjanya Joy[2], Sunil PM[3], Prem Sasikumar[4]

[1]Assistant Professor, Oral Medicine and Radiology,
Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala
[2]Intern. Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala
[3]Professor and Head, Oral and Maxillofacial Pathology,
Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala
[4]Assistant Professor Oral and Maxillofacial Surgery, Mahe Institute of Dental Sciences

Corresponding Author:

Joseph Johny, Assistant Professor, Oral Medicine and Radiology, Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala. Tel: 9497494634, Email: joseph_kjr@rediffmail.com

**Abstract**

Mucoepidermoid carcinoma is the most common malignant neoplasm found among major and minor salivary glands. Intraorally it shows more predilection for palate. Also other common sites include buccal mucosa, tongue and retromolar area. Tumour of low-grade malignancy appear as slow growing, painless mass that seldom exceeds 5 cm in diameter. Here we report a rare case of mucoepidermoid carcinoma which was initially diagnosed as mucocele. The lesion was asymptomatic for 13 years and was then histopatho-logically confirmed to be a low grade mucoepidermoid carcinoma during a routine dental check-up.

**Keywords**:-Mucoepidermoid carcinoma, Mucocele, Buccal mucosa, Low grade, Tumour

**الملخص**

سرطان الغشاء المخاطي هو الورم الخبيث الأكثر شيوعًا بين الغدد اللعابية الكبرى والثانوية. داخليا فإنه يظهر المزيد من الميل للحنك كما تشمل المواقع الأخرى الشائعة الغشاء المخاطي الشوكي واللسان ومنطقة الشبكية. يظهر هذا السرطان كورم خبيث منخفض الدرجة وبطيء النمو وغير مؤلم لا يتجاوز قطره ٥ سم. هذه حالة نادرة من سرطان الغشاء المخاطي الذي تم تشخيصه في البداية على أنه تورم بالغشاء المخاطي. كانت هذه الحالة بدون أعراض لمدة ١٣ عامًا، ثم تم تأكيدها من الناحية المرضية على أنها سرطان غشاء مخاطي منخفض الدرجة أثناء فحص الأسنان الروتيني.

## Introduction

Mucoepidermoid carcinoma which is a malignant epithelial tumour was first studied by Stewart, Foote and Becker in the year 1945. As the name suggests, the tumour consists of both mucus secreting cells and epidermoid type cells in different proportions. Mucus cells are seen in clusters or they can occur singly. Mucus cells have a pale, at the same time a foamy cytoplasm. They have a distinct cell boundary and also a small peripherally placed compressed nuclei. Epidermoid cells with their eosinophilic cytoplasm may not be common but can sometimes show keratin

pearl formation. Often another group of cells which doesn't belong to mucous or epidermoid type can also be seen. They are intermediate cells which either small basal cells with scanty basophilic cytoplasm or oval cells with more abundant pale eosinophilic cytoplasm. Columnar and clear cells are also present

Parotid gland is usually most commonly affected [1]. This carcinoma of salivary gland accounts for about 5% of all salivary gland tumours. It occurs in individuals from second to seventh decade. While it is rarely seen in the first decade of life [2]. In children, mucoepidermoid carcinoma is the most common malignant salivary gland neoplasm. Usually, they are of three grades; low, medium and high. Low grade tumours have a limited potential to metastasize to regional lymph nodes. Due to their tendency to develop cystic areas, mucoepidermoid carcinoma shows close resemblance to mucocele, especially those of the retromolar region. We report a rare case of mucoepidermoid carcinoma which was asymptomatic for about 13 years and was initially thought to be a mucocele.

## Case report

A 58-year-old male patient reported to the Department of Oral Medicine and Radiology, Sree Anjaneya Institute of Dental Sciences, Calicut for routine dental check-up. A swelling was noticed on the right buccal mucosa since 13 years. It was initially small in size and gradually increased to its current size with periods of remission and exacerbations. Swelling was completely asymptomatic

during these years. The past medical history and dental history were not significant for our case.

On intraoral examination, a solitary, sessile, round, swelling was seen on the right buccal mucosa adjacent to lower vestibule in relation to 45 and 46 which measures about 1.5cm in diameter (Figure 1) with well-defined margins and normal colour of the mucosa. On palpation all the inspectory findings were confirmed. The swelling was non tender, soft, fluctuant with a brownish discharge. Adjacent teeth showed no mobility or displacement. Involved teeth responded to electric pulp testing. Panoramic radiograph showed no bone involvement. Based on the history and clinical findings we came to a provisional diagnosis of mucocele. Excisional biopsy was done, and the specimen was sent for the histopathological evaluation of the lesion.



Figure (1) solitary, well defined, round swelling in the right buccal mucosa adjacent to the vestibule in relation to 45 and 46

Histopathology revealed the presence all the three cellular types in the connective tissue (Figure 2). Mucous cells had an abundant, pale and a foamy cytoplasm. Epidermoid cells demonstrated a polygonal shape and they had intercellular bridges. Few of them showed keratinization. Basaloid cells referred to as intermediate cells were also present. Epidermoid cells together with intermediate and mucous cells were lining the cystic spaces. Overlying normal epithelium showed cystic spaces. Clusters of clear cells were also present. Clear cells and intermediate cells were sheet pattern.
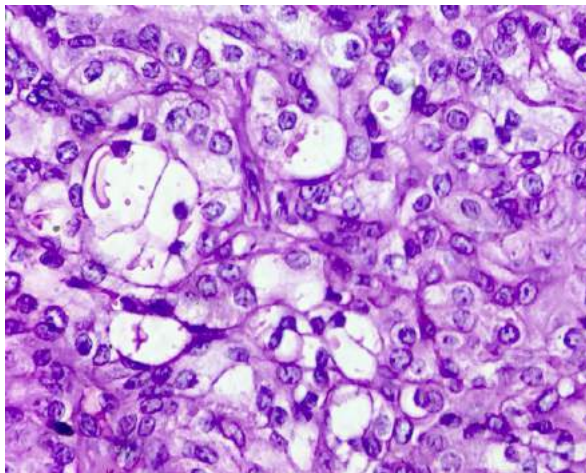


Figure (2) Microscopic view 10X - Connective tissue showing predominantly mucus cells with abundant, pale, foamy cytoplasm. Cystic areas can also be seen

## Discussion

Among the salivary gland neoplasms, 10-15% originates from minor salivary glands [3]. Usually patients complains of a longstanding (more than 12 months generally) painless swelling in the mouth. Intraoral mucoepidermoid carcinoma affecting the minor salivary gland can even occur in the ectopic salivary gland tissues. Palate, cheek, mandible, lip and tongue are the common sites whereas frequency of mucoepidermoid carcinoma is less in retromolar area, oropharynx, and ectopic salivary gland.

This is the first case of mucoepidermoid carcinoma reported in the literature with a longstanding history of 13 years. Mucoepidermoid carcinoma can be completely asymptomatic during the course of progression. It may present itself as a bluish, red – purple, fluctuant, smooth surfaced mass closely resembling a mucocele. The present case is similar to this. The middle aged male patient showed a prolonged, at the same time slow progression of the tumour. Localised fluctuant swelling was present for nearly 13 years which at times showed episodes of regression and then reappearance. The patient reported no symptoms associated with the lesion. Major salivary gland involvement can result in pain, paraesthesia, and other difficulties with the lesion. When low grade tumours are soft and also compressible, high grade tumours show ulceration, bone resorption and adjacent tooth numbness. All these clinical features are not there in our case. Features of high grade tumours are absent in our case. Hence it was necessary to rule out the possibilities for a low grade tumour also. Unfortunately, histopathological reports were however favouring the chances of a low grade mucoepidermoid carcinoma rather than a mucocele.

Pluripotent reserve cells of excretory ducts can differentiate into squamous, mucous, or columnar cells and can give rise to mucoepidermoid carcinoma [4,5]. Following the histopathological studies, based on the proportion of all the three cell types and by the extent of atypia presented by cells, MEC can be categorized into three grades. Low grade, intermediate grade and high-grade tumours. As the name suggests low grade tumours present minimal cellular atypia at the same time high grade tumours have considerable amount of cellular atypia. Mucous cells predominate in low grade tumour whereas high grade tumours show islands or sheets of intermediate and epidermoid cells. Intermediate grade tumour shows more of intermediate cells and degree of cellular atypia is more than low grade but less than a high grade tumour.

Wide local excision ensures oncologic safety in case of low grade and intermediate grade tumours [6,7,8]. Treatment plan is made depending upon the location of tumour, aggressiveness of the tumour mass. Treatment shall however result in tumour free margins. If tumour has progressed to that extent where bone is involved, the affected bone should also be removed. As low grade tumour shows less recurrence, we planned surgical excision of tumour mass in our case. High grade mucoepidermoid carcinoma require more invasive surgical treatment or even chemotherapy or radiotherapy following that. Low grade and intermediate grade mucoepidermoid carcinoma show very low recurrence rate that is less than 10%. At the same time the survival rate is about 90%. Radical neck dissection is indicated in case of metastasis. Low and intermediate grade tumours rarely show metastasis. Grade of the tumour determines the prognosis [7,8]. We followed up our patient for one year. There were no signs of recurrence or any other complaints.

**Conclusion**

One should be kept in mind that mucoepidermoid carcinoma should be considered as a differential diagnosis for longstanding cases of mucocele. This is the first case of mucoepidermoid carcinoma in the literature reported with a longstanding history of 13 years. Proper clinical and histopathological evaluation is mandatory for the proper diagnosis and treatment planning.

## References

[1] Ritwik P, Cordell KG, Brannon RB. Minor salivary gland mucoepidermoid carcinoma in children and adolescents: a case series and review of the literature. J Med Case Rep 2012;6:182

[2] Spiro RH. Management of malignant tumours of the salivary glands. Oncology 1998; 12:671-80.

[3] Vander Poorten VL, Balm AJ, Hilgers FJ, Tan IB, Keus RB, Hart AA. Stage as major long-term outcome predictor in minor salivary gland carcinoma. Cancer 2000; 89:1195-204.

[4] Lee WH, Yoon JH. Mucoepidermoid carcinoma of the hard palate: a rare cause of hypervasculartumor. Yonsei Med J 2003; 44:723-6.

[5] Da Cruz Perez DE, Pires FR, Lopes MA, et al. Adenoid cystic carcinoma and mucoepidermoid carcinoma of the maxillary sinus: report of a 44-year experience of 25 cases from a single institution. J Oral Maxillofac Surg2006; 64:1592-7.

[6] Munhoz Ede A, Cardoso CL, Tjioe KC, et al. Atypical clinical manifestation of mucoepidermoid carcinoma in the palate. Gen Dent 2009;57: e51-3.

[7] .Moraes P, Pereira C, Almeida O, et al. Paediatric intraoral mucoepidermoid carcinoma mimicking a bone lesion. Int J Paediatr Dent 2007; 17:151-4.

[8] April MM, Brodsky LS, Cunningham MJ, et al. Mucoepidermoid carcinoma in a 10-year-old girl. Head Neck 1997; 19:431-5.

# 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*
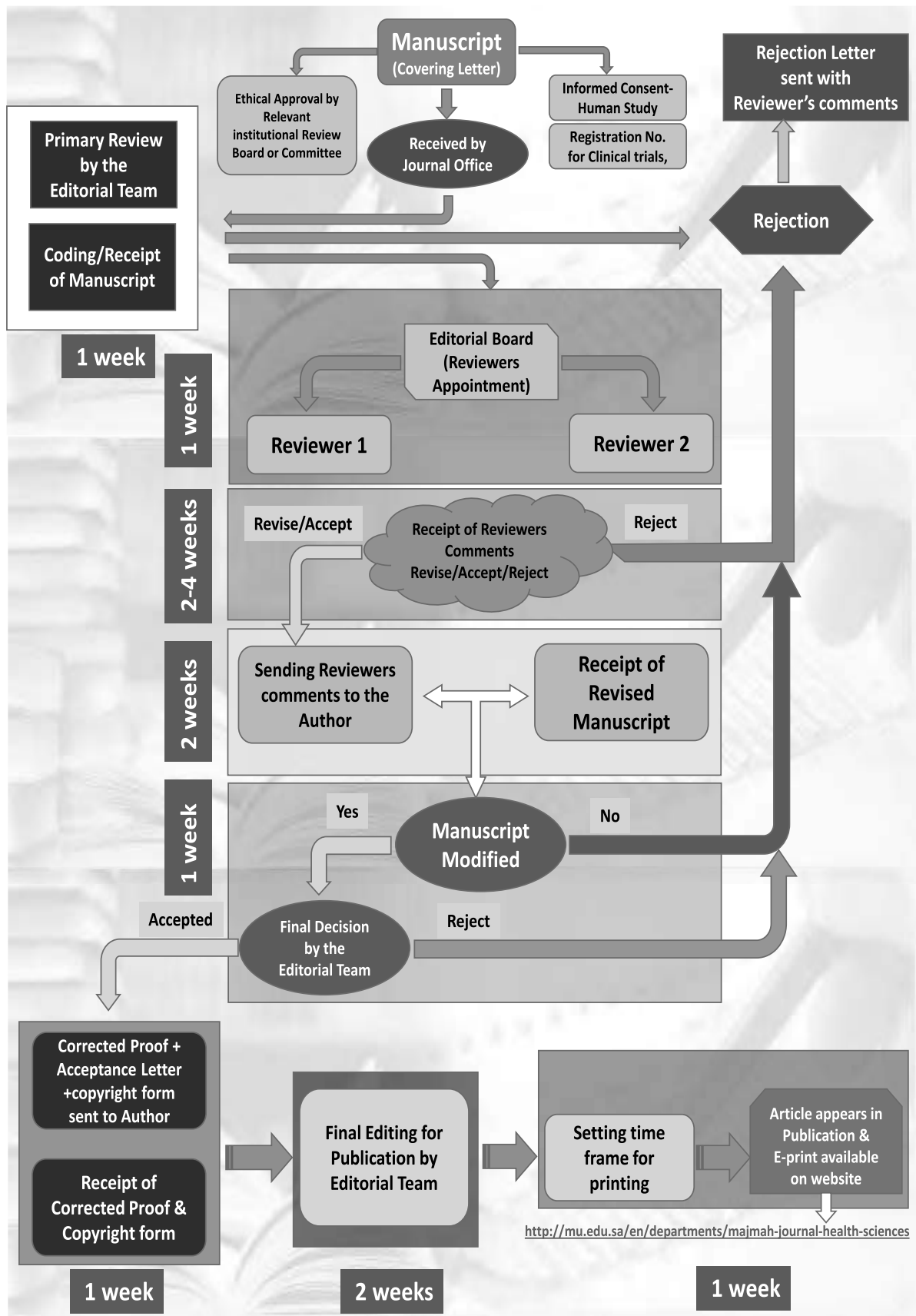
The manuscripts should include a complete and detailed description of what was done. This includes a description of the design, measurement and collection of data, the study objective and major hypotheses, type and source of subjects, inclusion and exclusion criteria and measures of outcome, number of 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,

**Rejection Letter sent with Reviewer's comments**

**Primary Review by the Editorial Team**

Received by Journal Office

**Coding/Receipt of Manuscript**

**Rejection**

**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

**Final Editing for Publication by Editorial Team**

Setting time frame for printing

Article appears in Publication & E-print available on website

Receipt of Corrected Proof & Copyright form

http://mu.edu.sa/en/departments/majmah-journal-health-sciences

**1 week**

**2 weeks**

**1 week**

## 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