INTRODUCTION

The hippocampus is a part of limbic system and hippocampal formation, which also includes the Dentate Gyrus, Subiculum, and Entorhinal cortex. Extensive evidence implicates the hippocampus and related structures in the formation of episodic memories in humans [1] and in consolidating information into long-term declarative memory [2]. Depression is a state of low mood and aversion to activity that can affect a person's thoughts, behavior, feelings and physical well-being [3]. Dysthymia is a state of chronic depressed mood and is also a feature of borderline personality disorder. Loss of hippocampal neurons is found in some depressed individuals and correlates with impaired memory and dysthymic mood. MRI scans of patients with depression have revealed a number of differences in brain structure compared to those who are not depressed, meta-analyses have shown that there is evidence in favor of smaller hippocampal volume [4] and increased numbers of hyper intensive lesions [5]. There may be a link between depression and neurogenesis of the hippocampus [6]. Drugs may increase serotonin levels in the brain, stimulating neurogenesis and thus increasing the total mass of the hippocampus [7]. Brain derived neurotrophic factor (BDNF) is drastically reduced (more than threefold) in depressed individuals as compared to the normal. Antidepressant treatment increases the blood level of BDNF. It is involved in both the causation of depression and the mechanism of action of antidepressants [8].

MATERIALS AND METHODS

Animal model

After taking approval from Institutional Animal ethical committee which strictly follows international guidelines on the ethical use of animals. 45 adult albino rats of either sex 150-200 gm were maintained at 21°C and given access to food and water ad libitum. Animals were randomly assigned into 3 equal groups: Control Group (CG), Depressed Group (DG), Treatment Group (TG)

The cage was small, made up of steel wire, measuring 9” x 2.75”, it was an indigenous one which was designed to suit the experiment as described and depicted previously [9]. It was framed to provide adequate immobilization without giving any physical harm to the animal. It is of light weight and easy to carry, with no maintenance cost.

Experimental Procedure

Before the experiment animals were handled manually for one week to remove handling stress. The CG group received food and water. The DG group were immobilized by the rat immobilizer 3 times (30 minute each) a day for 7 weeks. The experiment was conducted between 10-11 am. The TG group received Fluoxetine 1mg/kg body weight once a day for 4 weeks after being immobilized for 7 weeks. Animals were anaesthetized by diethyl ether, and perfused intracardially with 10% formaldehyde. Brains were removed and hippocampus was dissected. Tissues processed with alcohol, xylene, and paraffin embedding was done. Blocks were made and 5 micron thin sections of identical regions were taken of different groups. Observations were made under 40x resolution by compound microscope after Haematoxylin and Eosin staining. CA4 region was identified in the hilum of dentate gyrus and Neuronal density was markedly reduced (85.4 cells/cubic mm) in experimental group, as compared to control (110.5 cells/cubic mm). Neuronal density was enhanced to 144.3 cells/cubic mm in Treatment Group. Statistical analysis was done using students t-test and the significance was assessed. It was found that stress induced depression causes significant neuronal loss in CA4 region that can be significantly reversed by the pharmacological intervention.

ABSTRACT

1. By the middle of the last century the hippocampal formation started to be one of the most studied structures of the nervous system. The present study was conducted using 45 albino rats of either sex (150-200 gm) and divided into 3 equal groups. First group was control and received water and food ad-libitum, second group was experimental receiving chronic depression for 7 weeks by immobilization method, the third group received Fluoxetine drug (1mg/kg body weight orally) for 4 weeks following chronic depression. The animals were sacrificed after the experiment, perfused with 10% formaldehyde, brains were dissected and tissue blocks were processed for paraffin embedding. Observations were made on 5 micron thick H E stained sections. Estimation of neuronal density of CA4 regions was performed using Motic images plus 2.0 software. Neuronal density was maintained at 21°C and given access to food and water ad libitum. Animals were randomly assigned into 3 equal groups:

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...number, the present study assessed the changes in the...By taking advantage of improved methods for quantifying neuron...hippocampal volume as a hallmark of normal aging.

This study showed fall in neuronal density in the selected area of...DISCUSSION

This study showed fall in neuronal density in the selected area of hippocampus after immobilization stress leading to chronic...dendritic extent in normal aging and Alzheimer’s disease.

REFERENCES