

EFFECT OF PRE-EXAMINATION STRESS ON OLFACTORY SENSITIVITY IN COLLEGE STUDENTS

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Received: 17 February 2017, Revised and Accepted: 29 March 2017

ABSTRACT

Objective: The present study was undertaken to assess the effect of pre-examination stress on olfactory sensitivity in college students.

Methods: A total of 80 apparently healthy males and females were included in the study after obtaining written informed consent. Blast injection method was used to measure the olfactory sensitivity.

Result: In the present study, we have observed decrease in the olfactory sensitivity in both males and females during pre-examination stress. However, it is not statistically significant.

Conclusion: We recommend further detailed studies for better understanding the links between stress and olfaction.

Keywords: Olfaction, Stress, Examination, Students.

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INTRODUCTION

The olfactory system is formulated into a peripheral part which recognizes olfactory information from the environment and a central part which interprets the olfactory signal and channeled it to other parts of the brain. The peripheral olfactory system is possessed of the olfactory epithelium for odor detection, vomeronasal organ for odor detection [1,2] and for alarm detection by septal organ, and Gruneberg ganglion [3,4]. In recent times, it was believed that the human olfactory sense had a little influence, a vision which turned into the analysis of the environment. Recent studies have shown that olfactory sensations have important interconnections with memory, language, and neurovegetative areas. In humans, olfaction has a small beneficence in determining objects or other people but plays an important role in social and emotional aspect. People learn to love or to hate certain foods or objects only by sensitizing their odor and this verified to be a very important economic factor [5]. In human patients, olfactory function inadequacy of olfactory system was noticed during the early phase of chronic neurodegenerative diseases such as Alzheimer's disease/Parkinson's disease [6] and also altered psychiatric disorders such as depression, anxiety, and schizophrenia [7]. Examination is a terrible and necessary stressor for every student. The reasons behind it may be to complete the lessons before examination or how to face the examination and about the result. Chief matters for students attempting their examination are comparisons, parental expectation, and peer pressure. These matters bog down, leading to severe examination stress [8]. Irregular examinations produced more stress than the examinations conducted rarely [9]. It was reported that both structural and functional aspects of brain structures including prefrontal cortex and hippocampus are adversely affected by chronic poorly managed stress [10]. Hence, the present study was undertaken to assess the effect of pre-examination stress on olfactory sensitivity in college students.

METHODS

Participants

The study was conducted at Little Flower Institute of Medical Sciences and Research from May 2016 to December 2016. A total of 80

apparently healthy males and females were included in the study after obtaining written informed consent. The present study was approved by Institutional Human Ethical Committee (EC/1/2015). The following criteria were followed while selecting the participants.

1. Apparently healthy males and females
2. Age between 18 and 24 years
3. Willing participants
4. Not suffering with any disease
5. Not using any kind of medications.

Measuring olfactory sensitivity

Blast injection method [11] was used to measure the olfactory sensitivity. The olfactometer, manufactured by Anand Agencies, Pune, was used in the study as standardized earlier [12]. Presenting odor is three drops of jasmine oil was mixed with 30 ml of water was used to present jasmine odor. Therapeutic essential jasmine oil was by Karmakara Company.

Data analysis

Data were presented as mean±standard deviation. Data were analyzed by SPSS 20.0 using one-way analysis of variance followed by Tukey's multiple comparison test. $p < 0.05$ was considered as significant.

RESULTS

Results are presented in Figs. 1 and 2. Olfactory sensitivity was not significantly different in males and females. Olfactory sensitivity was decreases in pre-examination period. However, it is not statistically significant.

DISCUSSION

According to mechanic, "Stress is a discrepancy between the demand impinging on a person whether these demands are external or internal and the individual's potential responses to these demands" [13]. Health sciences education is reported as stressful [14]. The stress response occurs by the activation of a complex range of responses involving the endocrine, nervous, and immune systems by maintaining homeostasis in the presence of stressor stimuli [15,16].

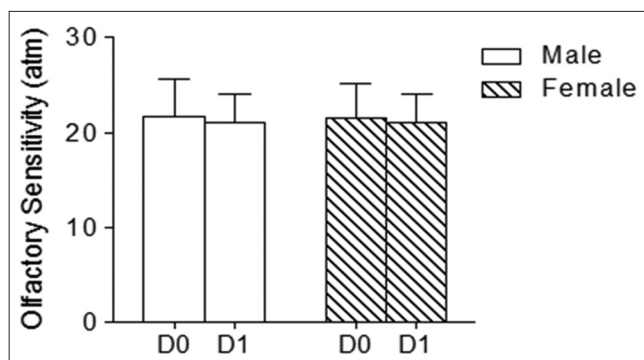


Fig. 1: Olfactory sensitivity in males and females (D0 - During regular classes, D1 - During pre-examination period). Data were presented as mean±standard deviation (*p<0.05, **p<0.01, ***p<0.001)

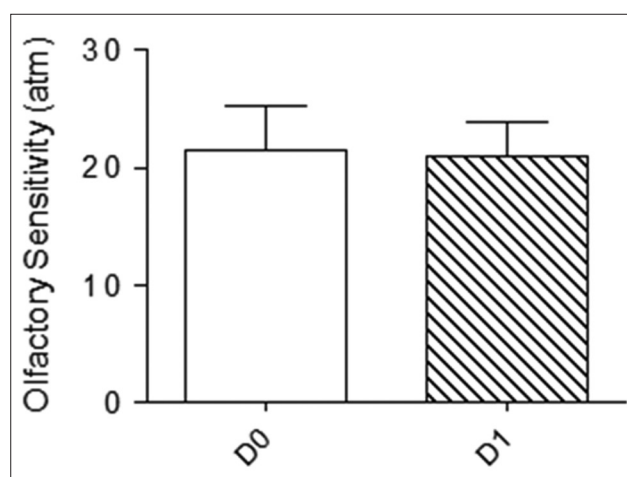


Fig. 2: Olfactory sensitivity in the participants during regular classes (D0) and pre-examination period (D1). Data were presented as mean±standard deviation (*p<0.05, **p<0.01, ***p<0.001)

Stress stimulates hypothalamic-pituitary-adrenal axis responsible for glucocorticoids release by functioning, especially in the hippocampus, amygdala, and prefrontal region [17].

There are ~6 million bipolar receptor cells placed within the olfactory neuroepithelium, which are collected as olfactory system [18,19]. This ciliated bipolar olfactory receptor (true bipolar neuron), protruding a single dendrite to the surface of the olfactory neuroepithelium and a single axon to the olfactory bulb. The dendrite has non-motile cilia with membrane receptors, where odor molecules join and it continued into the epithelial surface [20]. The olfactory fila are composed by axon bundles and act over the cribriform plate of the ethmoid bone and synapse at the olfactory bulb. The surface area of the cilia human ~25 mm [5,21]. Small quantities of odors can identify by humans, and one of the main functions of olfactory system is food selection [22,23]. Most fundamental part of the brain is olfactory system, so it related with numerous brain areas [24,25].

The sensory (in particular, olfactory) perception occurs not only in a space but also remarkably in internal physiological and psychological states [26,27]. As olfactory system is firmly correlated with the limbic system, it positively or negatively affects the emotions and memory [28]. Previous studies show that an odor is a powerful healing key [29], especially if participants are in a nervous and aroused state. Stress-induced hormonal changes alternate olfactory system by amygdala and hippocampus [11,30]. Previous studies show that jasmine has good reactivity to aroma [12].

CONCLUSION

In the present study, we have observed decrease in the olfactory sensitivity in both males and females during pre-examination stress. However, it is not statistically significant. We recommend further detailed studies for better understanding the links between stress and olfaction.

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