

PRE-EXAMINATION STRESS IN SECOND YEAR MEDICAL STUDENTS IN A GOVERNMENT COLLEGE

Areeba Husain Rizvi, Maha Awaiz, Zohra Ghanghro, Mehjabeen Ahmed Jafferi, Sina Aziz*

Students of Dow Medical College, *Department of Paediatrics, Dow University of Health Sciences, Karachi, Pakistan

Background: Pre-examination Stress is a common condition faced by students prior to exams and is quite predominant among medical students. Many studies have been conducted to assess the impact of stress on students prior to examinations. This study however aims to determine the behavioural and physiological changes occurring in the second year medical students during the pre-examination period. **Methods:** Questionnaires were distributed among students to review the changes that occurred in medical students related to their behaviour, physical activities and functions just before exams. Duration of study was two months from October-November, 2009. The questionnaire was divided into two parts. The first part contained demographic information about the patient, the second part contained opinions of students experiencing pre-examination stress. SPSS was used for data management and approval from the Ethical Review Board of Dow University of Health Sciences was obtained before starting the research. **Results:** The data for this study was collected from 226 students of 2nd year MBBS, Dow Medical College, Karachi on specially designed questionnaires. Among the 226 students 22.1% were male while 77.9% were female with mean age 20±1 years. Changes observed in pre-examination period included anorexia, nausea, fatigue (54.87%), changed concentration span (80.09%), increased irritability (68.14%), mood swings (50.88%), disturbed menstrual cycle (15.91%), disturbed sleep cycle (80.97%), increased intake of caffeine/energy drinks (38.94%), disturbed metabolism (46.02%), aggravated skin problems such as acne (12.83%). Among the 226 students 42.04% did regular exercise and 76.12% prayed regularly. Both of these factors helped them in coping with stress. **Conclusion:** Majority included in our research experienced stress prior to exams but the signs and symptoms varied greatly. Irritability, increased intake of caffeine/energy drinks, and disturbed sleep cycle seemed to dominate physiological and behavioural changes in the pre-examination period.

Keywords: Behavioural changes, Physiological changes, Pre examination period, Medical students.

INTRODUCTION

The study of Medicine is extensive, time-consuming and very stressful. In every five-years study period students are subjected to endless working hours, and exams add an extra stress quotient. In order to maintain a remarkable grade-point-average (GPA) students often have to work beyond their mental threshold and physical strength.

Stress refers to conditions that arouse anxiety or fear. The transient rise in systolic blood pressure during stress is a common observation.¹ Physiological studies have shown that stress from any source can influence on the endocrine, haemopoietic and immune systems.² Cytokines and cortisol seem to play an important role in the communication between these systems.³ The well documented changes that occur are increase in erythrocytes, neutrophils and platelets, whereas lymphocytes, eosinophils and monocytes decrease in number. Lymphocytes and monocytes express receptors for several stress hormones, including norepinephrine and epinephrine,⁴ thus stressful events could alter immune function. It has also been observed that female students respond to examination situation with stronger anxiety and more intense stress related behavioural, metabolic and psychological changes. Menstrual cycles of females also seem to get affected

during the pre examination period owing to hormonal changes as observed in previous studies.⁵

Studies conducted locally so far on the similar topics such as exam related anxiety are few in number.⁶ Hence the aim of this study was to determine the behavioural and physiological changes in medical students during pre examination period.

SUBJECTS AND METHODS

This study was conducted from October-November, 2009 on 2nd year medical students. Approval was obtained from the Ethics Review Board of Dow University of Health Sciences.

Questionnaires were distributed among 300 (2nd year) medical students out of which a total of 226 responded. Female respondents were 77.9% (n=176) and remaining 22.1% (n=50) were males. Average age of the students was 20 years and standard deviation taken under consideration was ±1 year.

The questionnaire assessed the age, gender and the factors that may influence the intensity and type of psychosomatic reactions and the *behavioural* and *physiological* changes observed during stressful examinations. We inquired about those factors that are normally seen to influence our health and behavioural changes in general.

The questionnaire included 16 questions. The subjects were asked to choose if they experienced an

increase or decrease in the symptoms associated with pre-examination stress. All the subjects were asked to respond in relation to the last exam they had taken. The questionnaires were printed and distributed among the students during a lecture break by four students, and were collected after another fifteen minutes. The data collected was then compiled on SPSS.

RESULTS

Table-1 shows the behavioural and physiological changes in students during pre-examination period.

Change in the concentration span was experienced by 80.09% of the students with 80.11% having an increase in the concentration span and 19.89% having a decrease in concentration span.

The students went through certain physiological changes. Insomnia, fatigue and nausea experienced by 54.87% of the students during exams. A disturbed menstrual cycle was experienced by 15.91% of the females. Disturbed metabolism, which included isolated diarrhoea, diarrhoea and constipation, isolated constipation was experienced by 46.02%. Skin disorders like acne, dermatitis; psoriasis was seen in 12.83% of the students. 80.97% of the students had a disturbed sleep cycle.

Some of the students also noticed behavioural changes in themselves just before the exams. Irritability was complained by 68.14% of the students while 50.88% of them had mood swings. Increased consumption of coffee, tea and energy drinks was observed by 38.94%. Among the 226 students 42.04% were physically active and seemed to cope well with stress; and 76.12% of the students prayed regularly during exams and experienced less stress.

Table-1: Result of questionnaire filled by medical students (n= 226)

Variables	Total	%
Behavioural changes in pre examination period		
Change in concentration span		
Increase	181	80.09
Decrease	145	80.11
Decrease	36	19.89
Feeling of irritability	154	68.14
Mood swings experienced	115	50.88
Increased consumption of caffeine/ energy drinks	88	38.94
Regular in exercise	95	42.04
Regular in prayer	172	76.12
Disturbance in sleep cycle	183	80.97
Physiological changes in pre examination period		
*Aggravated skin disorders	29	12.83
**Disturbed metabolism	104	46.02
***Disturbed menstrual cycle (females)	28	15.91
Experience of nausea, insomnia, fatigue, anorexia (Either one of these)	124	54.87

*Acne, Psoriasis, Dermatitis

**Isolated diarrhoea, diarrhoea and constipation, isolated constipation

***Shortened or prolonged menstrual cycle

DISCUSSION

Stress is a condition that puts mind in a state of fear or anxiety and is most commonly observed prior to and during examinations. Pre-examination stress is one of the most widely suffered problems in medical students throughout the world. However, stress is only healthy as a short-lived response. Excessive or prolonged stress can lead to illness and physical and emotional exhaustion. There are several changes that we go through in the time period that is followed by exams. These changes may be: *physiological, hormonal, immunological, psychological* and *behavioural*. The extent to which these changes take place in different students can depend upon gender, physical activity, and spiritual strength etc.

In the survey that we conducted it was observed that the intake of caffeine, tea and energy drinks most commonly affected metabolism, immunity, moods and sleeping patterns, which is in accordance with studies previously published.^{5,7}

The semester system introduced in the medical college has changed the examination pattern according to which students appear twice for Semester Professional exams. The extensive course of Anatomy, Biochemistry and Physiology in second year along with increasing competition in terms of GPA (grade point average) induces a lot of anxiety and stress among the students. Due to this they tend to study beyond their threshold levels ending up mentally saturated and food and sleep deprived which is in concert with previous studies that link psychological factors and inappropriate time scheduling with pre-examination stress.^{8,9}

In our study the trends show more than half the students suffered anorexia, insomnia, fatigue and nausea due to long working hours and tension of completing piled up course. Female students are seen to have higher anxiety levels as compared to their male counterparts, as demonstrated by a recently published study.¹¹ The stress often causes increased levels of *cortisol, epinephrine* and *norepinephrine* (also called Stress hormones), *leptin, NPY, nitrite, nitrate, ACTH* and *adrenomedullin* in blood. Increased cortisol level in turn leads to health consequences ranging from weight gain and moodiness to decreased immunity, high blood pressure and diabetes as documented in previous studies.¹¹⁻¹³

During our study 80.11% of the students reported an increased concentration span during studies prior to exams. This is in agreement with positive effects of moderate stress in coping with challenging situations, however metabolic disorders, disturbed sleep, menstrual cycles and increased mood

swings, all have been related to excessive release of stress hormones in researches conducted earlier.^{5,14-16}

According to our study the students consume increased amounts of energy drinks and caffeine in the form of coffee, tea because they think it helps lift their mood and improves alertness. However increased caffeine increases the levels of *adenosine*, *adrenaline*, *cortisol* and *dopamine* in blood. Elevated level of these hormones is responsible for the temporary boost one may experience but leads to fatigue, depression, mood swings, weight problems, heart disease, diabetes, skin disorders and decreased immune responses in the long run in addition to heart burn, stomach ulcers. Caffeine inhibits the absorption of some nutrients and increases the urinary excretion of calcium, magnesium, iron and some trace minerals. It increases the acidity of human gastrointestinal tract, which leads to heartburn, as depicted in a recent study¹⁷; it also decreases blood flow to the brain by as much as 30%. Caffeine also causes blood sugar swings by stimulating a temporary surge in blood sugar followed by increased insulin secretion that then leads to a blood sugar crash within a few hours, according to previously published studies.^{7,8,18,19}

The increased incidence of experiencing skin disorders in some students prior to examinations may be linked to increased levels of adrenal *corticosteroids- glucocorticoids*, released as part of natural response to stress.^{12,13} These play a role in deterioration of skin barrier function. It thus decreases cell growth and inhibits differentiation into skin cells. This can also worsen skin disorders such as psoriasis and eczema.

Imbalances in the levels of the hormones *oestrogen* and *progesterone* may lead to disturbed menstrual cycles in some female students. This materialises when the level of oestrogen increases with simultaneous decrease in progesterone levels two weeks prior to one's menstrual cycle. Psychological stress is thought to trigger these changes in accordance with researches published earlier.^{5,14,20}

It was noted that the students who exercised regularly experienced less severe symptoms of exam related stress. Daily physical activity helps improve the digestive system, improves immune responses and enhances cognitive functioning. It was also seen that students who prayed regularly showed a calmer state of mind and coped well in stressful exam times. According to previous researches and in our findings we may associate this to meditation during prayers when one clears his/her mind of all stress embarkers and focuses on spiritual connection with God. Significant increases in Brain Integration Scale scores (preparatory brain responses, broad band

frontal coherence) have been showed in past researches.²¹ Therefore these support our findings and prove the significance of meditation.

This study had limitations that included the response rate and the spectrum of the research. The number of forms received was lesser than those handed out. This could be owing to the fact that some subjects were under excessive pressure and decided not to respond. In future we need to work on a broader platform which would allow a more extensive study in order to have the option of comparing the results and obtaining a more generalized and accurate conclusion.

CONCLUSION

This study highlights the fact that the disturbance in sleep cycle (80.97%) is most marked in students prior to exams followed by changes in concentration span (80.09%), regularity in prayers (76.12%) and irritability (68.14%). In light of the statistics obtained through this research, we recommend that students should inculcate physical activity and regular praying in their lives to combat stress effectively.

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Address for Correspondence:

Areeba Husain Rizvi, C-107, Ruffi Fountains, Block-19, Gulistan-e-Johar, Karachi, Pakistan. **Cell:** +92-334-3730674

Email: areebarizvi@yahoo.com