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Stress levels, gender and "Examination Performance" of medical students

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Abstract

Introduction: The effects of stress are known to be multi faceted. Hans Selye, the father of the science of stress, studied effects of stress on the human body. Performance of a person in examination depends on many factors. In present study, we attempted to find stress levels, gender and their correlation with the examination performance of first year medical students.

Material and methods: In present study, we asked the first year medical students to rate their perceived level of stress in percentage score from 0-100, 100 being the highest. We correlated this stress level and gender, with subject's examination performance.

Results: It was found that stress levels higher than 40, lead to decrease in examination performance. We also found girls having negtive correlation with rising stress, where as boys showed positive correlation. This dichotomy needs further confirmation.

Keywords: Stress, Stress levels, Gender, Marks, Examination performance

Introduction

While studying happiness and stress in medical students, since last 8 years; 2 years before, we got curious about relation between stress levels and examination performance in reference to gender of the medical students. Giving google search on title specific topic, "Gender and Examination performance" we found only 5 results. Undergoing still more specific google search on title specific topic, "Gender and Examination performance, by first year medical students" we found 0 results. THESE lead us to work on present research project, albeit, a pilot scale research study.

Stress as described by Hans Selye, results from wear and tear of the body. He further classified stress into eustress and distress.(1) Eustress refers to the physiological stress that motivates a person to work hard and get desired results of his efforts. Spielberg described stress state as a persons' response to the stress and stress trait as a persons' habit to get stressed. The specific signs and symptoms of stress vary widely from person to person.(2)

Stress is known to evoke 3 F reaction (freight, fight and flight), raising the catecholamine levels and helping one win an emergency life threatening situation.(3) In a catch 22 situation of chronic stress, where fight is futile and flight is not possible: sympathetico adreno cortical system is activated. This causes release of stress hormones, including corticosteroids.(4)

It is said that we need some stress in our lives to motivate us. With that in mind it

seems unhealthy to be either under-stressed or over-stressed. The absence of stress by making one idle, can affect performance, health and well being; whereas the existence of too much stress, leads to many diseases; psychological and behavioural.(5)

Stress activates hypothalamo pituitory adrenal axis and causes release of cortico steroids.(6) Research studies about cognitive impairment found decreased memory capacity in stressed individuals. Studies employing Magnetic Resonance Imaging (MRI) technology also indicate that chronically stressed persons have selective atrophy in the human brain.(7)

There are many methods to measure sympathetic activity in a person, as a proxy to measure stress. Measuring galvanic skin resistance and evoked potentials are proved methods, which need sophisticated instruments, technical skills, laboratory set up and are, per se, time consuming. Measuring cardio respiratory effects caused by raised levels of catecholamines, need medical personnel and spare time of both; subject and physician.

The most cost effective, least time consuming and therefore the most commonly used methods to decide stress levels are self report questionnaires. Many of these have been designed to measure stressful states and traits such as anger, anxiety, depression and Type A coronary behavior.(9)

The Stress Response Curve, as devised by Nixon, P. (1979), shows that as the level of stress increases, the performance level also increases; till the point of eustress, or healthy tension. Near the point of fatigue, an identified area called the comfort zone is seen. This indicates the range of stress levels that we can absolutely manage. Comfort zone stress facilitates reasonably good and sustainable performance levels.(10)

Dr. Richard Earle from the Canadian Institute of Stress, located in Toronto, Canada, rates stress levels on the basis of answers about frequency of 20 defined events (signs and symptoms), during last one month. Respondents are rated having low, moderate or overt stress, on the basis of their score between 0–20, 20–40 and 40–60 respectively.(11) Dr Earle gave new concept of vitality quotient, as devised by ratio of stressors over satisfiers.

The Holmes and Rahe Stress Scale utilizes 43 different events, allots different scores to these events(stress points) from 15 –100, multiplies event by how many times it happened in last 1 year and makes a stress level score. It derives 4 categories: of range 01–50, 51–200, 201 –300 and >301; as low, medium, high and severe levels of stress.(12)

Studies in college are altogether different from that in school. One of the biggest challenges for young people at university is to adjust to the lower degree of predictability.(13) Stellar success at A–levels of higher secondary examinations requires, both being smart and working hard. But dealing with the variety of not yet familiar exam styles and atmosphere at medical university is an additional challenge. San Diego's widely circulated students' independent news letter states that final exams create unnecessary stress, to the students and parents.(14)

So much is the stress of examinations that in 2010–2011 Young Minds, a U.K. based charity, received 6332 calls to the helpline. Out of this 6332 calls, 884 calls were of 16–17 year young's and of those, 39% were about school problems including exam stress.(15)

According to statistics from the United Way, 60% of youth visits to the doctor are for stress and anxiety, more so during exam days. Such is the prevalence of stress that CTV Calgary and the United Way of Calgary and Area, have come together to raise awareness about mental health, stress and anxiety among youth: in a three–year initiative called Real Youth.(16)

Performance in Examination depends on many factors. In a study of commerce

students it was found that examination performance of a student was governed by teaching in the class, his own study and his ability to write in the examination hall.(17)

According to Britney Cleme, University of Minnesota, Rochester, yoga meditation practice, increases exam marks from 52 to 60%. As per study conducted by R. Holland, [www.elsevierhealth.com/journals/pubh(2006) 120, 249-255], University of East Anglia, Norwich; trainees when provided with adequate trainer contact time, feedback and wide experience, were able to achieve better results.(18) According to Saima Rasul, [Procedia Social and Behavioral Sciences 15 (2011), 2042-2047], The Islamia University of Bahawalpur, Pakistan; at university level the psychological, physical, socio-economic and educational factors: affected the respondents' performance in examination, the most.(19)

Alam (2001) studied academic achievement in relation to socio economic status, anxiety level and achievement motivation. The study revealed significant positive relation between socio economic status and academic achievement; achievement motivation and academic achievement. The study further revealed a negative relationship between anxiety and academic achievement.(20)

First year medical studies are considered highly difficult. Home sickness, teen age, unknown colleagues, strict (not–so–friendly) aloof teachers, new environment, international language other than mother tongue, and technical terminology; make study of first year of medicine highly stressful. Wide syllabus, no prescribed text books, frequent surprise tests, practical examinations and oral viva voce examinations prove tough to the students. Performance and results of examinations apart from being unpredictable, at times are highly surprising and shocking.

It seems one can precisely judge ones' own stress level. Medical students being aware of their body and mind can be more trusted in this matter. Self assessment / perception of stress levels can be of great use in research studies.

We took up study of self perceived stress levels, and results of 50, I M.B.B.S. students in intermediate examinations; during present project.

Material and methods

50 students of I M.B.B.S. participated in the present study. We asked the participants to note down their stress level, in the range 0–100. Their performance in intermediate examination conducted in $\pm$ 60 days was studied in correlation with their gender and their stress levels. The examination marks considered were of three written theory papers each of 50 marks and two practical examinations of total 110 marks. The practical examination included amphibian (frog) experiments' graphs, experiments on human blood parameters and human clinical practicals. At most places in this study, marks are denoted in percentage.

The participants were divided into having scores of 01–40(low to minimum stress) and 41–100 (borderline to very high stress). Further classifying the participants, as per gender, male and female; we got another two groups. Both group as per gender had 25 persons and 12 and 13 persons in each group belonged to stress levels 01–40 and 41–100.

Average stress of girls, boys and all participants was 49.8%, 44.6% and 47.2% respectively.

The effect of stress levels and gender, on examination (theory and practical) performance was studied.

Results

Girls had overall higher level of stress than boys. (Approximate by 10%). However girls scored better by 6–10% in nearly all examinations carried in $\pm$ two months (Table 1). It seems girls, as a group, are more sincere and more systematic. Girls perhaps know a little better as to how handle

Table 1: Gender, stress levels & average marks in intermediate exams.

Intermediate exam	Average stress	3 theory 150 %	2 practical 110 %
Female	49.8	49.7	56.3
Male	44.6	46.0	53.4
Average marks	47.2	47.8	54.9

Table 2: Stress levels 01–40, gender and exam performance.

Intermediate exam	Average stress	3 theory 150 %	Correlation	2 practical 110 %	Correlation
Female 01–40	24.2	57.2	0.09583	62.6	0.11907
Male 01–40	22.2	43.5	-.20436	49.5	-0.4495

Table 3: Stress levels 41–100, gender and exam performance.

Intermediate exam	Average stress	3 theory 150 %	Correlation	2 practical 110 %	Correlation
Female 41–100	73.5	42.8	-0.4015	50.6	-0.4686
Male 41–100	65.3	48.3	0.2654	57.0	0.30205

Table 4: Stress, gender and exam performance.

Intermediate exam	Average stress	3 theory 150 %	Correlation	2 practical 110 %	Correlation
Averg all Female	49.8	49.7	-0.5222	56.3	-0.4779
Averg all Male	44.6	46	0.18026	53.4	0.24592
Averg all pax	47.2	47.8	-0.1858	54.9	-0.1395

a little higher stress in their educational career.

Girls with stress levels 01–40, had positive correlation with exam performance. This suggested that girls scored better with rise in stress levels from 00 to 40. Boys had negative correlation with stress levels 01–40 (Table 2).

Girls at stress levels 41–100, had decreasing performance with increase in stress levels (Table 3). This validates The Yerkes-Dodson Law. Boys' exam performance however had positive correlation with stress levels rising from 41–100.

Studying stress levels 01–100, females' stress levels had negative correlation with exam performance at scales –0.47 to –0.52 (Table 4). In contradiction, males' stress levels had positive correlation with exam performance, at scales 0.18 to 0.25. Thus there is a dichotomy between gender, suggesting that males perform better even with higher stress.

During our study it was found that stress, when considered irrespective of gender, had negative coefficient correlation with performance in all intermediate exams (Table 4). Higher stress had more impact perhaps on theory examinations. Stress seems to affect memorizing, recollecting, organizing, interpreting and writing skills.

This validates The Yerkes-Dodson Law, first described in 1908 by psychologists Robert Yerkes and John Dillingham Dodson. The law suggests that there is a relationship between performance and arousal. Increased arousal can help improve performance, but only up to a certain point. Beyond that point of eustress; when arousal becomes excessive, performance diminishes.(21)

Discussion

Interest in gender and examination performance started arising in 2000–2010. In ICAEW (Institute of chartered accountants of England and Wales) exams, it was found that number of unmarried men and women, passing the exam at first attempt; were 71.8 and 53.4% respectively. This percentage in married men and women was 55.9 and 52.4%.(22)

Between 1990 and 2000, (Arnot and Miles, 2005 and Elwwod 2005, Gipps 2006) it was found that girls were outperforming boys in many subjects.(23)

Evaluating performance in written and objective structured clinical examinations (OSCEs) in medical under graduates, during July 2002 and 2003, it was found that white females performed best in all OSCEs and in 3 out of 4 written examinations.(24)

In our study, we found that, females' stress levels had negative correlation with exam performance at scales –0.47 to –0.52 (as seen in Table 4). In contradiction, males' stress levels had positive correlation with exam performance, at scales 0.18 to 0.25. Thus there is a dichotomy between gender, suggesting that males perform better even at higher stress. This dichotomy needs further exploration and confirmation; which we plan to do in further studies.

Since exam stress is very rampant and at times lethal, experts have various recommendations and advices to offer to reduce the same. The foremost is to set up a study plan and prepare well for the exam. (25) Also of importance is to get plenty of sleep and eat sensibly.(26)

In our present study, we found that about 52 % of all students had stress higher than 40 and they needed training in de stress measures. These students were offered counseling. They were acquainted with relaxation techniques, laughter therapy, creative arts, pranayama, dhyan and yoga.

Conclusion

Performance in examination depends on as many as 14 'P's viz. professor, pupil, past behavior, prejudice, preferences, preparation, persistence, presentation, patience, personality, peace of mind, perfection, pictures and presents.

We studied effect of stress levels and gender on the examination performance. We found girls having negtive correlation with rising stress, where as boys showed positive correlation. This needs further confirmation.

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