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Original Research Article.

To Study the Association of 'Perceived Stress' and 'Coping Mechanism' With 'Stroop Test' in Medical Students

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ABSTRACT

Background: Prolonged stress affects the overall health of the students including their cognitive skills.

Aim & Objective: To evaluate the stress level of Indian medical students using the PSS Scale and to correlate the score with their capacity to cope with stress using the 'COPE scale' and cognition using the 'Stroop Test'.

Methods: The study was conducted on the young Indian adult population of both the sexes aged between 18-25 years. 150 subjects were recruited from 1st and 2nd year MBBS students at a government medical college located in the state of Rajasthan. Perceived Stress Scale (PSS)-10 was used to assess stress score, a standardised Coping scale was used to assess cognitive, emotional, and behavioural methods of dealing with problems and Stroop Test was used to assess the cognitive functions.

Results: The mean score of PSS in the subjects was 19.69±1.63 and most of the students were in the category of moderate stress (88.6%). The overall mean ± SD of the 'Cope scale' score was 36.89±6.25. In the 'Stroop Test' the average reaction time of the study participants was 2106.79 ± 792.1 msec whereas the percentage correctness of response was 97.39 ± 4.13 %.

Conclusions: Our study showed that most of the subjects were in the category of moderate stress. There was a significant negative co-relation between the PSS Scores and the Coping Scale as well as between the Coping Scale and reaction time of the Stroop Test.

Keywords: Perceived Stress Scale (PSS), Coping Scale, Stroop Test.

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INTRODUCTION

Stress among medical students has been reported by several studies conducted worldwide. During the initial years of medical education training, students are subjected to various kinds of stressors – pressure of academics with an obligation to succeed, an uncertain future and difficulties of adjusting into the system. Studies have also focused on evaluating stress levels, burnout, and resilience in the 1st year medical students and have reported that there was a gradual increase in perceived stress and burnout levels and decrease in resilience and overall physical and emotional health by the end of the first academic year.[1,2]

Some of the common sources of stress in medical undergraduates have been reported to be academic causes (such as vastness of syllabus, frequent exams, poor time management and lack of facilities for entertainment/extra-curricular activities) and psychosocial concerns (such as high parental expectations, staying away from family in hostels, etc.).[3] Due to all the possible above-mentioned problems faced by the medical undergraduates, some studies have also tried to examine the students coping skills. While some studies have found that students use negative coping strategies like substance abuse to cope with their increasing stress,[3] others have found students to be using positive coping strategies such as involvement in sports, music and,[4] having positive relationships, involvement in spiritual and mindfulness practices.[5] Most of the studies done so far have taken into account all undergraduate students in varying years of education and assessed their stress levels and coping skills.

Keeping this background in mind this study was planned to correlate the level of stress, cognitive function as well as capacity to cope with stress amongst 1st and 2nd year MBBS students in a medical college located in Northern India.

MATERIALS AND METHODS

A cross- sectional study was done on Healthy young adults' population of both the sexes aged between 18-25 years. 150 subjects were recruited from 1st and 2nd year MBBS students at a government medical college located in the state of Rajasthan. The project was approved under the STS–scheme of ICMR for medical undergraduates. The purpose of the study was explained to all the subjects and informed consent was obtained from them before commencement of the study. Institutional Ethical Clearance (IEC) was taken before starting the study. The study enquired into the stress level of Indian medical students (of both sexes) aged between 18-25 years using the Perceived Stress Scale (PSS-10) and categorised the subjects into three groups depending upon their PSS score: vulnerable, semi-vulnerable and non vulnerable. It assessed the capacity of students to cope with stress using a standardised Coping Scale. In addition, it assessed the cognitive function of students in each of the groups using the 'Stroop Test' and correlated the findings to the 'PSS Scores' and 'Coping Scale'.

Perceived Stress Scale (PSS)-10 PSS-10 measures an individual's perception of stress in the last one month. Cohen et al., 1983showed correlation of PSS with multiple other parameters, such as: (a) Stress measures (b) Self-reported health measures (c) Help seeking behaviour etc. PSS scores were obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) to the four positively stated items (items 4, 5, 7, & 8) and then summing across all scale items. Higher scores indicate a higher level of stress with a range from 0-40. Scores ranging from 0-13: low stress, scores ranging from 14-26: moderate stress and scores ranging from 27-40: high perceived stress.[6]

Coping Scale A standardised scale was used that assessed cognitive, emotional, and behavioural methods of dealing with problems. Some items, focusing on cognitive and emotional approaches, in this scale have been adapted from Holahan and Moos[7] widely used Coping Strategies Scale (items 2, 3, and 4 below), while other cognitive and emotional items were original (1, 5, 6, and 8). The remainder of the items were adapted from Spitzberg and Cupach's framework for assessing coping in response to stalking. Adapted items have been reworded to focus on general coping patterns (versus a response to a specific situation) and simplified to suit a community sample in which some have limited reading levels and educational attainment.[8] Scoring: Each answer category was assigned a value from 4 to 1. Higher scores indicate better coping skills.

Stroop Test: In psychology, the Stroop effect indicates the interference observed between a main task and an interfering cognitive process. This interference is manifested by a longer reaction time when asked to name the colour in which a word is written while the colour which it indicates is different (for example, the green word written in red) compared with a situation where the word and the colour correspond (the yellow word written in yellow).The name of this effect comes from the name of the psychologist who discovered it, John Ridley Stroop.[9] Before conducting the Stroop test the subject will be asked to relax for 5 minutes. After detailed history and physical examination, the subjects will be first familiarized with the test, by doing a trial run. In the online version of the Stroop test, each subject will be presented with a series of coloured words (black, blue, green and red). These words will appear in different colours, sometimes matching the word (e.g., word blue written in blue congruent) and sometimes not matching the word (e.g., the word blue written in red incongruent). The task of the subject is to indicate as quickly as possible whether the colour in which the word is written matches the word itself or not. Most people respond faster and more accurately to the congruent trial as compared to the incongruent trial. The correctness of response of the subject and average reaction time will be calculated in seconds for the three groups.[10]

Data and Statistical analysis

All statistical analysis was done using SPSS software version 21 for windows (IBM SPSS, INC, Chicago, IL). The continuous variables (stress scale and coping scale) are presented as mean ± SD and the categorical variables (cognition) are presented as numbers and percentages. 'T- Test' was used to compare the continuous variables between the three groups. Correlation was seen between coping scale and PSS score along with the parameters of the Stroop test - % correctness of the response and reaction time. 'P value' ≤ 0.05 was considered to be significant.

Table 1: Socio-demographic features of the study participants (n=150)

Parameter	Mean	Std. Deviation
Age (in years)	19.69	1.63
		Number (%)
Gender	Male	69 (46%)
	Female	81 (54%)
Year of the Study	First year student	127 (84%)
	Second year student	23 (16%)
Religion	Hindu	145 (96%)
	Muslim	02 (1.3%)
	Sikh	02 (1.3%)
	Jain	01 (0.6%)
Type of family	Joint	50 (33%)
	Nuclear	100 (66%)

Table 2: PSS Score of all the subjects categorized as low, moderate and high (n=150)

PSS score	Mean	Std. Deviation	P value
Low (N=8)	20.00	1.77	
Moderate (N=133)	19.62	1.64	
High (N=9)	20.44	1.33	0.29
Total (n=150)	19.69	1.63	

Table 3: Distribution of Cope Scale Score of the participants categorized according to their Stress level (n-150)

Category of Stress	Mean	SD
Low (N=8)	37.50	4.81
Moderate (N=133)	37.22	5.92
High (N=9)	31.44	9.69

Table 4: Results of the 'Stroop Test' of the study participants

Stroop Test	Minimum	Maximum	Mean	Std. Deviation
Percentage of correct response (%)	72.00	100.00	97.39	4.13
Reaction time taken (msec)	1000	6000	2106.79	792.12

Table 5: Reaction Time and Percentage of Correct Response of 'Stroop Test' in the three categories of subjects

Category of Stress	Reaction time (msec)	Percentage correctness of response (%)
Low (N=8)	2023±489.05	95.88 ± 4.73
Moderate (N=133)	2120±792.33	97.48 ± 4.16
High (N=9)	1983±1044.75	97.55 ± 3.13

Table 6: Correlation between PSS Score, Coping scale and Stroop test parameters

Pearson Correlation	PSS score	Coping Scale	Percentage of correct response (%)	Reaction Time (msec)
PSS score	1	**-0.20****	0.07	-0.06
Coping Scale	**-0.20****	1	-0.05	**- 0.08****
% of correct response	0.07	-0.05	1	**-0.18***
Reaction Time taken	-0.07	**-0.08****	**- 0.18***	1

****.** Correlation is significant at the 0.01 level

*. Correlation is significant at the 0.05 level

OBSERVATIONS AND RESULTS

This study was conducted by the Department of Physiology of a Govt. Medical College located in the state of Rajasthan. The aim of our study was to estimate the stress level of medical students aged between 18-25 years using the Perceived Stress Scale (PSS). The Stress Score was correlated with the 'Stroop Test' that evaluated their cognition and with the Coping mechanism using the 'Coping Scale'. The total number of participants in our study was 150. The socio-demographic features of study participants can be seen in Table 1. The PSS Score of the study participants can be seen in Table 2. Most of the subjects were in the category of moderate stress (88.6%) while the remaining were almost equally distributed in the category of mild and severe stress.

The score of the 'Coping Scale' in all the subjects can be seen in Table 3. The overall mean ± SD of the score was 36.89±6.25. Table 4 shows the results of the 'Stroop Test' The average reaction time of the study participants was 2106.79 ± 792.1 msec whereas the percentage correctness of response was 97.39 ± 4.13 %. The reaction time and percentage correctness of response of 'Stroop Test' in all the subjects divided into 3 categories can be seen in Table 5.

The correlation between the various parameters of the study can be seen in Table 6. Significant negative co-relation can be seen between the PSS Score and Coping Scale as well as between the Coping Scale and reaction time of the Stroop Test. The reaction time and percentage correctness of response of the Stroop Test were also seen to be negatively significantly correlated. No correlation was seen between the remaining parameters.

DISCUSSION

The present study was done to determine the stress level of medical students aged between 18-25 years using the Perceived Stress Scale (PSS). This was correlated with the 'Stroop Test' that evaluated their cognitive functions and with the coping mechanism assessed using the Coping Scale.

A similar study was conducted by George et al. in the age group of 17-25 years where majority of the participants were females (58.3%) and were in the age group of 17-19 years (55.1%). Most of them belonged to the first semester (31%) and were staying in the hostel (91.7%) and had parents who had an annual income of less than 5 lakh rupees (17.2%). It was also observed that majority of the students had non –working mothers (52.4%) and had at least one sibling (69.3%).[11] Another similar cross-sectional study was done by N. Shakthivel et al on medical undergraduates in South India that also had similar findings as ours. Majority of the students were girls (68.8%) and had a mean age of 18 ± 0.5 years. Most of the participants were hostellers, were Hindus, whose fathers were professionals while the mothers were homemakers and lived in a nuclear family.[12]

In the present study we assessed the stress level of students using the PSS Score. Most of the subjects were in the category of moderate stress (88.6%) while the remaining were almost equally distributed in the category of mild stress (N= 8) and severe stress (N=9). A cross – sectional study was done by N. Shakthivel et al in the year 2017 where they found that 80% of the boys and 75% of the girls fell in the category of moderate stress, a higher percentage of boys reported moderate stress (50%) as compared to girls (39%). Among students who reported moderate or high stress levels, the most commonly employed coping mechanism was found to be religion (25%) followed by self-distraction (19%), instrumental support (19%), positive reframing (19%) and humour (16%). Among boys, the most common mechanism was humour (26%) followed by self-blaming (19%), whereas in girls the commonest strategy was turning towards religion (30%) followed by positive reframing (22%).[12] A similar study done by S Nair et al in Karnataka showed 19.58% of the students were moderately stressed and 13.74% were severely stressed.[11] Similar findings have been reported in a study done by Waghachavare VB et al. where the mean PSS Score reported was 19.69±1.6. Majority of the students had moderate levels of stress (75.1%), followed by those with a severe level of stress (13.5%) and a mild stress level (11.4%).[13] A study by Safree, Yasin and Dzulkifli (2010) also indicated similar results. They found that depression, anxiety, and stress are negatively correlated with academic achievement. The study found that the ability to manage stress was equally important.[14]

In our study we have used a standardized 'Cope Scale' to assess the cognitive, emotional, and behavioural methods of dealing with stressful situations. The overall mean ± SD of the score was 36.89±6.25. Students' preferences for the methods used for managing stress vary according to their field of study, for example students at the College of Nursing used social support as a coping method more than their counterparts in the other colleges.[15] In another study, it was seen that the most widely employed coping mechanisms were problem-solving and social support. These findings were consistent with an experimental study that indicated that it is strongly advised to encourage the students to use 'social support' as a coping mechanism. Coping strategies help in tackling stress, however, use of dysfunctional coping strategies such as anger, distraction and avoidance may worsen stress.[16] A study done by Dhar et al. in the year 2009 reported the five most frequently used coping strategies were: positive thinking, listening to the music/radio, solving family problems, talking to parents and praying more.[17] Singh et al (2011) also found that the most commonly used coping strategies that were used by 77.3 % of the students to relax were: watching TV, movies, a shower, shopping, sleeping and physical exercises.[18]

In the current study we have used the 'Stroop Test' to evaluate cognitive functions of the subjects in all three categories of subjects. The average reaction time of the study participants was 2106.79 ± 792.1 msec whereas the percentage correctness of response was 97.39 ± 4.13 %. A study was done to assess the reaction time of Stroop Test in Nepalese medical students in the year 2014. The subjects had a significantly higher reaction time for the incongruent trial as compared to the congruent trial ($p<0.001$).[19]

In our study we assessed co-relation between the PSS Score, Coping Scale and Stroop test parameters. A significant negative co-relation was seen between the PSS Score and Coping Scale as well as between the Coping Scale and reaction time of the Stroop Test. The reaction time and percentage correctness of response of the Stroop Test were also found to be negatively significantly correlated. Similar results were seen in a study conducted in the year 2015 by Abd Elaziz where a significant negative correlation was seen between perceived stress levels with coping strategies.[20] Ganesan Y. et al. in their study also reported like us that majority of students have moderate level of stress and there was a significant inverse relationship between stress level and coping strategies among students.[21]

Another similar study done by George et al. observed that the coping mechanisms used by the severely stressed students such as self-distraction, use of emotional support, behavioural disengagement, venting and planning were far different from those used by students who were less stressed, pointing to the fact that these methods failed to control stress.[11]

CONCLUSIONS

Our study showed that most of the subjects (88.67%) were in the category of moderate stress as seen from the PSS Scores. There was a significant negative co-relation between the PSS Scores and the Coping Scale as well as between the Coping Scale and reaction time of the Stroop Test. Hence we can conclude that moderate to severe level of stress had negative effect on coping mechanism and cognitive functions of students.

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REFERENCES

1. Jordan RK, Shah SS, Desai H, Tripi J, Mitchell A, Worth RG et al. Variation of stress levels, burnout, and resilience throughout the academic year in first-year medical students. PLoS One 2020;15: e0240667.

2. McKerrow I, Carney PA, Caretta-Weyer H, Furnari M, Miller Juve A et al. Trends in medical students' stress, physical, and emotional health throughout training. Med Educ Online 2020; 25:1709278.
3. Sreeramareddy CT, Shankar PR, Binu VS, Mukhopadhyay C, Ray B, Menezes RG et al. Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal. BMC Med Educ 2007; 7:26.
4. Shaikh BT, Kahloon A, Kazmi M, Khalid H et al. Students, stress and coping strategies: A case of Pakistani medical school. Educ Health (Abingdon) 2004; 17:346-53.
5. Kaewpila W, Thaipisuttikul P, Awirutworakul T, Jumroonrojana K et al. Depressive disorders in Thai medical students: An exploratory study of institutional, cultural, and individual factors. Int J Med Educ 2020; 11:252-60.
6. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. Journal of Health and Social Behavior 1983;24(4):385–96.
7. Holahan CJ, Moos RH. Personal and contextual determinants of coping strategies. Journal of Personality and Social Psychology 1987; 52(5): 946-955.
8. Spitzberg B, Cupach W. Managing unwanted pursuit. In M. Motley (Ed.), Studies in Applied Interpersonal Communication 2008: 3-25. Thousand Oaks, CA: Sage.
9. Stroop JR. Studies of interference in serial verbal reactions. J of Experimental Psychology 1935; 18(6):643-662.
10. https://www.memozor.com/other-memory-games/words-memory-games/stroop-effect-game.
11. George LS, Balasubramanian A, Paul NK, Leelamoni K. A Study on Perceived Stress and Coping Mechanisms Among Students of a Medical School In South India. JEBMH 2016;3(38):1889-1895.
12. Shakthivel N, Amarnath VM, Ahamed F. Level of Perceived Stress and Coping Strategies Prevailing Among 1st year Medical Undergraduate Students: A Cross-sectional Study from South India June. International Journal of Medicine and Public Health 2017;7(2):111-115.
13. Nair S, Ramesh A, Hiremath, SG. Perceived stress among medical undergraduates in a private medical college in Raichur, India. International Journal of Recent Scientific Research 2013;4(4):428-431.
14. Yasin AS, Yasin SM, Dzulkifli MA. The relationship between social support and academic achievement among students. International Journal of Business and Social Sciences 2010;1(3): 110 – 16.
15. Rużyczka EW, Jabłeka M. Job burnout syndrome and stress coping strategies of academic students. Polish Journal of Public Health 2013;123(3): 241-247.
16. Baqutayan S. Stress and social support. Indian Journal of Psychological Medicine 2011; 33(1):29–34.
17. Dhar R, Walia I, Das K. A descriptive study to assess the causes of stress and coping strategies used by the newly admitted basic B.Sc nursing students. Nursing and Midwifery Research Journal 2009; 5(1): 31-37.
18. Singh C, Sunita S and Sharma R. Level of stress & coping strategies used by nursing intern. Nursing & Midwifery Research Journal 2011; 7(4): 152-60.
19. Ghimire N, Paudel BH, Khadka R, Singh PN. Reaction time in Stroop test in Nepalese Medical Students. J Clin Diagn Res. 2014; 8(9): BC14-6.
20. AbdElaziz EM, Shehata AG. Perceived Stress and Coping Strategies among Nursing Students at Ras Al Khaima Medical and Health Science University in the United Arab Emirates. Alexandria Scientific Nursing Journal 2015; 17(2): 21-36.
21. Ganesan Y, Talwar P, Fauzan N, Oon YB. A Study on Stress Level and Coping Strategies among Undergraduate Students. Journal of Cognitive Sciences and Human Development 2018; 3(2): 37-47.

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