



PSYCHOLOGICAL STRESS LEVELS IN MEDICAL STUDENTS AND TEACHERS DURING COVID 19 PANDEMIC

Psychiatry

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ABSTRACT

Background: In present situation, Corona virus disease 2019 (COVID-19) pandemic has emerged as major threat to physical health of people, along with paramount socio-economic and unmeasurable psychological consequences globally. Psychological impact of these prevalent circumstances is far more challenging for medical students and medical teachers. Aim: This study focuses on assessing mental stress levels in medical students and teachers due to COVID-19 pandemic.

Methods: A cross-sectional observational study with a sample size of 119 medical students and 60 medical teachers was conducted by Department of Physiology, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi, India. Two established validated scales - perceived stress scale -10 and Zung self-rating anxiety scale, were used to determine stress and anxiety status respectively of both medical students and medical teachers during ongoing COVID-19 outbreak and also decipher their association with other socio-demographic and emotional conditions. Data was collected through an online survey distributed as google forms.

Results: Perceived stress and anxiety levels were high amongst both medical students and medical teachers. Correlational analysis revealed strong positive association between perceived stress score and anxiety score in both the groups. Even after normalization of age and similar distribution of gender in two groups - medical students had higher anxiety and perceived stress levels than medical teachers.

Conclusion: The existing COVID outbreak is culminating to higher stress and anxiety levels in the medical profession with higher manifestation of the same in medical students. Remedial measures and effective training should be provided to this affected group.

KEYWORDS

medical students, medical teachers, perceived stress scale, Zung self-rating anxiety scale, Corona virus disease.

INTRODUCTION

The year 2020 has been challenging as the entire world has been facing the Corona virus disease 2019 (COVID-19) pandemic. Besides being a major threat to the lives and physical health of people, it has resulted in paramount socio-economic and unmeasurable psychological consequences in various populations [1-4]. Probable reasons for this immense impact on mental health could be multifactorial - social isolation, economic recession, fear due to insufficient knowledge of COVID 19, social stigma, and future insecurities to name a few [2]. Stress, anxiety, depressive symptoms, insomnia, denial, anger and fear have emerged as some of the most common mental health issues associated with the COVID-19 outbreak [5,6].

This situation is far more disabling for the students who - besides the above-mentioned difficulties - have also to adapt to the situation of suspension of their respective ongoing classes and sudden introduction of virtual learning to meet the gap. Many studies have reported a significant negative impact on psychological well-being of this vulnerable group across the globe [7,8]. This is even more demanding for medical students who have in general also been shown to exhibit higher levels of anxiety, stress and depression than their counterpart students [9]. Several studies conducted in differing sub-population of medical students using diverse questionnaires and scales have reported variable levels of anxiety, stress and depression in the present COVID era [7,10-15]. Most studies have utilized scales which are used for diagnosis of clinically significant psychological conditions thus maybe less sensitive in detecting subtle psychological distress experienced by the medical students [7,10,12, 14]. One of the studies was based on the overall psychological distress score which fails to delineate the manifestations into anxiety or stress parameters [10]. The rest of the two studies have used a single scale Depression Anxiety Stress Scales (DASS-21) to estimate the prevalence of psychological burden where the first study was restricted to first year medical students and the second study sample comprised all years medical undergraduate students [15-17].

Stress and anxiety are related but they exist as two separate entities and deciphering the differential presence of the two will aid in development of better coping mechanisms to help the exposed medical students. "Stress" is a physiological adaptive response to an actual or perceived stressor. Although, severe or prolonged stress might culminate to disbalance of homeostasis [18]. On the contrary, anxiety

is a response to stress -defined by apprehension, tension, or uneasiness that stems from the feeling of lack of control due to inability to handle a challenge [19]. Thus, perceived stress and anxiety represent a continuum of subclinical psychological impact of stressor and it is important to assess the two together in a population to have a holistic idea. Besides, the perceived stress scale is used to measure chronic stress which could be experienced due to the underlying anxiety levels (gauged using the Zung self-anxiety scale in this study) in an individual. Stress and anxiety present as early manifestations of psychological burden which later ends up to clinical conditions like depression, insomnia etc. If the early signs are assessed it will not only be more sensitive in early screening of sub-clinical status of the affected population, it will also allow early risk stratification and subsequent management. Therefore, the present study focuses on measuring the perceived stress scale and anxiety levels due to the COVID-19 separately using two validated scales in the medical students.

Apart from this, we could not come across any literature focusing on the stress and anxiety levels of medical teachers which also form a high-risk group in the current COVID pandemic. Most available literature exists on health care workers which forms a non-homogenous group including nurses, medical technicians, private practitioners and so on. There is lack of a systematic study conducted on the target group of our study - medical teachers (doctors who are also teaching). This susceptible group - not only have to cope with the COVID related factors, but also additional stressors like learning and using the online mode of teaching to students, additional workload and pressure in the pandemic, fear of contracting COVID and spreading to family members and many more such factors.

Both medical students and teachers are the pillars of medical system throughout the world. It is of paramount importance to any country to decipher the psychological status especially in the current situation and help them in reducing their stress levels. In countries with limited resources and huge population load- it is also essential to delineate amongst students and teachers who are the most affected and thus one by one cater support in the order of their requirements (need analysis for management strategies).

To the best of our knowledge, this would be the first study trying to assess both the perceived stress scale and anxiety levels using two

different validated questionnaire-based scales in both medical students and medical teachers together and comparing the same in these two highly vulnerable populations in the ongoing pandemic.

Methods

Study Population

A cross-sectional observational study with a sample size of 119 medical students and 60 medical teachers was conducted by the Department of Physiology, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi, India. The study was approved by the ethics committee for research in human subjects and informed consent was obtained from all the participants.

The primary objective of this study was to determine the stress and anxiety status of both medical students and medical teachers during the ongoing COVID-19 outbreak and also decipher their association with other socio-demographic and emotional conditions. Data was collected through an online survey distributed as google forms. We have utilized two of the established validated scales - perceived stress scale -10 (PSS) for stress and Zung self-rating anxiety scale for anxiety respectively. Additionally, the questionnaire had close-ended questions regarding the socio-demographic and emotional profile of medical students.

Perceived Stress Scale (PSS) - 10

PSS is one of the most widely used psychological instruments for measuring the perception of stress. It is a measure of the degree to which situations in one's life are appraised as stressed. It predicts both objective biological markers of stress (like serum cortisol) and increased risk of disease in people with higher perceived stress levels.

It has a set of 10 questions asking about the person's feelings and thoughts during the past month. Each question is rated on a 5-point scale ranging from never (0) to almost always (4). Positively worded items are reverse scored (questions 4, 5, 7, and 8), and the ratings are summed, with higher scores indicating more perceived stress: Scores ranging from 0-13 would be considered low perceived stress; Scores ranging from 14-26 would be considered moderate perceived stress; Scores ranging from 27-40 would be considered high perceived stress. Previous studies have suggested that the PSS-10 shows adequate internal consistency, test-retest reliability, and validity across different populations [20].

Zung Self-Rating Anxiety Scale

Zung self-rating anxiety scale (SAS) was designed as a simple bedside scale to assess a person's level of anxiety. The SAS comprises a 20-item self-report assessment device built to measure anxiety levels, based on scoring in 4 groups of manifestations: cognitive, autonomic, motor and central nervous system symptoms. Answering the statements, a person indicates how much each statement applies to him or her within a period of one or two weeks prior to taking the test. Each question can be answered with a response using a 4-point scale, from 'none of the time' to 'most of the time.' Amongst the 20 questions - 15 are increasing anxiety level questions and 5 are decreasing anxiety questions [21].

The total raw score ranges from 20-80. The score is then graded as follows to determine the clinical interpretation of one's level of anxiety: 20-44: Normal range; 45-59: Mild to moderate anxiety levels; 60-74: Marked to severe Anxiety Levels; 75 and above: Extreme anxiety levels [22].

SAS has been shown to be a good discriminating test for anxiety disorders. Moreover, it is found to be more sensitive and specific in comparison with one of the already established Depression Anxiety Stress Scale (DASS) anxiety index [22,23]. Amongst all the scales available to screen for anxiety, the SAS emerges to be one of the more successful ones delving deeper into the specific symptoms of anxiety itself, rather than concentrating on general negativity of emotions which is common to both depression and anxiety [22, 23, 24].

Statistical Analysis

Each parameter was tested for distribution of the data based on standard normality tests and mostly found to be non-parametric and thus represented as median and interquartile range. The sub-grouping data on the basis of grading of scales represents the absolute number falling in each grade followed by percentage represented in brackets. Descriptive data of socio-demographic and emotional responses has

been represented in the form of absolute number followed by percentage in brackets. The level of statistical significance was set at $p < .05$ (two-tailed). Comparison of descriptive data of teachers and students was done using Mann-Whitney U test. Association between variables was determined by using Spearman (non-Gaussian) correlation analysis. Comparison of the sub-groups of stress and anxiety scales was done using Chi-square test. All statistical analyses were performed using GraphPad Prism version 5.00 for windows (GraphPad Software, Inc., USA). Multiple regression analysis for perceived stress scale was done using the stepwise method including all variables found to have $p < .07$ in univariate correlation analysis using MedCalc software version 12.2.1.0 for Windows.

RESULTS

The present study assessed the perceived stress and anxiety levels in the current COVID outbreak in 119 medical students and 60 medical teachers in India.

Descriptive Profile Of The Study Population

The teachers' median age was 37 years while students' median age was 21 years. As expected, the medical students were statistically younger than their medical teachers. The gender distribution amongst the medical students and medical teachers did not differ with similar representation of males and females (Table 1).

However, in terms of the psychological impact of COVID - both the perceived stress scale (PSS) score and Zung self-rating anxiety scale (SAS) score was significantly higher in medical students as compared to their medical teachers (Table 1).

Table 1. Descriptive Data

Parameter	Teachers (n = 60) Median (interquartile range)	Students (n = 119) Median (interquartile range)	p value
Age (years)	37 (33-40)	21 (19-22)	<.0001
Gender (M: F) *	22:37	63:56	ns
PSS score	15 (11-16.75)	22 (17-27)	<.0001
SAS score	35.00 (27.00-38.75)	40.00 (34-45)	<.0001

Note. M = male; F = female; PSS = Perceived Stress Scale; SAS = Zung anxiety score.

* Represents absolute numbers and rest all values are represented as median (interquartile range).

Distribution Of Perceived Stress Scale (PSS) And Zung Self-Rating Anxiety Scale (SAS) In The Study Population

Although the median PSS score of teachers was lower than students - amongst the teachers maximum people had scores in the moderate range while in the medical students group - maximum had scores in the low perceived stress range (Table 2).

Table 2. Grading Of Perceived Stress Scale (PSS) For Teachers And Students

	Low Perceived Stress		Moderate Perceived Stress		High Perceived Stress	
	n	(%)	n	(%)	n	(%)
Teachers (n = 60)	26	(43.33)	33	(55.93)	1	(1.69)
Students (n = 119)	112	(94.11)	6	(5.04)	1	(.85)

However, in terms of anxiety - in concordance to overall anxiety being lower in medical teachers than medical students - maximum teachers had scores in the normal category while the students had maximum scores in the mild to moderate category. Strikingly, quite a few students also had scores in the moderate to severe category as well (Table 3).

Table 3. Grading Of Zung Self-rating Anxiety Scale (SAS) For Teachers And Students

	Normal		Mild to Moderate		Moderate to Severe	
	n	(%)	n	(%)	n	(%)
Teachers (n = 60)	52	(86.67)	8	(13.33)	0	(0)
Students (n = 119)	9	(7.56)	77	(64.71)	33	(27.73)

Descriptive Data on Responses of Medical Students on additional questions on Socio-Demographic and Emotional aspects

The maximum medical students in our study hailed from an urban background. The level of education of both parents for the majority of students was till graduate level and for some being till postgraduate level (Table 4).

Table 4. Grading Of Responses From Medical Students On Questions On Socio-demographic Profile

In which area, are you residing while pursuing the online education	Rural <i>n</i> (%)	37 (31.1)
	Urban <i>n</i> (%)	82 (68.9)
What is the education level of your mother?	Primary <i>n</i> (%)	8 (6.7)
	Secondary <i>n</i> (%)	13 (10.9)
	Matric <i>n</i> (%)	9 (7.6)
	Inter <i>n</i> (%)	5 (4.2)
	Graduate <i>n</i> (%)	70 (58.8)
	Postgraduate <i>n</i> (%)	14 (11.76)
What is the education level of your father?	Primary <i>n</i> (%)	3 (2.5)
	Secondary <i>n</i> (%)	6 (5)
	Matric <i>n</i> (%)	8 (6.7)
	Inter <i>n</i> (%)	11 (9.2)
	Graduate <i>n</i> (%)	76 (63.9)
	Postgraduate <i>n</i> (%)	15 (12.6)

During the lockdown period, the majority of students have communicated mostly with their close family members several times a day. The frequency of communication was less with distant family members. They have also frequently communicated with their close friends and batch mates. Few students have interacted with voluntary staff or non-government organizations (NGOs) as well.

They were more comfortable in approaching their family members in case of sickness or apprehensions about the Covid 19 crisis but for sorting their study related issues, online classes related problems or when depressed they preferred speaking to their close friends or batchmates rather than family for support.

Overall, during the ongoing pandemic, the positive emotions (like hopefulness, joy) were overridden by negative emotions (like frustration, anger, boredom and anxiety) amongst the students. Most of the students seemed to be pessimistic about the whole scenario (Table 5).

Table 5. Grading Of Responses From Medical Students On Questions On Various Emotional Aspects

1. How often you have communicated with following people in the lockdown period		
Close Family Members	Several times a day <i>n</i> (%)	68 (57.14)
	Once a day <i>n</i> (%)	19 (15.97)
	Several times a week <i>n</i> (%)	10 (8.4)
	Once a week <i>n</i> (%)	9 (7.56)
	Twice or thrice a month <i>n</i> (%)	7 (5.88)
	Not at all <i>n</i> (%)	6 (5.04)
More Distant Family Members	Several times a day <i>n</i> (%)	2 (1.68)
	Once a day <i>n</i> (%)	7 (5.88)
	Several times a week <i>n</i> (%)	27 (22.69)
	Once a week <i>n</i> (%)	22 (18.49)
	Twice or thrice a month <i>n</i> (%)	43 (36.13)
	Not at all <i>n</i> (%)	18 (15.13)
Close Friends	Several times a day <i>n</i> (%)	25 (21.01)
	Once a day <i>n</i> (%)	23 (19.33)
	Several times a week <i>n</i> (%)	31 (26.05)
	Once a week <i>n</i> (%)	16 (13.45)
	Twice or thrice a month <i>n</i> (%)	14 (11.76)
	Not at all <i>n</i> (%)	10 (8.4)
Batch Mates	Several times a day <i>n</i> (%)	14 (11.76)
	Once a day <i>n</i> (%)	17 (14.29)
	Several times a week <i>n</i> (%)	27 (22.69)
	Once a week <i>n</i> (%)	20 (16.81)
	Twice or thrice a month <i>n</i> (%)	19 (15.97)
	Not at all <i>n</i> (%)	22 (18.49)
Voluntary Staffs/NGO	Several times a day <i>n</i> (%)	4 (3.36)
	Once a day <i>n</i> (%)	4 (3.36)
	Several times a week <i>n</i> (%)	3 (2.52)
	Once a week <i>n</i> (%)	6 (5.04)
	Twice or thrice a month <i>n</i> (%)	15 (12.61)
	Not at all <i>n</i> (%)	87 (73.11)

2. In the following situations, whom would you like to approach first among the following

If you are depressed and need to talk about it	Close family members <i>n</i> (%)	44 (36.97)
	More distant family members <i>n</i> (%)	2 (1.68)
	Close friends <i>n</i> (%)	58 (48.74)
	Batch mates <i>n</i> (%)	1 (0.84)
	Voluntary staffs/NGO <i>n</i> (%)	2 (1.68)
	Others <i>n</i> (%)	0 (0)
Talk about study related problems	No one <i>n</i> (%)	12 (10.08)
	Close family members <i>n</i> (%)	16 (13.45)
	More distant family members <i>n</i> (%)	3 (2.52)
	Close friends <i>n</i> (%)	71 (59.66)
	Batch mates <i>n</i> (%)	27 (22.69)
	Voluntary staffs/NGO <i>n</i> (%)	0 (0)
Help you with online platforms like zoom, MS teams etc.	Others <i>n</i> (%)	0 (0)
	No one <i>n</i> (%)	2 (1.68)
	Close family members <i>n</i> (%)	19 (15.97)
	More distant family members <i>n</i> (%)	2 (1.68)
	Close friends <i>n</i> (%)	48 (40.34)
	Batch mates <i>n</i> (%)	43 (36.13)
If you wanted to talk about COVID crisis	Voluntary staffs/NGO <i>n</i> (%)	3 (2.52)
	Others <i>n</i> (%)	0 (0)
	No one <i>n</i> (%)	4 (3.36)
	Close family members <i>n</i> (%)	47 (39.5)
	More distant family members <i>n</i> (%)	6 (5.04)
	Close friends <i>n</i> (%)	38 (31.93)
3. To what extent you felt the following emotions while studying and attending online classes in this lockdown due to COVID outbreak.	Batch mates <i>n</i> (%)	14 (11.76)
	Voluntary staffs/NGO <i>n</i> (%)	6 (5.04)
	Others <i>n</i> (%)	4 (3.36)
	No one <i>n</i> (%)	4 (3.36)
	Close family members <i>n</i> (%)	22 (18.49)
	Rarely <i>n</i> (%)	39 (32.77)
Joyful	Often <i>n</i> (%)	25 (21.01)
	Sometimes <i>n</i> (%)	29 (24.37)
	Always <i>n</i> (%)	4 (3.36)
	Never <i>n</i> (%)	12 (10.08)
	Rarely <i>n</i> (%)	33 (27.73)
	Often <i>n</i> (%)	41 (34.45)
Hopeful	Sometimes <i>n</i> (%)	24 (20.17)
	Always <i>n</i> (%)	9 (7.56)
	Never <i>n</i> (%)	12 (10.08)
	Rarely <i>n</i> (%)	23 (19.33)
	Often <i>n</i> (%)	32 (26.89)
	Sometimes <i>n</i> (%)	46 (38.66)
Angry	Always <i>n</i> (%)	6 (5.04)
	Never <i>n</i> (%)	7 (5.88)
	Rarely <i>n</i> (%)	15 (12.61)
	Often <i>n</i> (%)	39 (32.77)
	Sometimes <i>n</i> (%)	47 (39.5)
	Always <i>n</i> (%)	11 (9.24)
Frustrated	Never <i>n</i> (%)	10 (8.4)
	Rarely <i>n</i> (%)	22 (18.49)
	Often <i>n</i> (%)	35 (29.41)
	Sometimes <i>n</i> (%)	41 (34.45)
	Always <i>n</i> (%)	11 (9.24)
Anxious	Never <i>n</i> (%)	6 (5.04)
	Rarely <i>n</i> (%)	16 (13.45)
	Often <i>n</i> (%)	35 (29.41)
	Sometimes <i>n</i> (%)	47 (39.5)
	Always <i>n</i> (%)	15 (12.61)
Bored	Never <i>n</i> (%)	6 (5.04)
	Rarely <i>n</i> (%)	16 (13.45)
	Often <i>n</i> (%)	35 (29.41)
	Sometimes <i>n</i> (%)	47 (39.5)
	Always <i>n</i> (%)	15 (12.61)

Correlational Analysis Teachers.

As expected, the perceived stress score and anxiety score in medical teachers had a strong positive association with each other ($r = .691$ and $p \leq .0001$) - that is those with higher PSS also have higher anxiety. Moreover, women medical teachers had significantly higher anxiety than males.

Students.

Similar to the findings of teachers, medical students with higher perceived stress levels experienced more anxiety ($r = .6121$ and $p = .0001$) and females had higher anxiety scores than males. Additionally, students affected by any chronic ailment had higher anxiety scores and perceived stress levels ($p = .0001$). Students who were frequently communicating with their close family members, friends or batchmates experienced lesser anxiety ($p = .05$). Also, the students

who often discussed their concerns with either peers or family members were found to be less anxious than the ones who didn't talk with anyone ($p = .018$).

Further, students hailing from urban areas had higher perceived stress levels ($r = .20$ and $p = .02$). Surprisingly, we found a weak positive correlation of PSS with mothers' education level, ie, students whose mothers were highly educated had more perceived stress ($r = .23$ and $p = .09$). Furthermore, students who frequently contacted their batchmates had lesser perceived stress levels ($p < .01$). Also, students who often discussed their concerns with peers or family members were found to have low perceived stress ($p < .01$).

Overall Group (Teachers And Students Together).

After considering both the groups together we found a highly significant positive correlation between SAS score and PSS score ($r = .683$ and $p < .0001$). On the similar lines, a positive correlation was found between SAS score and grading of PSS ($r = .594$ and $p < .0001$). Also, there was a positive correlation between anxiety and age ($r = -0.215$ and $p = .0037$). However, overall association between anxiety and gender was not significant ($r = .09$ and $p = .22$).

Multiple Regression Analysis to decipher the Determinants of Perceived Stress Scores in Medical Students and Teachers

On multiple regression analysis - the PSS score emerged to be dependent on three variables - anxiety scores, age and gender with positive association with higher anxiety score and female gender and negative association with older age groups (Table 6).

Table 6. Multiple Regression Analysis Of Perceived Stress Score

Dependent Y	PSS score		
Method	Stepwise		
Sample size	179		
Coefficient of determination R^2	0.6094		
R^2 - adjusted	0.6027		
Multiple correlation coefficient	0.7806		
Residual standard deviation	4.9196		
<i>Regression Equation</i>			
Independent variables	Coefficient	SE	p
(constant)	6.5344		
SAS Score	.4407	.3817	<.0001
Age	-0.3286	.04346	<.0001
Gender	3.0444	.7473	.001

Note. SE indicates standard error

One of the major findings of this study was that overall medical students were found to be experiencing higher perceived stress than medical teachers. After regression analysis - two confounding variables emerge age and gender as determinants of PSS and plausible reasons for difference in these two groups. But the gender distribution in these two groups was similar and also - even after normalization of age, we still found that the medical students have higher anxiety and perceived stress levels than medical teachers (Figure1, 2).

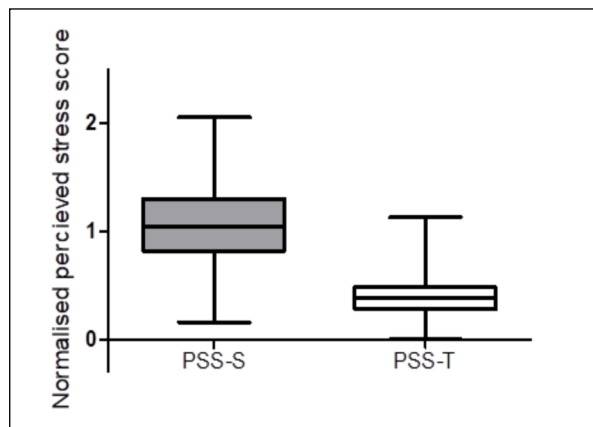


Figure 1. Comparison of perceived stress scales normalised to age in medical students and medical teachers. Box-and-whisker plots show median as horizontal line and box as the interquartile range, whiskers indicate the 10th and 90th percentiles.

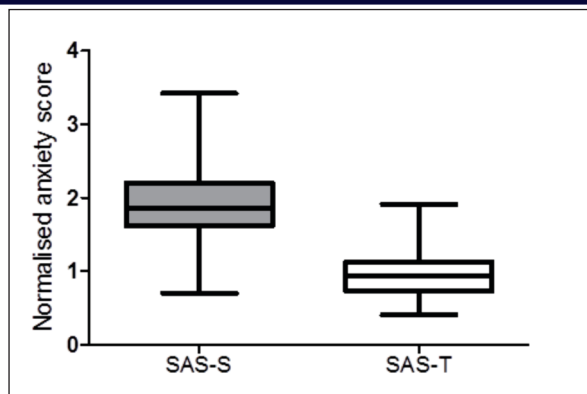


Figure 2. Comparison of Zung self-rating anxiety scale normalised to age in medical students and medical teachers. Box-and-whisker plots show median as horizontal line and box as the interquartile range, whiskers indicate the 10th and 90th percentiles.

DISCUSSION

The present study found that due to the ongoing COVID - 19 pandemic the perceived stress and anxiety levels were high amongst both medical students and medical teachers. The medical students experienced higher levels of stress and anxiety as compared to their teachers. But interestingly, in terms of distribution of perceived stress - the majority of students fell into the category of low stress levels while 43% teachers had stress levels in the low perceived stress category and 56% teachers had stress levels in the moderate category. Strikingly, the anxiety score distribution pattern showed - only 13 % of teachers fell in the category of mild to moderate scale with none in moderate to severe whereas in students - 65 % did experience mild to moderate anxiety and also 27 % in the category of moderate to severe anxiety. Moreover, we also found that the negative emotions predominated in the students during this pandemic time. We further performed correlational analysis to decipher the relationship between various socio-demographic factors, perceived stress levels and anxiety levels in medical students and teachers. Finally, on multiple regression analysis - the determinants of perceived stress score in both medical students and teachers together were found to be positive association with higher anxiety score and female gender and negative association with older age groups. Also, even after normalization of age and similar distribution of gender in the two groups -we still found that the medical students have higher anxiety and perceived stress levels than medical teachers. Thus, the salient finding of our study is that the existing COVID outbreak is culminating to higher stress and anxiety levels in the medical profession with higher manifestation of the same in the medical students.

Perceived stress scale (PSS) is a validated self-report measure to assess chronic stress perception by an individual. It has been widely utilized in research studies as a marker of global stress as well as to gauge efficiency of any intervention on psychological stress [25-27]. It had also been correlated to psychiatric or physical ailments. Moreover, literature suggests the relationship of PSS with quality of life, job satisfaction, immune functions and depression [28-30]. Consequently, it can be concluded that PSS is one of the important scales to evaluate stress. The prominent finding of this study was high PSS (mean value lying in the category of moderate stress) in the medical students. Very few studies have measured PSS in medical students during COVID outbreak - but their results are in concordance to our study that they have high levels of perceived stress [31,32]. Although, in our study we found that the maximum number of students falls in the category of low PSS as compared to these studies which show moderate to severe PSS in their study population - these differences could be apparently due to difference in geographical location or post- COVID timeline of conduction of study.

Zung self-rating anxiety (SAS) scale is a norm-referenced scale which is a well-accepted instrument for adults and adolescents to make self-report measurements of anxiety in both clinical and research settings. It has good psychometric credentials with internal consistency reliability coefficient of 0.80 [33]. Most studies on assessment of anxiety in medical students have used diverse scales mostly relevant for clinical conditions which may fail to detect earlier signs of psychological distress. Few studies have used Zung self-rating anxiety

scale but these are conducted on working mothers, healthcare workers and hospital staff [34- 36]. However, literature where Zung self-rating anxiety scale in medical students in COVID pandemic is scarce and contrasting to our study indicating no anxiety in students [36]. This result is not only unrealistic but also as opposed to other studies where anxiety has been assessed using other scales [14, 37].

Additionally, the PSS and anxiety score was higher in students than the teachers. We could not find studies focusing per se on PSS and SAS in medical teachers as most studies available include either medical staff or healthcare professionals (and thus have lack of clarity whether they are also involved in teaching of medical students). In terms of distribution - maximum students fared in the low PSS range while almost 56 % teachers were in the moderate category. In anxiety scale - picture was contrary - majority of students fell in mild to moderate range and maximum teachers were non-anxious. As we discussed, anxiety and stress exist in continuity. Chronic anxiety can culminate in higher perceived stress. Although, the students had low PSS but if the anxiety levels are not addressed in them it might culminate to higher distress in future. Overall, the students were more anxious and stressed than their teachers. This prominent finding could be a result of several confounders like the sex distribution within the groups, age difference or the potential stressors in their life to name a few. Ideally, the teachers would be expected to be more stressed - as they not only have to deal with the virtual teaching methodology load, but also cater to patients along with their family pressure but this is not the case.

We found medical teachers to be measurably stressed. Female teachers had significantly higher perceived stress than male counterparts. Challenges like fear of contracting disease, fear of transmitting the disease to family members while returning from the workplace, coping with new online methods of teaching, lack of technological skills, pressure to finish academic year timely etc. can be the cause of higher perceived stress levels in teachers.

While the students despite residing in their homes amongst their family members had significantly higher stress levels. This could be attributable to sudden new challenges faced by the medical students in terms of academics, new methods of learning, uncertainties about future, fear of infection, quarantine induced restrictions, lack of freedom, no social life, no face-to-face peer interaction and fears caused by rumours and misleading news about pandemic and many more such reasons. This could culminate in the dominance of negative emotions like anger, frustration, boredom and anxiety amongst students.

Further - we performed correlational analysis- in medical teachers, medical students and both groups together. We found that in all three groups - PSS and SAS score and also women gender and SAS score was found to be correlated. Similar results have been reported in literature for PSS and SAS and SAS and female gender [14,38,39].

In the student's group- we had also asked some additional questions on social and emotional factors. As expected, we found that those suffering from a pre-existing chronic ailment had higher PSS and SAS. Additionally, one of the most relevant findings was that the students who were regularly communicating with either their families or friends experienced lesser mental burden. Thus, everyone should be encouraged to talk to others in order to relieve their stress levels especially in the present situation when meeting each other is not feasible. Also, those who were residing in urban areas experienced higher stress potentially due to higher COVID disease load in the metropolitan cities. One of the exceptional findings was the positive correlation of higher maternal education and PSS - which probably emphasizes the higher expectations by educated mothers resulting in stress in their children.

We further analysed the determinants of PSS in our study population by multiple regression analysis- and found that it was determined by SAS, age and gender. Previous studies have also found such results on correlation - PSS and SAS, PSS and age and PSS and gender [13,38,39].

In order to negate the probability that higher PSS in medical students than medical teachers were due to the confounding effect of age and sex- we looked into the gender distribution amongst the two groups which was found to be similar and for age we normalized and compared. Even after normalization for age, medical students still had

statistically significant higher perceived stress and anxiety levels than medical teachers. Therefore, it can be concluded that medical students have higher PSS and anxiety in the current situation.

Medical students are the future torch bearers of our health care system - thus, their mental health issues need to be taken care of as a priority to ensure the wellbeing of them and the society at large. Complete knowledge about the disease and common measures to deal with it may help in mitigating some fears. Introduction of the pandemic module in the new competency based medical education (CBME) curriculum in India is one such effective approach to deal with the same. Time to time counselling and motivational sessions could additionally aid in reducing their stress and anxiety levels.

The limitations of the present study include small sample size, lack of pre-COVID stress and anxiety score of study population thus inability to deduce the causal effects of COVID-19 on mental health and further the constraints of subjective questionnaire-based study design.

CONCLUSION

The medical students and medical teachers are experiencing higher levels of perceived stress and anxiety during the ongoing COVID pandemic. The psychological impact is significantly higher on medical students than the teachers. We need to find out the causes and potential remedies immediately to address the mental pressure as well as enhance their endurance to such potential future disasters in the forerunners of our healthcare system.

Conflict Of Interest

The authors declare no conflicts of interest associated with this manuscript.

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