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Stress, Resilience and their Correlation among Medical Undergraduates during Covid-19 Pandemic: A Cross-sectional study

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ABSTRACT

Background

Medical education can be detrimental to a person's health. Factors, such as lack of sleep, heavy academic loads, and exposure to potentially fatal events, can make it unpleasant. This study was conducted to assess Stress and Resilience among Medical undergraduates during the Covid-19 pandemic and to determine the associated factors.

Methods

A cross-sectional study was conducted among 223 medical students using a pre-validated online questionnaire. Perceived Stress Scale (PSS-10) and the Connor Davidson Resilience Scale (CD-RISC-10) were used. Data was presented as mean and standard deviation. Chi-square test, and Fisher's exact test were done using SPSSversion 26. Mann Whitney U test was used to compare the resilience scores & P-value<0.05 was considered significant.

Results

Majority of the medical students (58.3%) had high stress and 48% had low resilience. High stress was seen among students having other siblings and this was found to be statistically significant. (p=0.002) The median perceived stress score among the respondents was 21(18-24). The median resilience score was 25 (20-29). A significant association was observed between the presence of siblings and stress (p<0.05). A negative correlation was seen between stress and resilience scores (r = -0.026). The median score of resilience among respondents with a higher stress level was 23 (19-27). This difference was statistically significant with the Mann-Whitney U test (p<0.001).

Conclusion

Majority (58.3%) of the students had high stress and low resilience. Higher stress was more among males (p=0.463), students residing in rural areas (p=0.187) and the presence of other siblings (p=0.002*) while females and students residing in urban areas (p=0.609) showed a lower resilience. Hence, medical education should not only satisfy the academic needs of the students but also equip them to deal with stress.

Keywords: Covid-19, perceived stress, medical students, resilience, education

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INTRODUCTION

SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19) being a pandemic can lead to heightened levels of stress among the population.[1] 'Stress' by definition is an unpleasant feeling or strain because of external demand.[2] Perceived stress, on the other hand, is not about measuring the frequency of stressful events but is on about how an individual would feel about the general stress in his life and his ability to handle such a stressful event.[3] Possible stress-related reactions in response to the coronavirus pandemic may include changes in concentration, irritability, anxiety, insomnia, reduced productivity, and interpersonal conflicts. This applies more directly to health care professionals. [4]

Medical training to become a doctor, a profession dedicated to caring for patients can at times be detrimental to an individual's health. The Indian Medical Association has reported that 75% of doctors face verbal or physical abuse on hospital premises and fear of violence was the most common cause of stress for 43% of doctors.[5],[6],[7] Further during this pandemic, there is a high degree of uncertainty about the role of medical students.[8] While some universities have recruited them for patient care, others have completely stopped them from interacting with patients in the background of them being amateur doctors.

In order to regain emotional equilibrium after a stressful experience, coping mechanisms are found helpful.[9]. Resilience is the ability to bounce back productively during a stressful situation. It is one of theimportant skills which helps to adequately manage painful feelings, failure, and illness and emphasizes the development of healthy coping mechanisms, that subsequently aid students to face variant challenges of the medical field like high workload, vigorous emotional, and physical demands of the profession.[10],[11],[12]

During this pandemic, there is a lot of uncertainty among medical students, in terms of academics, clinical work and exposure which are also important predeterminants to induce stress. Hence having good resilience can act as a buffer to wither stress. Hence, the current study was planned to assess Stress, Resilience and their correlation among Medical undergraduates during the Covid-19 pandemic and to determine the associated factors.

Methodology

An online cross-sectional study was conducted among medical students (first years to final years and interns) between 15 April 2022- 15 May 2022 to assess Stress, Resilience and their correlation among Medical undergraduates.Based on a study conducted by Priscilla Roselyn Sam et.al on undergraduate nursing students in Vellore, an overall 54.3% had high stress and 55.1% had low resilience. Taking the lower value among them, at a confidence interval of 95% and absolute precision of 7%, the sample size was calculated as 195.[13]

Sample size, $n=Z^2PQ / d^2$ where Z = 1.96; P = 54.3% for high stress, Q= (100-P) and d = 7%. As a result, the minimum number of participants required for this study was calculated to be 195. However, a total of 223 participants filled out the questionnaire and were included in the final analysis.

Purposive sampling was adopted as the study was specific to medical undergraduates. Google form questionnaire link was shared among the medical students at JSS Medical College through WhatsApp. The survey remained open for a period of one month. 223 students completed the questionnaire at the end of one month and were included in this study.There were no specific exclusion criteria. Ethical committee approval was obtained from the Institutions Ethics Committee (JSSMC/220121/02NCT/2022-21) and informed consent was obtained from the students.

The questionnaire was validated with a pilot study by face validation. The questionnaire included questions relating to socio-demographic variables (Age, Sex, Residence, Type of family, Presence of siblings, Education of Mother and Father, Occupation of Mother and Father), Perceived Stress Scale (PSS 10)[14] for assessment of stress, and Connor Davidson Resilience scale (CD RICS 10)[15] for assessment of resilience.

Perceived Stress Scale has 10 items which are scored between 0 – 4. Maximum score is 40. Connor-Davidson resilience scale also has 10 items scored between 0 – 4 with a maximum of score 40. Since in both the scales, higher scores inferred higher stress and resilience, the median value of 20 was considered as a cut-off and scores higher than it was considered as higher stress and resilience respectively.

The reliability as measured by Cronbachs Alfa valuewas 0.57 for Perceived Stress Scale and 0.86 for Connor Davidson Resiliance Scale Data was entered into Microsoft Excel 2019 and analyzed using SPSS (Statistical Package for the social science) Windows, Version 26.0. (IBM Corp. Released 2019. IBM SPSS Statistics for Armonk, NY, USA). The data were presented as mean, standard deviation, and percentages. The Chi-square test and Fisher's exact test were used to determine the association between socio-demographic variables with Stress and Resilience categories. Mann Whitney U test was used to compare the difference in resilience scores among medical students with respect to stressleves. P-value < 0.05 was considered statistically significant.

Results

Among the 223 students who responded to the online survey, 37.2 % were males and 62.8 % were females. The majority of the respondents were permanent residents of urban areas (89.2%). The mean age of study participants was 21.5 $\pm$ 2.6 years. Majority of the students belonged to nuclear families (86.5%) and 12.6 % were from joint families. A smaller proportion of 14.8 % of students was the only child in their families while the remaining have other siblings. Out of the 223 respondents, 40 (17.9%) were studying in the first year, 38 (17%) were in the second year, 88 (42.6%) were in the third year and 20 (9%) were in the fourth year. The median score of perceived stress among the respondents was 21 with an interquartile range of 18 to 24.

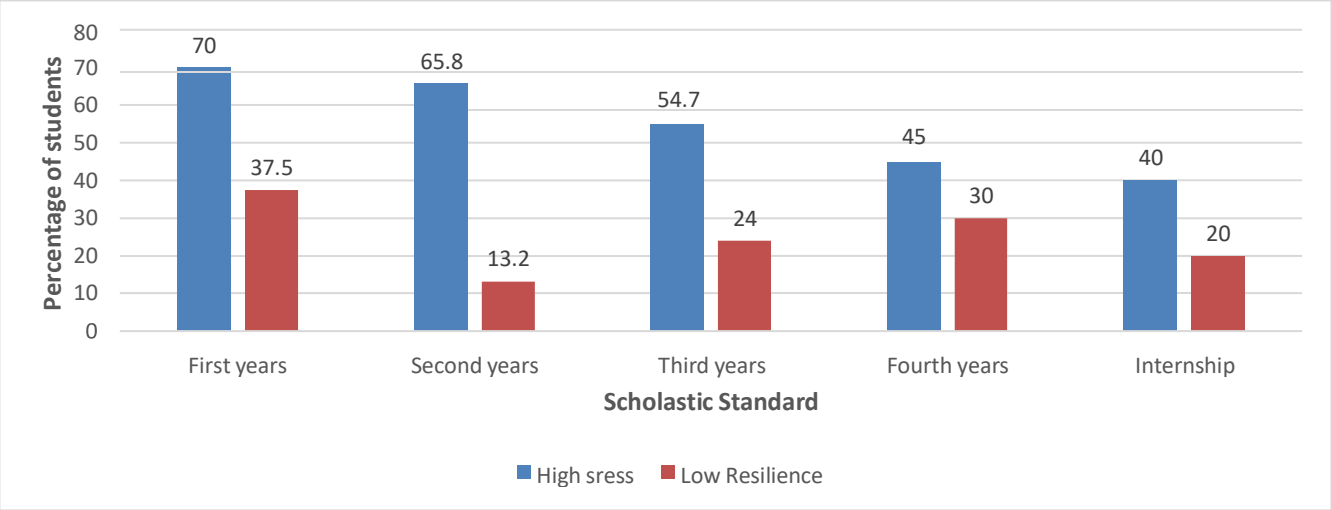
The majority of the students (58.3%) had higher stress levels. The proportion of higher stress levels was more among males (61.4%) compared to females (56.4%). The rural residents showed a higher proportion of high stress (70.8%) compared to urban students (56.8%). However, these associations were not statistically significant on performing a chi-square test. However, our observations suggested a statistically significant association between the presence of other siblings and stress level (p-value <0.05). None of the single-child respondents showed a higher stress level.

The median resilience score among the participantswas 25 with an interquartile range of 20-29. Femalesshowed a higher proportion of low resilience (28.6%) compared to males (19.3%). The urban residents had a higher proportion of respondents with low resilience (25.6%) compared to rural residents (20.8%). Both the respondents belonging to three-generation families showed a higher resilience while 25% of joint family and 25.4% of nuclear family member respondents showed lower resilience. However, none of these associations were statistically significant.

Figure 1 shows the proportion of medical students across each scholastic level having higher stress and lower resilience levels. Maximum stress was noted among the first-year medical students (70%) followed by the second years (65.8%) while lower resilience was observed more in second years (13.2%) and interns (20%).

Among the fathers, 37.7% had a professional education or honors degree, 51.6% were graduates or postgraduates and 10.8% were qualified with a diploma or higher secondary education. The educational status of the mothers was more varying with 18.8% of professional or honors education, 66.4% of graduates or postgraduates, 5.8% diploma or higher secondary education and 7.6% with high school education.

Figure 1: Bar chart depicting the proportion of respondents with higher stress levels and lower resilience levels in each scholastic level of medical education



The majority of male parents had a semi-professional occupation (41.7%) while the remaining 33.2% were professionals and 25.1% were businessmen, farmers, or clerical workers. The proportion of professionalworkers among the respondents' mothers was 17% while 24.7% were semi-professional employers. The majority of mothers (51.6%) were housewives. No statistically significant association was observed between parental educational status or occupational status and the stress level in respondents. Further, the parental educational and occupational levels also showed no association with resilience. **(Table 1)**

Table 1: Distribution of respondents across the various categories of demographic characters and the proportion of higher and lower stress and resilience across those categories

Demographic Character		Total Frequency (N=223)	Stress Level			Resilience Level		
			Low n=93(41.7)	High n=130)	p-value	Low (n=56)	High (n=167)	p-value
Gender	Male	83 (37.2)	32 (38.6)	51 (61.4)	0.463	16 (19.3)	67 (80.7)	0.122
	Female	140 (62.8)	61 (43.6)	79 (56.4)		40 (28.6)	100 (71.4)	
Area of Residence	Urban	199 (89.2)	86 (43.2)	113 (56.8)	0.187	51 (25.6)	148 (74.4)	0.609
	Rural	24 (10.8)	7 (29.2)	17 (70.8)		5 (20.8)	19 (79.2)	
Type of Family	Nuclear	193 (86.5)	82 (42.5)	111 (57.5)	0.659	49 (25.4)	144 (74.6)	0.805
	Joint	28 (12.6)	11 (39.3)	17 (60.7)		7 (25)	21 (75)	
	Three Generation	2 (0.9)	0 (0)	2 (100)		0 (0)	2 (100)	
Presence of other siblings in the family	Present	190 (85.2)	186 (97.9)	4 (2.1)	**0.002***	48 (25.3)	142 (74.7)	0.901
	Absent	33 (14.8)	33 (100)	0 (0)		8 (24.2)	25 (75.8)	

Chi-square test (Note-The numbers in the parenthesis represent percentages calculated row wise)

A comparison was done between the stress level and resilience scores of the study respondents. It was observed that the participants with high stress tend to have low resilience and vice versa. Spearman Correlation test was used to comparethe parameters which showed a statistically significant negative correlation between Resilience and Stress scores (r = 0.026).

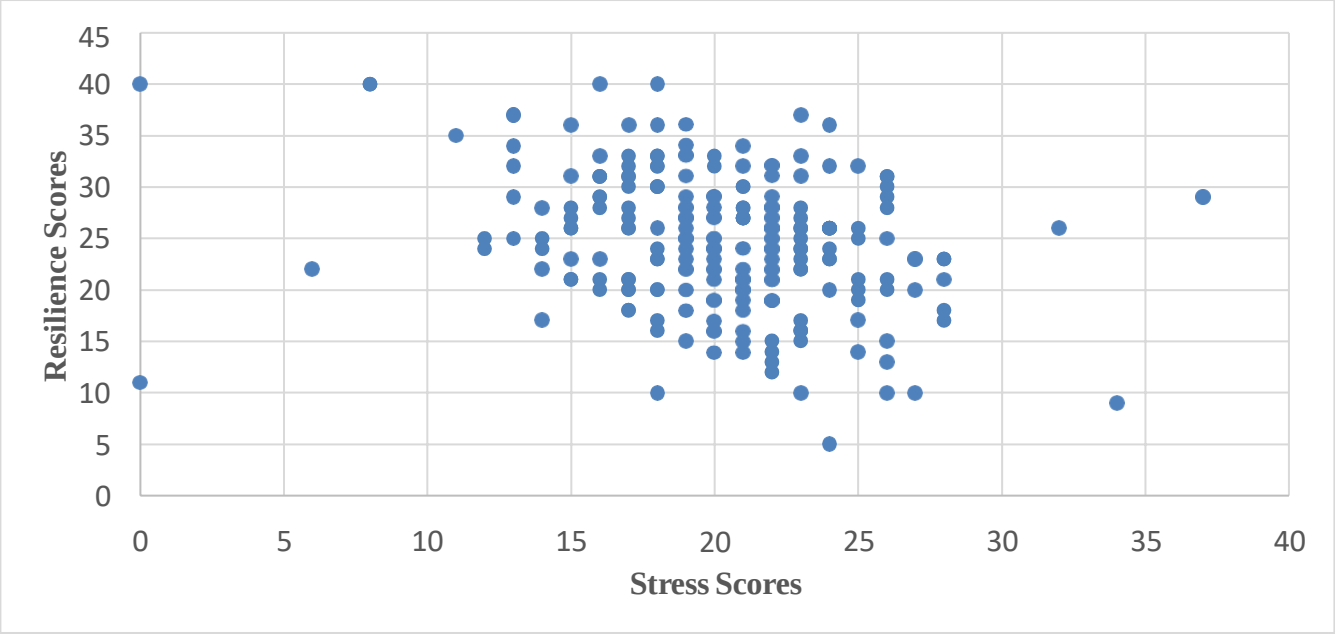
According to figure 2, lower stress is observed among participants with higher resilience,median score of 25 (IQR: 22-31.5) while the participants with low resilience, a median score of 23 (IQR:19-27) has a high stress level. This difference was found to be statistically significant with a Mann-Whitney U test p-value of <0.001. (Table 2), (Figure 1), (Figure 2)

Table 2: The median Connor Davidson Resilience scores observed among respondents reported higher and lower stress levels.

	Stress Score		p-value
	High-Stress students	**Low-Stress students**	
	Median (Interquartile Range)	Median (Interquartile Range)	
Resilience score	23(19-27)	25(22-31.5)	<0.001#

#Mann Whitney U Test

Figure 2: Correlation between Stress (Perceived Stress Scale) and Resilience (Connor-Davidson resilience scale) Scores



DISCUSSION

In our study, we found that the majority of the students (58.3%) had higher stress levels and 48% had low resilience. Similar studies in India showed higher perceived stress among medical students. For example, studies were done by Ranadip Chowdhury et al in Kolkata (46.3 %), Nitin Joseph et al in Mangalore (47.5 %) and Shubhada Gade et al in Nagpur (29.05 %) which showed a higher prevalence for perceived stress among medical students.[16],[17],[18] Similar findings were also observed in studies done in Pakistan and Saudi Arabia.[19],[20] Though stress factors like exposure to life-death situations and academic pressures are inevitable, it does not imply that medical competence can be acquired at the cost of one's health.[5],[6],[7]

The medical profession is governed by the Hippocratic principle of doing no harm. This also should be applied in the training of the would-be physicians so that they are better equipped to handle necessary stress and avoid unnecessary ones.[21],[22] This is especially important during the pandemic where uncertainties themselves lead to stress, which in turn results in reduced empathy.[23] The essence of medical education is not only to provide competence but also to preserve the integrity of the individual. Studies done in Norway show perceived stress is less when they enter medical school, but it increases as they stay further in medical school. The lower age of entry into medical school can also contribute to the increased levels of perceived stress.[24]

Resilience is relatively a new concept and there is not much research in the educational field to make any pedagogical implication. Resilience can be conceptualized in two ways, one as a component of personality and the other as a modifiable characteristic that depends upon the situation. Resilience involves behavior, thought as well as action.[25],[26] It is inversely related to stress, which implies that being more resilient leads to a lower perception of stress.[27] According to a study done in China, the mean resilience scores of medical students were found to be lower than those of university students from other nations. They did not, however, compare the scores to those of the Chinese general population, despite the fact that a brief look at the reported mean CD RISC scores of Chinese medical students reveals that they are significantly lower than those of the US general population.[15],[28] Emmy Werner conceptualized resilience as a fluid process, which is built through constant interaction with stressors.[29] Resilient students are more friendly, responsible and they believe they are in control of the environment and were able to distance themselves from dysfunctional situations. If we look at resilience as a dynamic process, it is very essential to include resilience-building strategies in the medical curriculum. Previous studies report resilience as an independent predictor of life satisfaction.[24]

Our study showed that among medical students, as the stress levels increases, resilience decreases and vice versa and thereby influence each other. This is similar to other studies done by Priscilla Roselyn Sam et.al. among undergraduate nursing students [30] and Petrie et.al. among adolescents with cystic fibrosis [31]where resilience mediates perceived stress or it is possible that an individual's perception of stress mediates their resilience, that is when the individual does not view the circumstance as stressful theybecome resilient.In this study, the proportion of higher stress levels was more among males (61.4%) compared to females (56.4%). Contradictory findings were observed in studies done in Pakistan and Sweden where higher levels of stress were observed among females when compared with males.[32],[33] However, more research is needed to see if specific components of medical education need to be adjusted to account for gender variations.

LIMITATIONS

The cross-sectional design and the sampling technique of the study based on students' self-reported data, could be a drawback. Reporting bias could have arisen as a result of respondents' interpretations of the questions or because of inaccuracies in responses. There can also be other possible academic stress elements that were not mentioned in the questionnaire. Furthermore, the research was conducted at a single college, which may restrict the data's generalizability. Also, a longitudinal study could have been beneficial in determining the amount of stress experienced during a student's academic career.

CONCLUSION

The majority of the participants in this study reported higher stress levels and lower resilience. Male students, those residing in rural areas, and those who have siblings were more likely to experience higher levels of stress, whereas female students and those students living in urban areas displayed lower levels of resilience. Our findings add to the growing body of evidence that medical students experience significant levels of stress and lack resilience. Medical education should also equip students to deal with stress.

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