

## ORIGINAL ARTICLE

**Suboptimal Health Status and Stress: An Observational Study on Medical Students in Islamabad, Pakistan**

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**ABSTRACT**

**Objective:** This study was conducted to find the frequency of suboptimal health and its association with perceived stress levels among medical students at a private university medical college in Islamabad, Pakistan.

**Study Design:** Descriptive cross-sectional study.

**Place and Duration of Study:** The study was conducted at the Department of Community Medicine, Foundation University Medical College Islamabad, Pakistan over a period of 6 months from February 2024 to July 2024.

**Methods:** A total of 210 medical students were randomly selected. They were asked to fill in questionnaires. Data on demographic profile, Suboptimal health status using (SHSQ-25) tool, and stress using the perceived stress scale (PSS-10) were obtained. SPSS version 20 was used to enter and analyze the data.

**Results:** The frequency of sub-optimal health status was (50%, 105/210). The majority of students (80.0%) had moderate levels of perceived stress. Mostly females (82.4%) and day scholars (85.2%) reported moderate levels of stress. A weak positive correlation between SHS and stress was found. ( $P < 0.005$ ). The hostelites were twice as likely to have suboptimal health status as compared to day scholars (OR 2.040, CI= 1.157- 3.598). However, males have no more odds of suffering from SHS as compared to females (OR =1.393, CI=0.788-2.463).

**Conclusion:** Suboptimal health status was frequently found among medical students in the study sample. Suboptimal health status and perceived stress have a statistically significant relationship.

**Keywords:** Health Status, Medical Students, Observational Study.

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**Introduction**

In today's fast-paced world and with the daily pressures of modern life, more and more people are reporting various health issues. These conditions can be quite complicated and have different symptoms, so they are often referred to as suboptimal health

status (SHS).<sup>1</sup> Suboptimal health is defined as a subclinical, reversible state midway between health and pathological conditions and may progress to chronic illnesses. Apparently, a healthy body does not necessarily mean a physically and mentally healthy state as asymptomatic subjects may carry within them the risk of developing chronic diseases. Nowadays, suboptimal health has become the center of concern for health professionals and has become a major health issue worldwide.<sup>2</sup> Previous studies have shown that the Chinese population has experienced a suboptimal health state (SHS) with 2/3<sup>rd</sup> of Chinese adults having suboptimal health showing a high prevalence rate.<sup>3</sup> Suboptimal health has also affected the quality of life of the adult population. SHS is characterized by persistent and recurrent fatigue, headaches, dizziness, anxiety, and

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depression, as well as a series of symptoms including non-specific pain sleep disorders, and functional disorders of different organ systems.<sup>4</sup>

Healthy lifestyles are stated as attitudes and behaviors of human beings that protect them from getting diseased and reduce the risks of early death. Healthy lifestyle attitudes can help prevent medical and psychiatric problems.<sup>5</sup> Unhealthy lifestyle factors have played a major role in developing diseases and disturbing the energy balance among humans. Poor dietary habits, work stress, physical inactivity, smoking, and environmental factors are major risk factors for suboptimal health.<sup>6</sup> An association of physical activity and screen time with suboptimal health was found in a study conducted in China showing that physical inactivity is a leading factor for suboptimal health status.<sup>7</sup>

Literature showed that a high suboptimal health status score is associated with a high risk of chronic diseases including cardiovascular diseases and type 2 diabetes mellitus (T2DM).<sup>8</sup> The association between suboptimal health and mental state shows that anxiety, depression, and smartphone dependence have led to the development of suboptimal health.<sup>9</sup> It has also affected the cognitive function of subjects making it a major public health concern.<sup>10</sup> Individuals who experience stress can engage in health-risk behaviors that may decrease work performance.<sup>11</sup> Stress can be either a triggering or aggravating factor for many diseases and pathological conditions.<sup>12</sup> Students with healthy lifestyles show better performance as academic performance is dependent on physical and mental health.<sup>13</sup>

The objectives of the current study were to find the frequency of suboptimal health status SHS among medical students of a private medical college in the capital city of Pakistan, and then find the association of SHS with perceived stress and their academic performance. This study aims to improve the health of students by assessing their suboptimal health status at the very beginning and identifying factors like stress. Identification of such factors will help students and authorities devise measures to alleviate these factors. There is a scarcity of data in our part of the world. This research will serve as a pioneer for decision-makers. Since medical students

are future healthcare providers, they should be taught to prioritize their health. This will ensure that future healthcare providers are equipped with the knowledge and skills necessary to provide quality care to their patients.

## Methods

The cross-sectional study was conducted at the Department of Community Medicine, Foundation University Medical College Islamabad, Pakistan over a period of 6 months from February 2024 to July 2024. MBBS Students from 2<sup>nd</sup> year to 4<sup>th</sup> year were selected. The first year and final year were excluded as their stress level might be different owing to new entrants in the first year and the tough study schedule in the last year. The sample size was calculated using the Rao software sample size calculator. With a margin error of 5% and a confidence level 95 % for a population of 450, the recommended sample size was 208. It was inflated to 210 for equal distribution across three classes (70 from each class). The students with any known disease were excluded. The researcher obtained a nominal roll of each class to randomly select the sample from each class by lottery method. The instructor was requested for 10 minutes' time during a lecture on a scheduled day. The selected students were briefed about the study and then asked to fill in questionnaires after taking written informed consent. Data on demographic profile, Suboptimal health status using (SHSQ-25) tool, and stress using the perceived stress scale (PSS-10) were obtained. Students were also asked to rate their last year's academic scores as poor (50-59%), average (60-79%), and good (>80%).

The SHSQ-25 covered five dimensions measuring individuals' fatigue (9 items), cardiovascular system (3 items), digestive system (3 items), immune system (3 items), and mental status (7 items). Respondents were asked to score each statement on a 5-point Likert-type scale (1 = *never or almost never*; 5 = *always*). The scores of 1 to 5 were re-coded as 0 to 4. A total score  $\geq 35$  will be categorized as having suboptimal health status (SHS).<sup>14</sup>

Perceived Stress Scale [PSS-10] was used to measure stress.<sup>15</sup> Individual scores on the PSS can range from 0 to 40. Individuals with scores ranging from 0-13, 14-26, and 27-40 will be categorized as having low,

moderate, and high levels of stress, respectively. The scales used are validated with Cronbach's alpha 0.745 for PSS 10 and 0.91 for SHS.<sup>15,16</sup>

SPSS v 20 was used to enter and analyze the data. The *chi-square* test and Spearman correlation was applied to find the associations.  $P < 0.05$  was considered statistically significant. Ethical approval was sought from the university Ethical Review Board Committee on dated: 20<sup>th</sup> March 2023 vide letter no: FF/FUMC/215-292 Phy/23 prior to data collection.

**Results**

A total of 210 medical students aged 18-24 years with a mean age of 21.09 (1.082) were included in the study. Among them, there were 79 (37.6%) males and 131 (62.4%) females. On the basis of accommodation, there were 82 (39%) hostelites and 128 (61%) day scholars. An almost equal proportion of students was included from all study years i.e. 2nd-year students (69), 3rd-year (70), and fourth year (71). Most of the students reported their scores in the average category (51.4%).

The frequency of suboptimal health status was (50%, 105/210). The frequency of suboptimal health status was higher in males 44/79 (55.7%) compared to females 61/131 (46.6%). On the basis of accommodation, more hostelites 50/82 (61%) had suboptimal health status than day scholars 55/182

(43%). Logistic regression analysis showed that the hostelites were twice as likely to have suboptimal health status as compared to day scholars (OR 2.040, CI= 1.157- 3.598,  $P < 0.011$ ). However, males have no more odds of suffering from SHS as compared to females (OR=1.393, CI=0.788-2.463,  $P = 0.2$ ).

The percentage of students having suboptimal health status ranges from (33-58%) with less percent observed in 3<sup>rd</sup> year. Most students with suboptimal health status reported their academic scores in poor 19/31(61.3%) and average 58/108 (53.7%) categories, however only 28/71 (39.4%) got good scores. *Chi-square* test of significance was applied which depicted difference in SHS was significant in the three study year group students ( $P = 0.003$ ) but not with respect to performance ( $P = 0.069$ ) as shown in table-1.

The top three common symptoms reported among individuals with SHS were tiredness (36/105), lethargy (34/105), and lack of concentration (32/105), with distraction being more common among males (35/79) and nervousness (33/131) among females. The junior most class (2<sup>nd</sup> year students) felt more exhausted and nervous than 3<sup>rd</sup> year and 4<sup>th</sup> year students, who felt tired and lethargic more. Figure.1 shows all symptoms.

The majority of students (80.0%, 168/210) reported

**Table-1: Health Status Variation Based on Gender, Accommodation, Academic performance, and year of study**

Variables	Categories		Optimal health n (%)	Sub-optimal health n (%)	Chi- square test ( $X^2$ )	P-value
Gender	Male	79	35 (44.3)	44 (55.7%)	1.644	0.200
	Female	131	70 (53.4)	61 (46.6%)		
Accommodation	Hostilities	82	32 (39.0)	50 (61.0%)	6.482	0.011*
	Day-scholar	128	73 (57.0)	55 (43.0%)		
Academic performance	Poor	31	12 (38.7%)	19 (61.3%)	5.342	0.069
	Average	108	50 (46.3%)	58 (53.7%)		
	Good	71	43 (60.6%)	28 (39.4%)		
Year of study	Second	69	30 (42.3%)	41 (57.7%)	11.428	0.003*
	Third	70	46 (66.7%)	23 (33.3%)		
	Fourth	71	29 (41.4%)	41 (58.6%)		

experiencing moderate levels of perceived stress, with a smaller proportion perceiving their stress as high (13.8%) and a few (6.2%) as low. A higher percentage of females reported moderate perceived stress (82.4%, 108/131) compared to males (75.9%, 60/79). Additionally, more day scholars (85%, 109/128) reported moderate stress levels compared

to hostelites (72%, 59/82). Across all academic years, moderate perceived stress was prevalent, ranging from 74% to 85%. Notably, the difference in stress levels between hostelites and day scholars was statistically significant ( $P = 0.009$ ) by applying *Chi-square* test, as detailed in table-2.

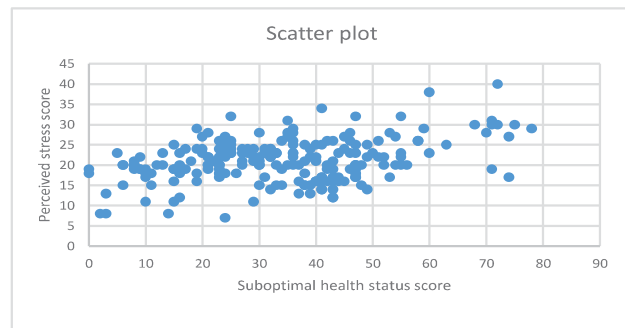
The most common stress symptoms (shown in

**Table-2: Stress levels and their association with various demographic factors**

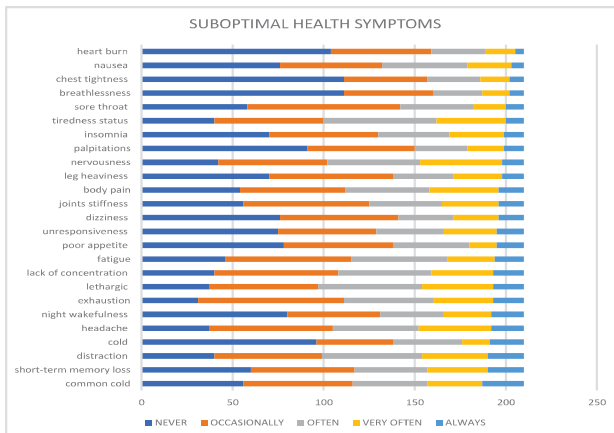
Variables	Categories		Low	Moderate	High	Chi-square test ( $\chi^2$ )	P-value
Gender	Male	79	8 (10.1%)	60 (75.9%)	11 (13.9%)	3.430	0.180
	Female	131	5 ( 3.8%)	108(82.4%)	18 (13.7%)		
Accommodation	Hostelites	82	10 (12.2%)	59 (72.0%)	13 (15.9%)	9.332	0.009*
	Day Scholar	128	3 ( 2.3%)	109(85.2%)	16 (12.5%)		
Academic performance	Poor	31	4 (12.9%)	25 (80.6%)	2 (6.5%)	6.811	0.146
	Average	108	3 (2.8%)	87 (80.6%)	18 (16.7%)		
	Good	71	6 (8.5%)	56 (78.9%)	9 (12.7%)		
Year of study	Second	69	6 (8.5%)	59 (83%)	6 (8.5%)	8.693	0.069
	Third	70	5 (7.2%)	57 (82.6%)	7 (10.1%)		
	Fourth	71	2 (2.9%)	52 (74.3%)	16 (22.9%)		

\*P value<0.05, statistically significant

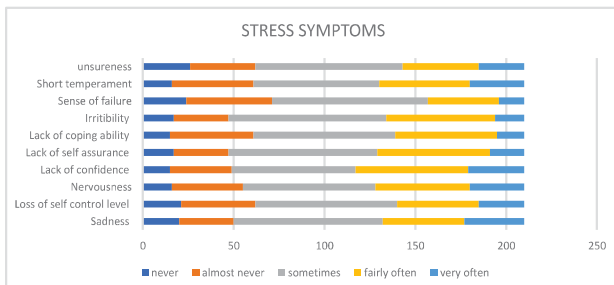
figure.2) were getting irritable easily (76/210) feeling sad (74/210), and feeling less assured (72/210). Females commonly reported being irritable (62/131) and males losing self-control (29/79). Stress was found to be significantly associated with suboptimal health status. ( $\chi^2 = 12.746$ , P value <0.002). Weak positive monotonic correlation between SHS (A) and perceived stress (B) was found using Spearman correlation. ( $r^2=0.13$ ,  $P<0.001$ ) as shown in figure.3 below.



**Fig.3: Scatterplot showing the relationship between stress and SHS**



**Fig.1: Prevalence of Suboptimal Health Symptoms**



**Fig.2: Prevalence of Stress Symptoms**

**Discussion**

According to our research, 50% of students showed suboptimal health status which shows a high prevalence of suboptimal health status. This is similar to the results of a study conducted in China (69.4%) and Pakistan (78.1%).<sup>2,17</sup> This is evident that SHS is a rising concern for global health. The results in our study showed that males (55.7%) had a high suboptimal health status as compared to females (46.6%). The results are contrary to a study conducted in China where female medical students (47.02%) showed high suboptimal health status as compared to males (41.41%).<sup>3</sup> However, a study conducted in Pakistan showed females (79%) had SHS more as compared to males (76.4%).<sup>17</sup> This regional difference may be due to sociocultural variation and the underpowered state of females. Our study showed that hostilities (61%) had a higher prevalence of SHS than day scholars (43%). This is in consonance to studies in Pakistan<sup>17,18</sup> where suboptimal health status in hostilities was high (78.5%). The high prevalence of SHS in hostilities is

due to psychological distress as well as unhealthy eating, sleeping, and lifestyle choices.

The most common symptoms reported often by individuals with SHS were tiredness (34.2%) lethargy (32.3%) and lack of concentration (30.4%) whereas a study conducted in China showed a high prevalence of fatigue (90.5%), nervousness (81%) and cognitive impairment (76.2%).<sup>2</sup> The variation may be due to subjective variation of symptoms experienced by participants.

In our study, students with low, moderate, and high perceived stress were 6.2%, 80%, and 13.8% respectively, while study conducted in medical students of Saudi Arabia had mild, moderate, and high-stress levels as 70.4%, 28.5%, and 1.1% respectively.<sup>19</sup> High perceived stress levels in medical students may be due to academic workload on students.

Females with moderate stress levels were more (82.4%) than males (75.9%) in our study, similar to a study in French university students.<sup>20</sup> Where females had raised stress levels.<sup>21</sup> This may be due to the fact that high societal pressures or personality types of females.

Students who showed poor and average performance had more moderate perceived stress (80%). This is similar to a study in Bangladesh where the low academic achievement group was more stressed than the high academic achievers.<sup>21</sup> According to our results, high perceived (22.9%) stress was found in 4<sup>th</sup> year medical students, comparable to study in Pakistan where students of 4<sup>th</sup> & 5<sup>th</sup> year experienced high stress.<sup>22</sup> This may be due to fact that higher classes have to master a huge amount of knowledge and skills.

The most common stress symptoms reported sometimes by students were irritability (36.1%), low mood (35.2%), and feeling less assured (34.2%). Whereas a study conducted in Pakistan showed the presence of low mood (82%), inability to concentrate (71%), and short temperament (66%) as the most common stress symptoms.<sup>22</sup> The variation may be due to different measurement scales used.

The association found between Suboptimal health status and Perceived Stress Levels was significant in our study and also in study in China showed a positive relationship between negative psychosocial

work stress factors and suboptimal health.<sup>23</sup>

To our knowledge, this is the first study in the South Asian region to assess SHS based on the validated scale for the Asian population. However, it relies on subjective assessment and is not supported by other biochemical parameters. It was a single-center, snapshot study, limiting the generalizability and temporality of our study findings. Nonetheless, it provides insights for the need of such studies with a large representative sample including youth, especially in resource-constrained countries.

### Conclusion

A high prevalence of suboptimal health status was found among medical students in the study sample. Suboptimal health status and perceived stress has a statistically significant association.

### Recommendations

Students, especially youth must be made aware of the importance of this third stage of health. Institutions should consider special concerns for hostilities and female students. Periodic assessment for SHS status and mentoring/ support clubs can help prevent physical and mental health problems among this population and also improve their academic performance.

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**Authors Contribution**

**MI:** Idea conception, data collection, data analysis, results and interpretation, manuscript writing and proofreading

**SM:** Idea conception, study designing, data collection, data analysis, results and interpretation, manuscript writing and proofreading

**MA:** Study designing, data collection, data analysis, results and interpretation, manuscript writing and proofreading

**ME:** Study designing, data collection, data analysis, results and interpretation

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