

## Original Research Article

# Association of mental and physical health of first year undergraduate students with ABO blood groups in an Indian urban medical college

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### ABSTRACT

**Background:** Medical students tend to have greater stress levels than the general population. Present study aims to explore mental and physical health of first year medical undergraduate students and association with different ABO blood groups.

**Methods:** In this cross-sectional study, 99 first year students were segregated on the basis of ABO blood groups. Mental health was assessed using validated General Health Questionnaire (GHQ-12). For physical health, height and weight of each student were measured and Body Mass Index (BMI) was calculated.

**Results:** Study shows higher prevalence of stress (GHQ-12 scores) of 54.6%. There was no statistically significant association of stress levels (GHQ-12 scores) and BMI with various ABO Blood groups using Pearson Chi Square test. On comparison GHQ-12 scores were highest for O blood group students and BMI values were greater in blood group B and O, but not significant. AB blood group had least GHQ-12 scores and BMI. On correlation of GHQ-12 scores with BMI, there was weak positive correlation.

**Conclusions:** Blood groups have no association with mental and physical health status. Interventions in early phase to reduce stress in medical students will reduce incidence of obesity and related health disorders in future.

**Keywords:** Blood groups, Medical Undergraduates, Questionnaires, Stress

### INTRODUCTION

Stress is the body's reaction to changes that requires physical, mental, or physiological adjustment or response.<sup>1</sup> It is observed that medical students undergo tremendous stress during their course.<sup>2</sup> Most of the studies show first year as the most potential target for stress during medical training.<sup>3,4</sup> Research in various countries has reported high incidence of emotional disorders like anxiety and depression among medical students.<sup>5</sup>

It is postulated that blood groups can predict personalities and some personalities are more prone to stress. Cattell et al, showed significant association of Premsia- tenderminded versus Harria- toughminded personality trait. A

blood type were more premsic, and O, B, and AB were more harric.<sup>6</sup> Many studies shows that mental illness such as personality disorders, mania, eating disorders, nervous tension are related to blood groups.<sup>7</sup>

Stress is also related to declining physical function like obesity over time.<sup>8,9</sup> Obesity has been prevalent and one of the most important metabolic concerns in the recent years that can be a predisposing factor for the development of many cardiovascular, endocrine, and malignant ailments.<sup>10</sup>

Among different parameters, body mass index (BMI) has been thought to be the most important variable which is affected by stressful events.<sup>11</sup> Studies show that physical fitness of subjects varies inversely with the BMI.

Increased BMI pose increased risk of additional health problems.<sup>12</sup> Some common conditions related to overweight and obesity include cardiovascular diseases, high blood pressure, diabetes, osteoarthritis and some cancers.

The ABO blood group system is not only important in blood transfusions, organ transplantation, cardiovascular diseases, erythroblastosis in neonates, but also one of the strongest predictors of national suicide rate and a genetic marker of obesity.<sup>13,14</sup> Research on ABO group system has been of immense interest due to its medical importance as non-modifiable attributing factor in causation of different diseases. Considering the lacunae in literature, present study is proposed to explore mental and physical health of the first year medical students in association with different ABO blood group types.

## METHODS

A Cross Sectional Study was carried out in Terna Medical College, Nerul, Navi Mumbai during period of one year from September 2017 to August 2018 after obtaining approval from Institutional Ethical Committee.

### *Inclusion criteria*

- First MBBS students in the age group of 18-20 years of either sex consenting to participate were included in the study.

### *Exclusion criteria*

- Students having any significant history of major illnesses like hypertension, diabetes, neurological, endocrine, psychiatric disorders or reporting any addiction and drug abuse on history taking were excluded from the study.

Total 99 students participated in the study willingly, of which 50 students were male and 49 students were female. Students were explained about the objectives of the study and were assured confidentiality of the information collected.

To evaluate mental health of the students, validated General Health Questionnaire (GHQ-12) was used. It is an extensively used tool to quantify stress levels. It is used as screening instrument for emotional disorders. GHQ-12 consists of 12 items, each assessing the severity of a mental problem over the past few weeks. GHQ-12 items were rated under four categories of responses; more so than usual, same as usual, less than usual and much less than usual for 6 positive items and not at all, no more than usual, more than usual and much more than usual for 6 negative items.

Data collection was conducted 6 months after the commencement of the academic year. This period measured the natural stress level and avoided the

examination period which might introduce biasness to the measurement. Lecture hall was chosen as the study location since all the students normally gathered at this location for lecture session. Students were requested to rate each event based on the problems they encounter for the past few weeks by choosing from four responses.

The scoring for GHQ-12 was done by modified binary scoring method whereby the two least symptomatic answers score 0 and the two most symptomatic answers score 1 i.e 0-0-1-1 for positive items and 0-1-1-1 for negative items.<sup>15</sup>

The minimum CGHQ-12 total score was 0 and the maximum score of 12. The sensitivity and specificity of GHQ-12 score at cut-off point of 4 were 81.3% and 75.3% respectively with positive predictive value of 62.9% and therefore participants who scored GHQ-12 equal to 4 and above were considered as having significant stress and taken as case in this study.<sup>16</sup> Higher the score, more is the psychological distress. The severity of stress was graded on the basis of scoring in the GHQ-12 scale: GHQ-12 score of 1-3 as no stress, score of 4-6 as mild stress, score of 7-9 as moderate stress and score of 10-12 as severe stress.

Age, sex, and anthropometric parameters: height (meters) and weight (kg) were noted for each student. Height was measured using a measuring scale whose least count was 0.1cm. Height of each student was converted in unit of metres. Weight was measured using weighing machine whose least count was 0.5kg. As physical health parameter for diagnosing obesity or malnutrition and related health risks, BMI of each student was calculated using Quetelet's index:  $BMI = \text{Weight (kg)} / \text{Height}^2 \text{ (m)}$ . BMI was classified according to the proposed criteria of the WHO, where BMI of the following values:  $<18.5\text{kg/m}^2$ ,  $18.5\text{-}24.9\text{kg/m}^2$ ,  $25\text{-}29.9\text{kg/m}^2$ , and  $\geq 30\text{kg/m}^2$ , is categorized as underweight, normal weight, overweight, and obese respectively.<sup>17</sup>

ABO blood grouping of each student was done by agglutination method using Anti-A and Anti-B antisera for each student in the Physiology department Haematology laboratory. Students were grouped into A, B, AB and O blood groups depending on the results.

### *Statistical analysis*

All data was presented in table form. The data was analysed using Statistical Package for Social Sciences (SPSS) version 19. Percentage of frequency of occurrence for each parameter was calculated. Pearson Chi Square test was applied and p value was obtained to find the significance of difference between different study groups. For comparison between groups, mean and standard deviation (SD) was calculated. One-way analysis of variance (ANOVA) and Post-hoc by Tukey-Honestly significant difference (HSD) test was used for analysis. p value less than 0.05 was considered to be

statistically significant. Correlation of GHQ-12 scores with BMI was done using Karl-Pearson Correlation Coefficient analysis test.

### RESULTS

Out of total 99 students, 31 (31.3%) students belong to blood group A, 30 (30.3%) belong to blood group B, 9 (9.1%) belong to blood group AB and 29 (29.3%) belong to blood group O. Table 1 depicts high prevalence of stress (GHQ-12 score) among first year medical students. Out of total 99 students, 57.6% students had stress and

42.4% had no stress. 38.4% of students had mild stress, 16.2% had moderate stress and 3% had high stress levels. There was no statistically significant difference between various blood groups. Stress prevalence was highest in blood group O (65.5%) and least for AB blood group (0%). Among 99 students, 17.2% belonged to overweight and obese group, 15.1% in underweight and 67.7% in normal BMI group. There was no statistically significant difference between various blood groups. However, overweight and obese group subjects mainly belonged to blood group O (20.7%) followed by blood group A (20%) and least in AB blood group (11.1%).

**Table 1: Association of GHQ score and BMI with different ABO blood groups.**

Parameters	N (%)	A Blood group	B Blood group	AB Blood group	O Blood group	Chi square Test	p-value	Significant at 5% level
<b>Total</b>	<b>99</b>	<b>30</b>	<b>31</b>	<b>9</b>	<b>29</b>			
<b>GHQ-12 score</b>								
No stress	42 (42.4%)	13 (43.3%)	13 (42%)	6 (66.7%)	10 (34.5%)	7.248	0.611	No
Mild stress	38 (38.4%)	9 (30%)	12 (38.7%)	3 (33.3%)	14 (48.3%)			
Moderate stress	16 (16.2%)	6 (20%)	5 (16.1%)	0 (0%)	5 (17.2%)			
Severe stress	3 (3%)	2 (6.7%)	1 (3.2%)	0 (0%)	0 (0%)			
<b>BMI</b>								
Underweight	15 (15.1%)	3 (10%)	4 (12.9%)	2 (22.2%)	6 (20.7%)	5.138	0.822	No
Normal	67 (67.7%)	21 (70%)	23 (74.2%)	6 (66.7%)	17 (58.6%)			
Overweight	16 (16.2%)	6 (20%)	4 (12.9%)	1 (11.1%)	5 (17.2%)			
Obese	1 (1%)	0 (0%)	0 (0%)	0 (0%)	1 (3.5%)			

Analysis done using Pearson Chi Square test, p>0.05 - Statistically not significant

**Table 2: Comparison (Mean and SD values) of parameters in different ABO blood groups.**

	A blood group		B blood group		AB blood group		O blood group		F value	p-value	Significance
	N	Mean±SD	N	Mean±SD	N	Mean±SD	N	Mean±SD			
<b>GHQ-12 score</b>											
Total(n=99)	30	4.73±2.70	31	3.94±3.04	9	3.11±2.71	29	4.52±2.23	1.094	0.356	No
Male(n=50)	13	4.85±2.99	16	4.81±3.53	5	2.20±2.05	16	3.88±2.16	1.327	0.277	No
Female(n=49)	17	4.71±2.59	15	3.00±2.17*	4	2.75±0.96	13	5.38±2.18*	3.38	0.026^	Yes
<b>BMI</b>											
Total (n=99)	30	21.73±3.19	31	22.27±2.64	9	20.66±2.61	29	22.18±3.96	0.673	0.571	No
Male (n=50)	13	23.23±2.18	16	23.16±2.47	5	21.05±3.58	16	23.34±3.68	0.830	0.484	No
Female(n=49)	17	20.59±3.42	15	21.31±2.54	4	20.16±0.72	13	20.76±3.95	0.204	0.893	No

^ p<0.05 statistically significant, \* depicts comparison of blood group B with O

Table 2 depicts that on comparison between various blood groups, there was no statistically significant difference in GHQ-12 score for most of the groups except between blood group B and O there was statistically significant difference in female group.

The mean GHQ-12 score was highest for blood group ‘A’ subjects followed by blood group ‘O’ and least for blood group AB. In males, highest score was for blood group A and in females, for blood group O. There was no

statistically significant difference on comparison of BMI between various blood groups as shown in Table 2.

BMI values were higher in males than females. Higher mean values of BMI were observed for blood group B and O students in total and female group. BMI values were least for AB blood group students. On correlation of stress (GHQ score) with BMI in different groups, there was mild degree of positive correlation but not statistically significant as shown in Table 3.

**Table 3: Correlation of stress (GHQ score) with BMI of students in different study groups.**

Study groups	Pearson correlation (r)	p-value	Significance
<b>Total</b>	<b>0.032</b>	<b>0.753</b>	<b>No</b>
Male	0.002	0.989	No
Female	0.057	0.697	No

## DISCUSSION

Present study shows that out of 99 first year medical students in an Indian urban medical college, 57.7% students had stress with mean GHQ-12 score of  $8.82 \pm 2.70$  indicating significant mild to moderate level of psychological distress. This finding is similar to other studies which showed first year as the most potential target for stress.<sup>3,4</sup> Although minimal amount of stress is desirable and is necessary to spark in a healthy competitive spirit, undue stress has undesirable impact on health of the students.<sup>18</sup>

There was no significant difference of GHQ-12 score between different ABO blood groups. This finding is consistent with previous study which concluded that there is no association between blood type and psycho wellness of individual.<sup>19</sup> In this study, stress prevalence was highest in O blood group subjects. Mean GHQ-12 score was higher for blood group A followed by blood group O though not statistically significant. Most of the studies show variable results in this regard. A study indicates that subjects with blood group O perceived more stress as compared to subjects of blood group A.<sup>20</sup> Boyer demonstrated that blood type might influence psychiatric symptoms. He showed that subjects with blood type A scored higher than those with type O on the obsessive-compulsive and psychoticism factors.<sup>21</sup> Neumann et al, found that individuals of blood type A demonstrated higher levels of depression, anger, and anxiety than those of blood type O.<sup>22</sup> It is postulated that blood type A had higher initial levels of very low density lipoprotein (LDL) toxicity preventing activity (TxPA), cortisol but quicker stress recovery rates than type O group.<sup>23</sup> O blood group has poorer recovery from stress as compared to A blood group, thus leading to stress related duodenal ulcers.<sup>6,24</sup> O type blood has also been found to occur more frequently in manic-depressive patients.<sup>24,25</sup>

There was no significant difference of BMI between different ABO blood groups. This finding is consistent with previous study that showed that no particular blood type was more predisposed to overweight, obesity and other health disorders like hypertension and diabetes.<sup>26</sup> Most of the studies show no association between anthropometric measures and ABO blood groups.<sup>27,28</sup> In this study, mean BMI values were higher for blood group B and O in total and female group, but not statistically significant. This finding is in agreement with the study that observed the B blood group was more susceptible to hypertension and obesity followed by blood group O, A

and AB blood group had less chance of getting hypertension and obesity.<sup>29,30</sup> In another study Group O has been linked to obesity, diabetes and cardiovascular risk.<sup>31</sup>

Different persons respond differently to the overwhelming stress, some lose their appetite, while others start eating more. These changed eating habits may lead to changes in the weight and BMI.<sup>32</sup> In present study, mild degree of positive correlation was observed between stress (GHQ-12 score) and BMI for all study groups. This finding was contrary to the studies that say that perceived stress scores are not related to body weight but consistent with findings of other studies.<sup>30,34</sup> Shet et al, and Rizvi et al, have studied perceived stress with BMI and stress in software professionals in different settings and in both the studies, there was a positive association of stress with BMI.<sup>11,34</sup>

The positive association between stress level and BMI points out that prompt measures should be taken to control obesity and in turn prevent the occurrence of life-threatening diseases such as hypertension and diabetes in young medical undergraduates, as academic stress is inevitable part of medical curriculum. Students should be encouraged to adopt stress coping skills in an early phase of medical education. Inclusion of stress and time management in foundation course of new competency based undergraduate curriculum by Medical council of India for newly admitted medical students is likely to bring change in their holistic health status as needed by future Indian physicians.<sup>35</sup>

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