Original Article

# Association of body mass index with perceived stress in male Saudi students

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## Abstract

**Background and Aim:** Upon reaching the university level, all students face a new learning environment, which may be a very stressful experience and if not dealt accordingly can lead to anxiety and depression affecting the performance of the students. Perceived stress scale (PSS-14) questionnaire was used as an attempt to determine level of stress and its association with the rising body mass index (BMI) was assessed in undergraduate students of Ummal Qura University (UQU), Makkah.

**Methods:** A cross-sectional questionnaire based survey was conducted among the undergraduate students of the batch 2013-14. A total of 252 students who participated, 200 were categorized as non-obese while 52 were obese according to BMI. PSS-14 questionnaire, comprising of 14 questions, was used for this purpose to relate probable sources of stress during the undergraduate study period. IBM-SPSS version 20 was used as a statistical tool. Apart from the descriptive and frequency analysis, attempt was made to find a correlation between the analyzed variables.

**Results:** No significant association was found between height and stress levels, but significant relationship was discovered between weight, BMI and PSS stress score. Levels of stress were not found significantly related in the non-obese and obese groups individually, but levels were significantly correlated when they were analyzed in total (non-obese and obese combined).

**Conclusion:** Therefore, it is suggested that students reported a higher level of perceived stress may be due to academic and peer pressure. This emphasizes the need for measure to be taken to control obesity in young undergraduates to control the stress and anxiety.

**Key words:** Perceived stress, perceived stress scale-14, undergraduate students, university level students

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## INTRODUCTION

Stress has been proposed as a complicated interaction between individuals and their environments. Any situations or events that affect the individual's health can cause stress. If remained unmanaged, not only can it lead to depression but other metabolic disorders.[1] Studies have classified stressors into three main categories (a) academic pressure, (b) social issues, and (c) financial problems.[2] The reasons for stress and depression vary with age, gender, social outlook, exposure, parental caring, self-esteem, and frustration. As it manifests only minimal psychological disturbances and remains symptomless, it is best to identify the condition before it becomes magnified.[3]

The phenomenon of stress is really a complicated interaction in anybody's life. Students, especially in

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undergraduate level may come across different types of stresses that may adversely affect their performance in their academic challenges, personal wellbeing, and future professional intelligence. It can lead to mental distress and it can have a negative impact on their cognitive functioning and learning.[4] According to a number of researchers, many undergraduate students consider their academic life stressful and demanding.[5] Stressful conditions take place when anybody is encountered with a situation, which he/she believes to be overwhelming and one cannot cope with such a situation.[6] Stress, if left unmanaged, can lead to severe psychological and metabolic consequences. Among them, body mass index (BMI) has been thought to be the most important variable which is affected by stressful events. 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.[7] Time and stress management has led to active and self-directed learning and preservation of health, wellbeing, and prevention of disease, therefore it has been recommended to improve medical education.[8] It is important for educators to know the prevalence and the causes of student distress. The most challenging aspect is to measure the potential sources of stress. In the current scenario, stressors such as the high cost of professional education, the realization of individual identity, career insecurity, and relationship with the faculty members are need to be considered.[4]

This study was conducted as an attempt to determine the stress level in undergraduate students studying in Ummal Qura University (UQU), Makkah. More than 300 male and female students join 2nd year medicine course after passing through their 1st year foundation course. All of them are Saudi nationals aged between 19 and 20 years. As Saudi Arabia is a developed country with strong financial backbone, most of the students do not face big financial constraint. Most of them live in Makkah, but very few of them come from other big and small cities situated in the vicinity of Makkah. Upon entry in the university, all students face a new learning environment, making new social circles and also adapting to a new and different world during their training. This may be a very stressful experience, especially during the formative 1st and 2nd years of their course. The relative paucity of information about stress and its sources during the early years of medical undergraduate training in Saudi Arabia warranted this study. Therefore, in the present study, we aimed to determine the level of stress among Saudi medical students using perceived stress scale-14 (PSS-14) questionnaire and to assess its association with BMI in these subjects.

## MATERIALS AND METHODS

### Study design

The present study was performed in the Faculty of Medicine, UQU, Makkah. Each year, a number of male students get admission in the various departments of UQU. At the end of each academic year, the students sit for their related examinations, held by the UQU, to qualify for the next academic year. We did not have any earlier estimates of prevalence of stress among medical students in Saudi Arabia. The students were asked to complete a set of questionnaires consisting of two parts, namely: Demographic information and academics, PSS-14.[9]

### Perceived stress

Perceived stress was measured using the PSS-14,[10] which comprised 14 questions with responses varying from 0 to 4 for each item and ranging from never, rarely, sometimes, often, and almost always, respectively, on the basis of their occurrence during 1 month prior to the survey. This survey questionnaire has an internal consistency of 0.85 (Cronbach's alpha coefficient) and test–retest reliability during a short retest interval (several days) of 0.85. The present study was designed in accordance with a similar study that was conducted in Pakistan.[11] The survey questionnaire determines the degree to which subjects think their educational tenure has been stressful during the past month. The survey questions were a mixture of positive and negative, hence the respective score for four questions, for example, 0 = 4, 1 = 3, and 2 = 2 were reversed, before adding them to the final score across all 14 items. Question No. 4, 5, 6, 7, and 10 are the positively stated items. The final single score was assessed as high scores indicating higher levels of stress and lower levels indicating lower levels of stress. The PSS-14 has a possible range of scores from 0 to 56. The ranges of scores were divided into stratified quartiles, upper two and lower two quartiles were combined (28 being the operational cut-off value for the upper bound) and were labeled as stressed and not stressed, respectively.[12]

### Brief procedure

After taking approval from the Institutional Review Board, a cross-sectional survey using two self-administered questionnaires distributed among the total of 252 undergraduates from different faculties of UQU, Makkah was included for survey, all belonging to the same age group, i.e., between 18 and 19 years. Only male students from different faculties of UQU admitted in September 2012 were invited to participate in this study. The study is conducted during their 2nd academic year between June and December 2013. The participants were

assured of confidentiality of the information provided and had an option of refusal to participate in the survey. The questionnaires were distributed among students during their practical timings, and filled questionnaires were collected after the lab activities.

### Statistical analysis of data

Data analysis was done using the statistical software SPSS version 20 for windows by (IBM-SPSS Inc., Chicago, IL, USA). Mean values for different variables were calculated including perceived stress score. Number and percentage of stressed and nonstressed cases were calculated according to the stress score. Percentage of frequency of occurrence was determined for each question of the PSS questionnaire used in the survey studies. Descriptive statistics were calculated for severity of the stress level among the participants. Pearson product-momentum correlation was applied to test the correlation between different variables and factors affecting PSS score. PSS score was labeled as dependent whereas BMI was considered as independent variable. 95% confidence interval was calculated and significance level was measured as per the international standards.

## RESULTS

Subject characteristics are shown in Table 1. Two hundred and fifty two students participated in the study. All were male students from different faculties of UQU, Makkah, in the undergraduate level, age ranging between 18 and 19 years (mean age being 18.3 years). Two hundred students were categorized in nonobese group (BMI 18–29) whereas 52 were found to be overweight and obese (BMI ranging from 30 and above). Mean BMI of nonobese and obese participants was 22.59 and 34.83, respectively, while the score was found to be 24.53 (standard deviation [SD] = 6.745) and 27.13 (SD = 6.803), respectively.

### Frequency of responses and results to perceived stress scale-14 questionnaire

The PSS questionnaire sample comprising 14 questions and the frequency of the occurrence are shown in Table 2. Most of the students (28.2–38.1%) responded all items of the questionnaire by selecting "sometimes."

A significant positive correlation ($P < 0.5$) was found between weight and height of the participants versus mean PSS-14 score. The relationship is depicted in Figure 1. Mean PSS-14 score of different subjects according to different BMI values is shown in Figure 2.

One hundred and sixty two (64.3%) out of 252 participants were found not stressed, i.e. having PSS-14 cumulative score of ≤ 28 which was the operational cut-off value while 90 (37.5%) of them were found to be under stress, i.e., having PSS-14 cumulative score of more than 28. Out of 200 nonobese subjects, 156 (68%) were not stressed, while 64 (32%) were under stress. Out of 52 obese subjects, 26 (50%) were not stressed, while 26 (50%) were under stress. One-tailed independent sample *t*-test of mean PSS-14 scores between obese and nonobese subjects' results are depicted in Figure 3. Mean PSS-14 score for nonobese was 24.53 ± 0.477 and mean PSS-14 score for obese was 27.13 ± 0.94 with a significant value, i.e., $P < 0.05$. Pearson correlation among the total participants between BMI and PSS score was found to be significant whereas no significant

**Table 1:** Subject characteristics

| | Total (*n*=252) | Normal (*n*=200) | Obese (*n*=52) |
|---|---|---|---|
| BMI | 25.12±6.106 | 22.59±3.247 | 34.83±4.601 |
| PSS-14 score | 25.07±6.826 | 24.53±6.745 | 27.13±6.803 |
| Stressed | 90 (35.7) | 64 (32) | 26 (50) |
| Nonstressed | 162 (64.3) | 136 (68) | 26 (50) |

BMI and PSS-14 were expressed in mean±SD. Stressed and nonstressed were expressed in total number (%). BMI: Body mass index, PSS-14: Perceived stress score-14, SD: Standard deviation

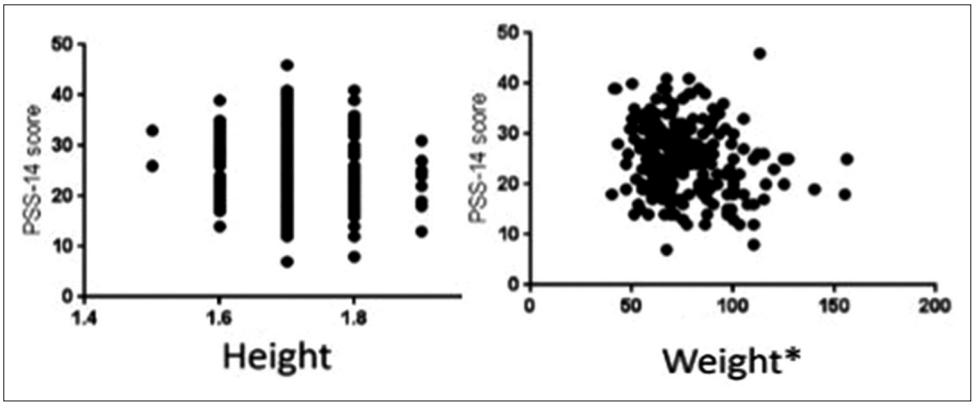


**Figure 1:** Pearson correlations between height and weight versus mean perceived stress scale score. Height versus mean perceived stress scale-14 score $P = 0.176$. Weight versus mean perceived stress scale-14 score $P = 0.009$*

**Table 2:** Frequency of responses to perceived stress score-14 questionnaire sample

| Statement | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| In the last month, I have been upset because of something that happened unexpectedly? | 44 (17.5) | 69 (27.4) | 79 (31.3) | 42 (16.7) | 18 (7.1) |
| In the last month, I have felt that I was unable to control the important things in my life? | 65 (25.8) | 68 (27) | 83 (32.9) | 24 (9.5) | 12 (4.8) |
| In the last month, I felt nervous and under tension? | 29 (11.5) | 65 (25.8) | 86 (34.1) | 44 (17.5) | 28 (11.1) |
| In the last month, I have dealt successfully with day-to-day problems and annoyance? | 36 (14.3) | 85 (33.7) | 79 (31.3) | 44 (17.5) | 8 (3.2) |
| In the last month, I have felt I was effectively coping with important changes that happen in my life? | 37 (14.7) | 81 (32.1) | 93 (36.9) | 31 (12.3) | 10 (4) |
| In the last month, I have felt confident about my ability to handle my personal problems? | 52 (20.6) | 88 (34.9) | 75 (29.8) | 22 (8.7) | 15 (60) |
| In the last month, I have felt that things were going my way? | 22 (8.7) | 78 (31) | 88 (34.9) | 50 (19.8) | 14 (5.6) |
| In the last month, I have found that I could not manage all the things that I had to? | 29 (11.5) | 84 (33.3) | 84 (33.3) | 42 (16.7) | 13 (5.2) |
| In the last month, I have been able to control problems in my life? | 12 (4.8) | 39 (15.5) | 96 (38.1) | 67 (26.6) | 38 (15.1) |
| In the last month, I have felt I was on top of things? | 33 (13.1) | 67 (26.6) | 85 (33.7) | 51 (20.2) | 16 (6.3) |
| In the last month, I have been angered because of things that happened were outside of my control? | 41 (16.3) | 57 (22.6) | 71 (28.2) | 54 (21.4) | 29 (11.5) |
| In the last month, I have found problems about things that I have to accomplish? | 14 (5.6) | 60 (23.8) | 91 (36.1) | 56 (22.2) | 31 (12.3) |
| In the last month, I have been able to control the way I spend my time? | 26 (10.3) | 59 (23.4) | 74 (29.4) | 60 (23.8) | 33 (13.1) |
| In the last month, I felt problems were piling up so high that I could not overcome them? | 44 (17.5) | 68 (27) | 77 (30.6) | 46 (18.3) | 17 (6.7) |

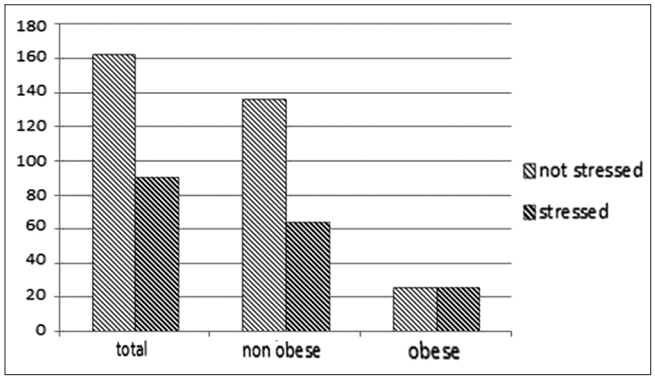


**Figure 2:** Frequency of scores according to body mass index. Total number of subjects = 252, 162 out of them were not stressed (64.3%) while 90 of them were found to be under stress (37.5%). Total number of nonobese subjects = 200, 156 out of them were not stressed (68%) while 64 of them were found to be under stress (32%). Total number of obese subjects = 52, 26 out of them were not stressed (50%) while 26 of them were found to be under stress (50%)

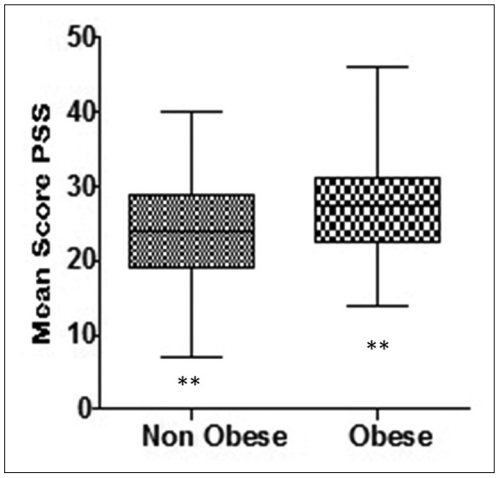


**Figure 3:** Paired *t*-test (one-tailed) of mean perceived stress scale-14 score in different categories. ***P* = 0.001. Mean perceived stress scale-14 score for nonobese was 24.53 ± 0.477**. Mean perceived stress scale-14 score for obese was 27.13 ± 0.94**

correlation was found between the scores of nonobese and obese students separately. This relationship is shown in Figure 4.

## DISCUSSION

In our study, perceived stress levels were measured in the general teenaged population residing in Saudi Arabia and were recently admitted in different universities across the kingdom for the purpose of undergraduate training program. This information can be equally important for education planners, educators, and researchers for the development of future strategy for the higher educational system of the kingdom. Few studies have been conducted in different parts of the Kingdom measuring the stress level in medical[12,13] and dental students,[14] but no study has been reported till date covering students from different faculties studying in the university level.

It is mentioned in the literature that uncontrolled stress and adrenal burnout may lead to depression and anxiety.[15] 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.[16] In our study, there was no significant

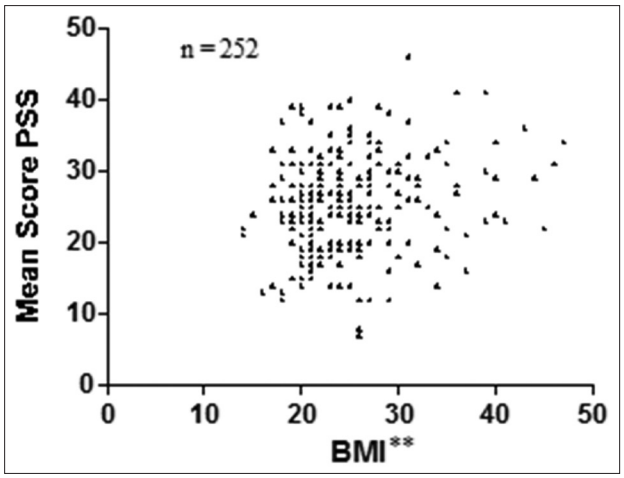


**Figure 4:** Pearson correlation between mean perceived stress scale-14 score and body mass index. Body mass index versus mean perceived stress scale-14 score $P = 0.009$**

association found between height and stress levels, but significant relationship was discovered among weight, BMI, and PSS stress score as described by some researchers.[7,17] This finding was contrary to the studies that say that perceived stress scores are not related to body weight.[14]

The experience of the undergraduate students regarding the perception of stress may vary not only according to the academic and nonacademic setting of the university in which the student is studying, but also depends upon the teaching methodology and evaluation (examination) system. In a study conducted in Jizan University, KSA, high levels of stress were found among undergraduate medical students.[13] In our study, mean PSS score was found to be 25.07 ± 6.826 which is different from what is mentioned in other studies done in the kingdom[12] and more closer to the studies done outside the kingdom.[10] Although the levels of stress were not found significantly related in the nonobese and obese groups individually, levels of stress were significantly correlated when they were analyzed in total (nonobese and obese combined). This shows the trend of rise in stress level as BMI creeps up, and if not dealt properly, it can be a predisposing factor for the development of depression and adrenal burnout in later years of study.[18,19]

### Limitations of the study

The present study was conducted only on male students from the Faculty of Medicine, UQU, as access to the female students is not feasible in the cultural setting of Saudi Arabia. This can be a limiting factor in the study. Since the information was based upon self-administered questionnaire, we cannot rule out the possibility of bias. Academic records and performance of the students in the class were not included in the study and it can be a limitation to the study. Further studies are necessary to evaluate the association between the presence of different stressors and incidence of stress.

## CONCLUSION

It is suggested that students reported a higher level of perceived stress. Probably, the most important contributor in this rise could be academic and peer pressure. The association between stress level and increasing BMI points out that prompt measures should be taken to control obesity in young undergraduates to control the stress and anxiety and, in turn, prevent the occurrence of life-threatening diseases such as diabetes and hypertension.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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