

# Perceived Stress and Food Consumption Frequency among Medical Students of Rawalpindi Medical University, Pakistan

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## ABSTRACT

Stress is a common health problem among medical students. Higher stress among students leads to change in food preference. This study was aimed to assess the relationship between perceived stress and food pattern among final-year MBBS student of Rawalpindi Medical University. This cross descriptive cross-sectional study was conducted among final-year MBBS students of Rawalpindi Medical University in January 2020. Data was collected through Perceived stress scale and self-structured questionnaire about demographic details and dietary habit details. Students with irregular dietary habits were excluded. Because of non-parametric nature of data, non-parametric statistical tests including Mann-Whitney test, Kruskal-Wallis test and Multinomial logistic regression were applied to assess the variables. Statistically significant differences of perceived stress were observed across gender ( $p=0.000$ ) and boarding status ( $p=0.004$ ). Significant differences of perceived stress were also found across intake three frequency levels of sweet foods ( $p=0.000$ ), snack foods ( $p=0.001$ ) and ready to eat foods ( $p=0.012$ ) while differences were non-significant across three intake frequency levels of fast foods ( $p=0.067$ ) and fruits and vegetables ( $p=0.175$ ). Multinomial logistic regression proposed increase intake of sweet foods, snack foods, ready to eat foods and fast foods with the increase in perceived stress while decrease intake of fruits and vegetables with the increase in perceived stress. Our study shows that perceived stress changes dietary patterns and with the increase in perceived stress consumption of unhealthy foods increases while consumption of healthy foods decreases. So, by applying suitable interventions for alleviation of stress we can improve dietary habits and consequently physical health.

**Keywords:** Perceived Stress, Food Consumption Frequency, Final Year, MBBS, Medical Students.

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## I. INTRODUCTION

One of the common health problems faced by students is stress [1]. Great concerns are there for university students regarding stress irrespective of their educational disciplines [2]. Pretty high level of perceived stress has been found in medical undergraduates in a study conducted earlier [3]. Among preclinical medical students 62% stress and 75% burnout have been observed in a recent study [4]. Stressors that are correlated to educational and psychological domains

lead to increase in level of stress among medical students [3], [5]. Increased level of stress adversely affects the student mental abilities and execution during examination in their medical school [6]. Medical students use various approaches to deal with stress which include gathering with family and friends, not comparing grades with other students, diverting oneself, expressing sentiments, denial, humor, sports, music, religious activities and careful and prudent use of time [7]-[11]. Change in dietary patterns is also an important and commonly used strategy along with all these strategies to deal

with stress. Because in literature, it has been shown that food is not only used for nutrition but also to manage stress and tension in certain studies [12], [13]. So, stress is also associated with change in appetite and food consumption patterns [14]. Different studies have contrasting findings regarding appetite changes among people during stressful conditions. According to one study people eat less foods when they get stressed, while a study in literature has also been reported that people eat more when they are under stress [15], [16]. Overeating and under eating both have outcomes that are not good for health in anyway. Likewise, changes in the selection of specific food groups by people while facing stress, have also been noticed, in literature various studies have shown more predisposition towards carbohydrate rich and energy rich among stressed people [17]-[19]. This predisposition is probably due to association between carbohydrate intake and serotonin brain activity [20]. Serotonin is a neurotransmitter in central nervous system that has ability to change the mood and behavior including depression, anxiety, anger. Carbohydrate intake increases serotonin level in brain that elevates the mood, and this could be the reason for preference for carbohydrate rich food [17]. Furthermore, a study has been reported that people prefer foods of substandard quality while dealing with stress [21]. More evidences regarding preference of foods that are not suitable for health have also been given in different studies in literature. We noticed in different studies that have been conducted across many countries that specific, unhealthy food groups, including sweet food, ready-to-eat food, snack food, and fast food, are eaten more by people when they have high stress level as compare to low stress level or normal circumstances and while healthy food groups including fresh fruits and raw vegetables are less consumed during stressful conditions [22]-[24]. Even though, numerous researches have been done among university/college students all around the world to evaluate the association between perceived stress and food selection [25]-[27]. However, on literature review very few studies were found in which this kind of relationship between perceived stress and food consumption among Pakistani students have been investigated. Moreover, as far as we know, no study in Rawalpindi Medical University Pakistan has examined association of perceived stress and food consumption among medical students. So, in the presence of many researches across the globe, very few studies across the Pakistan and none in Rawalpindi Medical University, that inspect the influence of perceived stress on the food selection our study aims to assess the effect of perceived stress on consumption different food groups among final year MBBS medical student of Rawalpindi Medical University. If results show more consumption of particular food group during perceived stress and that food group belongs to unhealthy food groups, then this study may provide opportunity of correction of dietary habits via interventions that are used by mental health team, to reduce the perceived stress. Therefore, we may be able to improve physical health via selection of healthy diet along with the improvement in mental health.

## II. MATERIALS AND METHODS

### A. Study design and Study population

A cross sectional descriptive study was conducted among final year MBBS students of Rawalpindi Medical University in January 2020. Participants recruited in this study were 343 students out of 374 students, and they were enrolled by simple random sampling. Only those students were recruited, who were willing to participate in the study and had regular dietary intake habits with exclusion of those who were suffering from any physical and mental illness and had not regular dietary intake because this could affect the perceived stress and food intake assessment. Data was collected using two questionnaires. Two questionnaires were given to all enrolled student. Response rate was 82.51% (only 283 students returned properly filled questionnaires from 343 enrolled students). Therefore, final sample size for this study was 283.

### B. Assessment of Characteristics of Study Population and Food Intake

Demographic details and information regarding food intake for last month were noted through self-structured questionnaire. Demographic portion had questions about the age, gender, and boarding status of participants and in dietary intake portion frequencies of particularly food group were assessed. The carbohydrate-rich and energy-dense foods were categorized into five groups: Fruits and Vegetables (i.e., fruits, fruits juice, salads, raw vegetables), sweet foods (i.e., desserts, ice creams, candies, or chocolates), ready-to-eat foods (i.e., instant noodles, frozen foods, canned foods, and microwave foods), snack foods (i.e., potato chips, corn chips and tortilla chips), and fast foods (i.e., pizzas, burgers, and shawarmas). Food intake of each food group was divided into three frequency intake levels including low, moderate, and high frequencies. These levels were established by knowing the consumption frequency of each food group per week during previous month (i.e., low frequency: once per week or less than once per week, moderate frequency: 2-3 times per week or 4-6 times per week, high frequency: once per day or more than once per day). All these food groups were taken as dependent variables.

### C. Assessment of Perceived Stress

While for the assessment of perceived stress internationally used questionnaire Perceived stress scale (PSS) was used, which consisted of 10 items. Its reliability to assess perceived stress has been established over the years [28]. It has three versions with 4, 10 and 14 items. However, the version that has 10 items was used in our study. The questions in scale ask about the feelings and thoughts during last months. Each item could score (i.e., 0= never, 1= almost never, 2= sometimes, 3=fairly often, 4=very often). Scores of items 4, 5, 7 and 8 were reversed. Scores of individual participants could range from 0 to 40 and higher scores indicating greater perceived stress. Similarly, individual could have one of three levels of stress on the basis of their scores on scale. These three levels of perceived stress included (i.e., low stress: 0-13, moderate stress: 14-26 and high stress: 27-40). Perceived stress was taken as independent variable.

### D. Data Analysis

A descriptive analysis of the study variables was carried out using SPSS v.25.0. A pilot study was conducted on 50 students to check the reliability of questionnaires in our population through the calculation of Cronbach's alpha value. It was 0.848 for Perceived stress scale (PSS), and 0.775 for Self-structured questionnaire indicating high inter scale

reliability. Non-parametric tests were applied because data was not normally distributed. Mann-Whitney test was used to see if perceived stress differs across the gender and boarding status of the students. Kruskal-Wallis analysis of variance test was used to compare the scores of perceived stresses across the three frequency intake levels of each food group. Finally, associations between perceived stress and different food groups were assessed through odds ratio (OR) which was calculated by using Multinomial logistic regression. A p-value of less than 0.05 was set statistically significant.

## III. RESULTS

The population consisted of 189 (66.8%) females and 94 (33.2%) males. While looking on boarding status, (45.2%) participants were boarder students while 155 (54.8%) were non boarder students. Mean age for study population was 22.93 years with standard deviation (SD) of ( $\pm 1.109$ ). Out of 283 participants 44 (15.5%) had mild perceived stress, 221 (78.1%) had moderate perceived stress and 18 (6.4%) had high perceived stress along with overall mean perceived stress score of 18.39 with standard deviation of  $\pm 5.345$ .

Table 1 shows the difference in mean score of perceived stress, between females and males and between boarders and non-boarders. Female students had high score indicating higher perceived stress as compare to male students. Likewise, boarder students had high score indicating higher perceived stress as compare to non-boarder students. Difference of perceived stress was statistically significant between females and males and also between boarders and non-boarders. These differences were checked by p value using Mann-Whitney test.

Table 2: indicates differences in mean score of perceived stress among three frequency intake level of each food group. Significant differences were found in perceived stress score, among three frequency intake levels, of sweet foods, snack foods, ready-to-eat foods, however, differences were not statistically significant among three frequency intake levels of fast foods and fruits and vegetables. These differences were measured by p value using Kruskal-Wallis test.

Table 3 summarizes the results of multiple logistic regression. Odds ratio (OR) was calculated using multinomial logistic regression model for each frequency intake level of all five food groups according perceived stress score. Study results indicated increase consumption of sweet foods, snack foods and ready to eat foods with the rise in perceived stress and while decrease consumption of fresh fruits and vegetables with the increase in perceived stress. Trend was same for fast food as sweet foods, snack foods and ready to eat foods with increase in perceived stress. So, high perceived stress leads to more consumption of unhealthy foods and less consumption of healthy food and therefore, high perceived

stress is predictor of unhealthy food consumption.

Results of current study indicates that consumption of unhealthy foods goes up with increase in perceived stress while healthy foods consumption goes down with increase in perceived stress.

TABLE I: DIFFERENCE IN PERCEIVED STRESS MEAN SCORE ACROSS GENDER AND BOARDING STATUS ALONG WITH MANN-WHITNEY ANALYSIS

Parameter		Perceive Stress Score	Mann Whitney Test
		Mean ( $\pm$ SD)	p-Value
Gender	Male	16.64 ( $\pm$ 5.172)	0.000
	Female	19.25 ( $\pm$ 5.229)	
Boarding Status	Boarder	19.52 ( $\pm$ 5.168)	0.004
	Non-Border	17.45 ( $\pm$ 5.322)	

TABLE II: DIFFERENCE IN PERCEIVED STRESS MEAN SCORE ACROSS THREE FREQUENCY INTAKE LEVELS OF ALL INCLUDED FOOD GROUPS ALONG WITH RESULTS OF KRUSKAL-WALLIS TEST

Food Groups		Perceive Stress Score	Kruskal Wallis Test
		Mean ( $\pm$ SD)	p-Value
Sweets	High	21.03 ( $\pm$ 5.465)	0.000
	Moderate	18.41 ( $\pm$ 4.578)	
	Low	16.58 ( $\pm$ 5.654)	
Snacks	High	20.27 ( $\pm$ 5.354)	0.001
	Moderate	18.63 ( $\pm$ 4.596)	
	Low	17.20 ( $\pm$ 5.944)	
Ready-to-eat Foods	High	20.22 ( $\pm$ 5.513)	0.012
	Moderate	18.57 ( $\pm$ 4.464)	
	Low	17.54 ( $\pm$ 5.019)	
Fruits and Vegetables	High	17.30 ( $\pm$ 5.157)	0.067
	Moderate	18.15 ( $\pm$ 4.869)	
	Low	19.49 ( $\pm$ 5.886)	
Fast Foods	High	20.00 ( $\pm$ 6.437)	0.175
	Moderate	19.49 ( $\pm$ 5.194)	
	Low	17.77 ( $\pm$ 5.184)	

TABLE III: MULTINOMIAL LOGISTIC REGRESSION MODEL FOR FOOD INTAKE

Food Groups	Frequency Levels	Odds Ratio	Confidence Interval	p-Value
Sweets	High	1	—	—
	Moderate	0.902	0.847-0.961	0.002
	Low	0.840	0.782-0.903	0.000
Snacks	High	1	—	—
	Moderate	0.942	0.883-1.004	0.066
	Low	0.893	0.834-0.956	0.001
Ready-to-eat Foods	High	1	—	—
	Moderate	0.942	0.882-1.006	0.075
	Low	0.907	0.849-0.970	0.004
Fruits and Vegetables	High	1	—	—
	Moderate	1.031	0.975-1.091	0.285
	Low	1.083	1.019-1.150	0.010
Fast Foods	High	1	—	—
	Moderate	0.982	0.897-1.075	0.693
	Low	0.922	0.847-1.004	0.061

## IV. DISCUSSION

The results of present study provide invaluable insights regarding the trends of food consumption patterns during stress period, among final year MBBS students of Rawalpindi Medical University, Rawalpindi Pakistan. Our study also shows difference in perceived stress across the gender and boarding status. Levels of perceived stress are also observed among participants.

Four important findings are noticed in this study. First, we found that females had high mean score on perceived stress scale which means that females had more perceived stress as compare to males and this difference was statistically significant. Similar finding has been reported by other studies that females suffer from higher perceived stress [3], [29]. Second, we also observed that perceived stress difference across boarding status was also statistically significant. Boarder students had high perceived stress as compare to non-boarder students which means boarder students had higher perceived stress. Poor mental health among boarder students has been observed by another study that was conducted in Thailand [30]. Higher stress among boarders may be due separation from home and difficulty in adaptation to new environment [31], [32]. The value of  $p$  to explore significant perceived stress difference across gender and boarding status was calculated through Mann Whitney test. Third, majority of the participants (221 students with the percentage of 78.1) were suffering from moderate level of perceived stress followed by participants (44 students with the percentage of 15.5) with mild stress level and then participants (18 students with percentage of 6.4) with high stress level. Higher levels of stress adversely affect mental abilities and the academic performance of students [6]. Last and fourth finding is about impact of perceived stress on food selection among students which is a main concern of this study. We observed, correlation between stress and intake of different food groups. Multinomial logistic regression model was used to inspect this relationship between perceived stress and food consumption, and we noticed that under stress intake of unhealthy foods was more as compare to unhealthy foods. Link between stress and food selection has also been reported in another study that was conducted in United Kingdom [23]. In our study we took five groups of food which were carbohydrate rich and energy rich. Unhealthy food groups were included sweet foods (i.e., desserts, ice creams, candies, or chocolates), snack foods (i.e., potato chips, corn chips and tortilla chips), ready to eat foods (i.e., instant noodles, frozen foods, canned foods, and microwave foods), and fast foods (i.e., pizzas, burgers, and shawarmas) while healthy food group was consisted of fresh fruits and vegetables (i.e., fruits, fruits juice, salads, raw vegetables). We noted that, consumption of sweet foods, snack foods, and ready to eat foods, was increased while consumption of fresh fruits and raw vegetables was decreased, with the increase in perceived stress among participants. Similar trend was noticed for fast foods as of sweet foods, snack food and ready to eat food, however the difference of perceived stress score across the three frequency intake levels was not statistically significant while difference of perceived stress score was significant across the three frequency intake levels of sweet food, snack foods, and ready to eat foods. For healthy foods like fruits and vegetables along with opposite trend of consumption with increase in perceived stress as compare to other included food groups in this study, perceived stress score difference was also not statistically significant across its three frequency intake levels. Kruskal-Wallis test was applied to see this difference of perceived stress score among three frequency intake levels of all food groups with the help of value of  $p$ . Throughout the world, different studies that have been reported similar findings about stress and food

consumption [17], [19], [23]. However, we also found a study with conflicting results in literature, according to results of this study relationship between stress and sweets and snacks was not significant [22]. This poor dietary patterns because of stress can lead to weight gain and obesity [33]. These poor consequences of substandard diet could further deteriorate health by causing chronic diseases like diabetes and heart problems. So, here we can say that mental health and physical health go hand in hand. Moreover, the relationship between carbohydrate rich and energy rich foods and stress is also under consideration in literature [17]. Carbohydrate rich foods may be more eaten in stress because it produces serotonin, which is an important neurotransmitter in brain. Serotonin alters and elevates mood. So, this could be a motive of participants of choosing carbohydrate rich food, however if this were the cause of preference for carbohydrate rich foods then why the consumption of fruits and vegetables was less during stress period although they are carbohydrate rich and appropriate for health. However, the consumption of other carbohydrate rich and energy rich food groups including ready to eat foods, snack foods, sweet foods and fast food was more even they are not good for health [17]. In various studies, different reasons have been described for selection of unhealthy food by people when they get stressed. Some studies have ascribed that speedy and easy accessibility to these foods is the reason for likeliness and ingestion of unhealthy foods. While healthy foods like fruit juice and salads take longer time to get prepared for eating [17], [18]. According to another study preference of unhealthy foods including sweet foods and fatty foods by stressed people because of their high palatability which leads to alleviation of stress through discharge of endogenous opioids [19]. Furthermore, as a study has been proposed that under stress people eat less, so this could be the reason of high consumption of unhealthy foods because these foods are energy dense and compensate for low calories because of less consumption of foods. Another reason for consumption of unhealthy food could be easy digestion of these foods because stress depress the function of gut [15], [19]. In the light of above all studies we come to a point that people eat unhealthy foods when they get stressed, because of many reasons and the only solution to this problem is stress management through appropriate interventions. Although, this is a distinctive study in its perspective. This is the first study, in which we have inspected the effect of stress on food selection among final year medical students of Rawalpindi Medical University Rawalpindi, Pakistan. We have observed in this study, that higher stress leads to consumption of unhealthy foods among students. So, by applying various suitable interventions that could relieve stress, we would also be able to increase the consumption of healthy foods and consequently improvement in physical health along with mental health. Sessions should be conducted at universities that provide knowledge about non-pharmacological interventions and strategies to deal with stress. However, this study also has some limitations. First of all, our study has descriptive cross-sectional design and because of this, we could not find causative effect of stress on food selection among students. Second, our study was not adjusted for gender and boarding status of students which were associated with stress and could have association with food selection as



well. So, further studies are required to examine the effect of gender and boarding status on dietary pattern during stress. These future studies could provide further information regarding effects of gender and boarding status on food selection which would lead to application of specific interventions at gender and boarding status level.

## V. CONCLUSION

Our study indicates higher perceived stress among female and boarder students as compare to male and non-boarder students. Perceived stress leads to change in food selection, consumption of unhealthy foods increases with the increase in perceived stress while consumption of healthy food decreases with the increase in perceived stress. By applying appropriate interventions for the reduction of stress we could increase the consumption healthy food consequently improvement in physical health along with mental health.

### What is already know on this topic

- Perceived stress is a common health among medical students.
- Stress leads to change in appetite among people.
- Poor dietary behaviors can lead to weight gain and obesity.

### What this study adds

- Perceived stress was higher among female and boarder medical students as compare to male and non-boarder medical students.
- Higher perceived stress was associated with the increase consumption of unhealthy food among medical students.
- Universities should conduct sessions to teach students about non-pharmaceutical interventions for stress management to maximize the mental and physical health among students.

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