RESEARCH ARTICLE

Association of perceived stress with healthy and unhealthy food consumption among teenagers

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Abstract

Objective: To evaluate unhealthy and healthy food consumption and their association with perceived stress in teenagers.

Methods: The cross-sectional study was conducted from February to April 2017 at five educational institutions in Faisalabad, Pakistan, and comprised individuals of either gender aged 13-19 years. Dietary habits were recorded on a proforma and perceived stress scores were calculated using Cohen's perceived stress scale. Multiple regression analysis was used to predict perceived stress scores.

Results: Of the226 subjects, 96(42.5%) were males and 130(57.5%) were females. The frequency of consumption per week of sweet snacks, fried foods, soft drinks, sports drinks, energy drinks and vegetables was significantly more in males compared to the females ($p<0.05$ each). The consumption of such unhealthy food had significant positive relationship with perceived stress scores, while consumption of healthy food, like fresh fruits and vegetables, had a significant negative relationship with it in males only ($p<0.05$ each). Perceived stress score was primarily predicted by higher consumption of sports drinks ($p<0.05$) and lower consumption of fresh fruits ($p<0.05$).

Conclusion: Increased consumption of unhealthy food items and low intake of healthy food could lead to stress in young individuals, especially in males.

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Introduction

Stress is a state of mental or emotional strain or tension resulting from adverse or demanding circumstances.[1] It is increasing in Pakistani students. Most boys and girls have faced stress at one time or other in their day-to-day routine, resulting in lack of concentration and low mood that render them short-tempered.[2,3] Despite other factors that can lead to stress in young healthy individuals, high consumption of unhealthy food items like junk food and less consumption of healthy food like fruits and vegetables can be a major contributing factor in the development of this stress.[4] A study in the United Kingdom has shown positive association of unhealthy food and negative association of healthy food with perceived stress in undergraduate students.[5] Unhealthy food items like junk foods, commonly known as fast food, are loaded with calories, fats and salt.[6] However, the trend of consuming junk food is not new, but this has increased tremendously over the past few years, especially in teenagers who feel no harm in consuming large doses of these high calorie non-nutritious and unhealthy foods. Americans spend more than $200 billion per year on this junk.[7] Unfortunately no such data is available for a developing country like Pakistan whose youth has already limited access to nutritious food due to limited resources, illiteracy about healthy food options, poverty and, above all, carelessness about one's own health. There are serious ill consequences of consuming junk food on health. Obesity and many adult onset diseases, like hypertension (HTN), diabetes mellitus (DM), and hypercholesterolaemia, are now becoming common among adolescents.[8] The matter of concern is that despite knowing the ill effects of junk food, the teenagers do not translate this knowledge into good food behaviour.[9] The reasons for this behaviour could be manifold, as this age group is struggling hard to get good academic scores to get entry in medical or engineering colleges, with additional burden of new studies, staying away from home in hostels or other psychosocial changes in one's support and social system. The current study was planned to evaluate the unhealthy and healthy food consumption and their association with perceived stress among teenagers.

Subjects and Methods

The cross-sectional study was conducted from February to April 2017 at five educational institutions in district Faisalabad, Pakistan, and comprised individuals of either gender aged 13-19 years who were selected using multistage sampling technique. Ethical permission was obtained from the institutional review board of The

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The sample size was calculated using the proportions of junk and healthy food consumption reported for male and female teenagers[10] and then taking its average. The formula used for the comparison of proportions was, $n = (Z_{\alpha/2}+Z_{\beta})^2 * (p_1(1-p_1)+p_2(1-p_2)) / (p_1-p_2)^2$, where $Z_{\alpha/2}$ was the critical value of the Normal distribution at $\alpha/2$ (confidence level = 95%, α = 0.05 and critical value = 1.96), Z_{β} was the critical value of the Normal distribution at β (power = 80%, β = 0.2 and critical value = 0.84) and p1 and p2 were the expected sample proportions of the two groups.

First of all, a list of all private schools and colleges providing higher school education in the district was prepared, Five schools/colleges were randomly selected and a list of all the students, both male and female aged 13-19 years was obtained from the relevant department after ethical approval from each institution's management. The required sample was randomly raised from the list of students from Excel sheet. Written informed consent was taken from each subject before data collection. Teenagers with known psychiatric or eating disorders, like anorexia nervosa or bulimia nervosa, were excluded.

Information regarding unhealthy and healthy food consumption was collected on a specially-designed proforma.[11] The consumption frequency per week of sweet snacks (e.g., candies, chocolate, cupcakes, etc.), salty snacks (e.g., chips, pretzels, nachos, etc.), fruit-flavoured drinks (e.g., fruitopia), fried foods (e.g., fries, fried chicken, etc.), soft drinks (carbonated beverages), fast food meals (e.g., McDonald, Pizza Hut, etc.), sports drinks (e.g., Gatorade, Powerade, etc.), vitaminised sugary waters, energy drinks (e.g., Red Bull, Monster, Guru, etc.), water (bottled or tap), fresh fruits and vegetables were noted.

The perceived stress score (PSS) of each student was calculated using Cohen's perceived stress scale with an internal reliability of 0.85.[12] It is a 10-item questionnaire (PSS-10) with responses collected on a 5-point Likert scale ranging from 0 (never) to 4 (very often). The items were based on the thoughts and feelings of the participants like, "In the past month, how often have you been upset because of something that happened unexpectedly?" and so on. PSS-10 scores were obtained by reversing the scores on the four positive items: For example, 0=4, 1=3, 2=2, etc. and then summing across all 10 items. Items 4, 5, 7, and 8 were the positively stated items. Scores of 20 or higher were considered high stress scores; 13-20 moderate stress; and <13 low stress scores.[12]

Data were analysed using SPSS 22. Normality of the data was checked by Shapiro-Wilk statistics, and it was found to be normally distributed. Data were presented in terms of frequencies and percentages for qualitative variables and mean ± standard deviation (SD) for quantitative variables. Pearson's correlation was applied to observe correlations between quantitative variables. Two independent sample t tests were used for comparisons. Stepwise multiple regression analysis was used to predict the PSS which was taken as a dependent variable, while consumption frequency of all healthy (water, fresh fruits, vegetables) and unhealthy food items (sweet snacks, salty snacks, fruit flavoured drinks, fried foods, soft drinks, fast food meals, sports drinks, vitaminised sugary waters and energy drinks) were taken as predictors of PSS. F-test was used to ensure that the model was a good fit for the data. R^2 and adjusted R^2 were used to tell what percentage of variability in the dependent variable was accounted for by the independent variable. $P \leq 0.05$ was considered statistically significant.

Results

Of the 226 subjects, 96(42.5%) were males with a mean age of 15.68±1.83 years and 130(57.5%) were females

Table-1: Comparison of study variables between the groups using Independent sample t test and chi-square test.

		Male (n=96)	Female (n=130)	p-value
Age Mean (SD)		15.68 (1.83)	17.00 (1.74)	0.000*
Education n (%)	Pre-medical	56 (58.3)	116 (89.2)	0.000*
	Pre-engineering	32 (33.3)	12 (9.2)	
	Arts	8 (8.3)	2 (1.5)	
Socioeconomic status n (%)	Upper class	14 (14.6)	17 (13.1)	0.009*
	Upper middle	65 (67.7)	107 (82.3)	
	Lower middle	16 (16.7)	6 (4.6)	
	Lower class	1 (1)	0 (0)	
PSS Mean (SD)		17.73 (4.49)	20.26 (5.33)	0.000*

*p-value $\leq$ 0.05 is considered statistically significant. PSS: Perceived stress scores. SD: Standard deviation.

Table-2: Comparison of unhealthy and healthy food consumption among the groups using chi-square test and independent sample t test.

Food items	Percentage of subjects consuming these food items			Consumption frequency per week Mean (SD)		
	Males n=96	Females n=130	p-value	Males n=96	Females n=130	p-value
Sweet snacks	82 (85.4)	113 (86.9)	0.446	5.31 (3.51)	4.10 (3.48)	0.003*
Salty snacks	70 (72.9)	120 (92.3)	0.000*	3.90 (3.15)	4.58 (3.51)	0.249
Fruit flavoured drinks	58 (60.4)	89 (68.5)	0.133	3.06 (3.28)	2.77 (2.74)	0.788
Fried foods	92 (95.8)	125 (96.2)	0.581	4.96 (2.66)	3.82 (2.60)	0.001*
Soft drinks	86 (89.6)	110 (84.6)	0.187	6.22 (3.89)	4.59 (4.06)	0.000*
Fast food meals	66 (68.8)	106 (81.5)	0.020*	2.08 (2.02)	2.55 (2.42)	0.165
Sports drinksa	28 (29.2)	17 (13.1)	0.002*	1.10 (1.93)	0.50 (1.67)	0.002*
Vitaminized sugary waters	24 (25.0)	22 (16.9)	0.093	0.74 (1.50)	0.46 (1.24)	0.118
Energy drinksb	38 (39.6)	23 (17.7)	0.000*	1.16 (1.76)	0.66 (2.27)	0.000*
Water	96 (100)	130 (100)	-	31.30 (2.63)	30.46 (3.81)	0.089
Fresh fruits	87 (90.6)	104 (80)	0.021*	3.06 (2.42)	2.93 (2.29)	0.755
Vegetables	91 (94.8)	98 (75.4)	0.000*	3.53 (1.80)	2.65 (2.15)	0.002*

SD: Standard Deviation.
*p-value ? 0.05 is considered statistically significant.
aSports drinks: They are most appropriate hydration fluid during strenuous activity and contain no stimulants, only carbohydrate and salts to replace those lost in sweat.
bEnergy drinks: They contain stimulants, primarily caffeine and sugar, which give a temporary boost to performance.

Table-3: Correlation of perceived stress score with junk food consumption in teenagers.

Food items	Male n=96		Female n=130	
	rho	p-value	rho	p-value
Sweet snacks (e.g., candies, chocolate, cupcakes, etc.)	-0.080	0.441	-0.056	0.527
Salty snacks (e.g., chips, pretzels, nachos, etc.)	-1.00	0.333	-0.139	0.116
Fruit flavoured drinks (e.g., Fruitopia)	-0.090	0.383	-0.154	0.079
Fried foods (e.g., fries, fried chicken, etc.)	0.245	0.016*	-0.149	0.090
Soft drinks	0.244	0.017*	-0.124	0.161
Fast food meals (e.g., McDonald, Pizza Hut, etc.)	0.009	0.928	-0.005	0.954
Sports drinks (e.g., Gatorade, Powerade, etc.)	0.246	0.016*	-0.044	0.618
Vitaminized sugary waters	0.205	0.045*	0.002	0.986
Energy drinks (e.g., Red Bull, Monster, Guru, etc.)	0.086	0.404	0.049	0.581
Water, bottled or tap	0.003	0.976	0.031	0.723
Fresh fruits	-0.277	0.006*	0.009	0.919
Vegetables	-0.252	0.013*	0.033	0.709

*p-value $\leq$ 0.05 is considered statistically significant.

Table-4: Stepwise multiple regression analysis showing independent predictors of PSS.

Males	Parameters	β	p-value
Unhealthy food[a]			
R^2 =0.061	Sports drinks	0.570	0.016
Healthy food[b]			
R^2 = 0.076	Fresh fruits	-0.512	0.006

Dependent variable is Perceived stress score (PSS),
p-value $\leq$ 0.05 is considered statistically significant.
[a]= Predictor in the model: Consumption frequency of fresh fruits, Excluded variables: Sweet, salty snacks, fruit flavoured drinks, fried foods, soft drinks, fast food, vitaminized sugary water and energy drinks.
[b]= Predictor in the model: Consumption frequency of sports drinks, Excluded variables: Vegetables and water.

with a mean age of 17.00±1.74 years. The mean PSS of female was 20.26±5.33 compared to 17.73±4.49 for male teenagers (p<0.001) (Table-1).

There was significantly increased consumption of salty snacks, fast food, fresh fruits and vegetables as well as significantly decreased consumption of sports drinks and energy drinks in females compared to males (p<0.05 each). The frequency of consumption per week of sweet snacks, fried foods, soft drinks, sports drinks, energy drinks and vegetables was significantly more in males compared to the females (p<0.05 each) (Table-2).

There was significant correlation of PSS-10 scores in males

only with fried foods, soft drinks, sports drinks and vitaminised sugary water, while the consumption of fresh fruits and vegetables had a significant negative correlation with PSS (Table-3).

Step-wise regression analysis showed that in males, the model was statistically significant for both junk and healthy food ($p<0.05$ each). PSS was primarily predicted by higher consumption of sports drinks and lower consumption of fresh fruits (Table-4).

Discussion

The study was designed to see association of stress with unhealthy food consumption. It was observed that females were fond of salty snacks, fast food, fresh fruits and vegetables compared to boys who usually liked fried food, soft drinks, sports drinks and energy drinks. The results are similar to those of another study.[13] Another study found that use of these drinks was more common in males and was causing behavioural disturbances in these individuals.[14]

An interesting finding in our study was that PSS was significantly higher in males consuming more fried foods, soft drinks, sports drinks and vitaminised sugary waters. This shows that increased consumption of these junk items can lead to increased stress among male teenagers, whereas consumption of fresh fruits and vegetables was negatively associated with PSS. One study showed that energy drinks and binge drinking resulted in lower sleep quality and quantity and increased level of stress amongst college students.[15] In line with our results, another cross-sectional study in Chinese population concluded that use of vegetables in diet helped in reducing depressive symptoms in males.[16] However, the difference between the two studies was the age difference. In our study, we selected teenaged population whereas in the Chinese study, adults were taken into account.[16] A research conducted in Australian secondary schools surveyed 7835 students aged 13-17 years and observed that adverse behavioural effects were associated with low fruit intake and high consumption of energy drinks.[17] It has been seen in many studies that low socioeconomic status is associated with more junk food intake compared to students with high socioeconomic status.[18,19] This finding is contradictory to what the current study found as most of the subjects belonged to the upper-middle socio-economic class.

In step-wise regression analysis, PSS was primarily predicted by higher consumption of sports drinks and lower consumption of fresh fruits in males. A study conducted in Korean adolescents aged 12-18 years showed that consumption of energy drinks was related to detrimental effects on health, like higher PSS, suicidal ideation and mood disturbances.[20] Similar to our results, a study in Egypt showed that less intake of fruits and vegetables was significantly associated with higher PSS. Moreover, like our study, this association was found in males.[21] One of the causes might be that a vicious cycle developed in which eating junk food leads to stress and, in stress, individuals were less likely to plan their meals carefully.[22] Another cross-sectional study in England suggested that interventions should be made to reduce stress and depression by encouraging intake of healthy fruits and vegetables.[5] It was observed in a randomised, placebo-control trial, done on 59 healthy students, that intake of encapsulated fruit and vegetable concentrate for 3 months resulted in 30% increase in T-cells, and deoxyribonucleic acid (DNA) damage in lymphocytes was decreased by 40%.[23] The study also observed increase plasma levels of b-carotene, lycopene and vitamin C that are very much beneficial for health. This increase in plasma nutrients, reduction in DNA strand breakage, increase circulating T-cells and antioxidant capacity of these nutrients enhances the immunity that in return helps body to combat stress.[23]

This trend of increase in junk food should be discouraged in young people. The cross-sectional design of the current study prevents any comment on the causal aspects of the subject. However, the study has filled an important gap and can help in making strategies to discourage consumption of junk food in teenagers and to encourage intake of fresh fruits and vegetables.

Conclusion

Increased consumption of unhealthy food items, such as sports drinks, and decreased consumption of healthy food items could lead to stress in young individuals, especially in males. Encouraging teenagers to adopt healthy eating habits can reduce this stress and improve the quality of life and studies.

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