NUTRITIONAL HABITS AND OBESITY;
A CASE STUDY AMONG PAKISTANI UNIVERSITY STUDENTS

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ABSTRACT

Objectives: To investigate the obesity intensity and relationship of socio-demographic factors like gender, residential area (Rural/Urban), Hostelite/ Non-Hostelite on the nutritional habits and body mass index (BMI) among different public universities students of Punjab, Pakistan. **Methodology:** Cross sectional survey. **Period:** 10 Nov to 10 Dec 2017. Total of 442 students from five different public sector universities of Punjab province participated in the survey from age group 19 to 24 years. **Results:** Out of total 442 participants, 65.4% of participants were from urban areas and 34.6 % belong to rural areas of country. Regarding BMI; 261 (59.0%) were with Normal BMI, 113 (25.6%) were Underweight, 60 (13.6%) were Overweight and 8 (1.8%) were Obese. Statistical analysis done by using Chi-square test, which revealed positive correlation between nutritional habits and area of residence (P= 0.035, Chi Value= 8.627), while less convincing evidence in case of BMI and area of residence (P=0.603, Chi Value= 1.855).Interdependence was observed in case of BMI and gender (p-value =0.010 (<0.05) whereas no significance relation was observed between nutritional habits and Hostelite/ Non-Hostelites (p-value= 0.109 (>0.05). **Conclusion:** BMI calculation and statistical results revealed that significant proportion of students was in underweight (25.6%) and overweight (13.6%) category in public universities in said age group. Chi-square test validated that students from rural areas are more vegans as compared to urban areas. Applied statics confirmed the significant relationship between gender and BMI which revealed that more female students were underweight while more male were overweight. Urban areas subjects were under weight as compared to rural areas. There is dire need of nutritional education and awareness campaigns regarding healthy nutrition among universities students.

Key words: Nutritional habits; Body mass index; university students; socioeconomic status

INTRODUCTION

Obesity and being underweight is a key problem in youngsters across the globe and also in Pakistan. It has direct or indirect relationship with many of life threatening diseases including cardiovascular diseases (CVD) in youngsters. It has also been associated to student educational performance as well. Body mass index (BMI) is an important factor that helps in health status determination regarding weight and height of an individual. Body weight regulation is determined by nutritional, genetic, environmental, socio-economic status (SES) and different other physiological factors. In Pakistan, obesity is one of the significant problem which is increasing day by day among adult.[1]

There is concern about the increasing number of underweight/obese and overweight individuals in the developing countries like Pakistan. The obesity rate has become triple in developing countries due to increased urbanization, more luxurious lifestyle and increased consumption of high caloric food.[2,3] In 2014, World Health organization has reported that 39% of adults globally were obese/ overweight, among them

38% were males and 40% were female. Similarly, a Canadian study showed that about 22.9% from selected adult population were overweight/obese individuals.[4]

Body Mass Index is considered one of the determinants of health status. It is a ratio of weight and height, which helps to determine the category of weight. Less than 18.5 BMI is considered underweight, from 18.5 to 25 normal, from 25-30 over weight and above 30 is obese.[5,6] Body weight regulation is determined by a combination of genetic, physiological, environ-mental and psychological factors.[7,8] Experiments in laboratory animals have repeatedly shown that there is a strong positive relationship between dietary fat intake and body weight. This is generally attributed to the more efficient metabolism of fat compared to other nutrients and to the hyperphagic effect of a high-fat diet.[9]

Nutrition is the most important aspects of healthy development in an individual. Nutritional knowledge of an individual influences his/ her eating behavior.[10] The fluctuations in eating behaviors have not been directly related to the long-term changes in weight. However, eating fast food, snacking, increase consumption of sweetened beverages, skipping meals are common attributes which are direct contributors to obesity and also related to the Body Mass Index [BMI] among adults.[11] Mediterranean diet is largely considered to be the best for healthy nutrition which principally consists of vegetables, fruits, pulses, cereals, olive oil and fish.[12] The nutrition without Mediterranean diet is associated with obesity, heart diseases and the food intake away from home mostly results in food-borne diseases.[13]

The social environment also affect greatly to the eating behavior of adults. As children grow and become independent from their parents regarding diet, their eating style also changes due to new social connections. So the eating behaviors of university students depend on their families, their friends and peers. Like environmental factors, socio-economic status [SES] of a person is also considering influence individual energy expenditure and intake etc.[14,15] A negative link is established, when link between socio-economic status and BMI is considered in developing countries, and vice versa is seen in some but not in all develop countries.[16-18] It is reported in women of Kenya that BMI losses as family revenue increase, reason behind this is that, women have to perform intense activities by working at home. The relationship between BMI and SES is considered to be not consistent, approved by several studies.

Next, diet quality is considered to be a key intimidate to determine relationship between BMI and SES. Negative relationship is found again in high SES individuals who consume healthy diet.[19-21] A Questionnaire basesd study result showed that low fat diet, fresh food and vegetables mostly consume by high SES individuals while vice versa is associated with lower SES individuals.[22] Case will not be same in under develop countries i.e. in rural areas elder people, where as SES increases energy intake also increases. Previous data suggest that doubt exist between relationship of BMI-SES. Some studies says that physical activities [PA] and sedentary activities like playing videos and watching T.V will not link with the relationship of SES-BMI, while some said that there is relationship.[23-25] In low SES areas the lack of PA is explain by some factors like lack of social inspiration due to uneducated parents, low availability to amusing routes.[26-29]

It is reported that females are highly sedentary and less PA as compared to males and mostly don't take breakfast, fruits, juices.[30] Poor diet is prolifera-tions of the probabilities of death and disease problems.[31,32] Sedentary actions decrease by spending more time in PA in schools.[33] The aim of our study is to find relationship between SES-BMI by identifying the factors that will influence them by applying ordinary least squares (OLS)

data-set instead of quantile regression (QR).[34]

Transition in living arrangements influence the food patterns of university students. In Greece, students which are living away from their home made some unsuitable food choices like increased sugar and fast food intake and decreased consumption of fresh fruits and vegetables, and oily fish.[35]

Body mass is basic variable, which give information about growth and health of any individual.[36,37] It is investigated that adequate diet plan and physical activity reduce the chances of obesity in university students. Various studies show that the habit of high intake of food and sedentary routine of young adults associated with obesity.[30] Low intake of vegetables, high consumption of fat containing food and less physical activity has strong influence on health of young students.[32]

The purpose of this study was to assess BMI status, dietary habits, physical activities, dietary beliefs and nutrition knowledge of university students. Relationship of these parameters with BMI was also assessed to check their effect on BMI.

METHODOLOGY
A cross sectional survey was done among the undergraduate students from five public sector universities in Punjab province from 10 Nov 2017 to 10 Dec 2017. Participants of survey were from university of Gujrat. Gujrat, University of Sargodha, PMAS-Arid agriculture university Rawalpindi, university of the Punjab and Bahauddin Zakariya University Multan. The study was approved by the faculty Administration of Biochemistry and Biotechnology department, University of Gujrat. For BMI calculation, Weight and height of the participants were measured with weight machine and measuring tape. The data were collected by using self-administered questionnaire.

A pretested standardized survey Performa was used to collect the subsequent data: gender, age, day scholar/ hostel resident, area of residence/ belongings, nutritional habits, socio demo-graphic data, family history and their relations to the BMI was checked. The survey was done on 442 students (64 Male and 378 females) enrolled in different life sciences departments in said universities in age range of 19-24 years. About 35% students from participants were from rural and 65% from urban areas of country. Clarity of the persistence of research among the selected graduating students was done prior to data collection. The privacy of all respondents has been sustained strictly.

BMI CALCULATION
According to World health organization BMI within range of 18.505 kg/m2 –24.995 kg/m2 is considered as normal. BMI< 18.55kg/m2 taken as underweight. BMI > 25kg/m2 and BMI > 30 kg/m2 taken as Overweight and Obesity respectively. The weight of students was measured without wearing shoes In kilogram [kg] and height was assessed by using measuring tape. Then data was input in Microsoft Office Excel and the statistical research was filled out by using SPSS for Version 20.0 Windows.

STATISTICAL ANALYSIS
Software IBM SPSS statistics Version 20.0 was utilized to evaluate the data gathered from the study. Student's weight status and weight control challenges were used to identify the demographic features with the help of cross-tabulation by using chi-square to analyze the statistical deviations.

The values to demonstrate demographic characteristics were conducted by gender categories because female and male vary in their desires to change their weight. Chi square formula [Through SSPS software] was employed to determine the connection between each BMI and nutrition habits, while keeping the gender and area of residence [rural or urban] as control. Statistical Package [SPSS] version 20.0 was used

for data entry and statistical analysis.

RESULTS

The effects of socio demographic factors on participants BMI was determined through statistical analysis. Among 442 students, 64 [14.5%] were males and 378 [85.5%] were females respectively. The mean age of students was 20.71±1.5[SD= ± 1.5] years old. 153 [34.6%] were belong to rural area and 289 [65.4%] were belong to urban area. 80 [18.1%] were Hostelite and 362 [81.9%] were Non-Hostelite [Table 1].

Table 1. Frequency and Percentage of different variables:

Variable	Category	Number	%
Gender	Female	378	85.5
	Male	64	14.5
Area	Rural	153	34.6
	Urban	289	65.4
Residency	Hostelite	80	18.1
	Non-Hostelite	362	81.9
Nutritional Habit	Vegetarian	141	31.9
	Non-vegetarian	83	18.8
	Both	160	36.2
	Fast Food	58	13.1
BMI Result	Underweight	113	25.6
	Normal weight	261	59.0
	Overweight	60	13.6
	Obesity	8	1.8

BODY MASS INDEX [BMI]

Body mass index [BMI] of students was calculated by using the measured height and weight and the mean BMI was 21.17±3.75 kg/m^2 [SD= ± 3.75] [Table. 2]. Among 442 students, 261 [59.0%] were Normal, 113 [25.6%] were Underweight, 60 [13.6%] were Overweight and 8 [1.8%] were Obese [Table 1].

AREA AND NUTRITIONAL HABITS

The relation of area [rural/urban] with nutritional habits was determined. In view of results, total 141 students were eating vegetarian diet, out of which 60 [39.2%] were rural and 81 [28.0%] were urban. The diet of total 83 students was Non-vegetarian, out of which 30 [19.6%] were rural and 53 [18.3%] were urban. 50 [32.7%] rural and 110 [38.1%] urban was eating both vegetarian/non-

Table 2. Statistic Analysis of Variables.

Factors	Rural		Urban		Chi Value	P value
	Frequency	%	Frequency	%		
Nutritional Habit					8.627	0.035
Vegetarian	60	39.2	81	28.0		
Non-vegetarian	30	19.6	53	18.3		
Both	50	32.7	110	38.1		
Fast Food	13	8.5	45	15.6		
BMI Result					1.855	0.603
Underweight	44	28.8	69	23.9		
Normal weight	89	58.2	172	59.5		
Overweight	18	11.8	42	14.5		
Obesity	2	1.3	6	2.1		
Factors	**Female**		**Male**			
	Frequency	%	Frequency	%		
Nutritional Habit					11.243	0.010
Vegetarian	125	33.1	16	25.0		
Non-vegetarian	62	16.4	21	32.8		
Both	143	37.8	17	26.6		
Fast Food	48	12.7	10	15.6		
BMI Result					9.661	0.022
Underweight	105	27.8	8	12.5		
Normal weight	221	58.5	40	62.5		
Overweight	46	12.2	14	21.9		
Obesity	6	1.6	2	3.1		

vegetarian type of diet. Similarly, 13 [8.5%] rural and 45 [15.6%] urban was eating fast food. When chi square is applied between area of residence and nutritional habits, p-value of 0.035 [<0.05] was obtained, which shows that there is significant relationship between area of residence and nutritional habits and both are dependent on one another. Urban areas students were found more habitual toward fast foods.

AREA AND BMI

The effect of being resident of rural/urban area on BMI was assessed, which results in p-value of 0.603 [>0.05], which shows that there is no significant relationship between rural/urban area and BMI mean they are independent of each other.

GENDER AND NUTRITIONAL HABITS

There are commonly different food choices of male and females which shows variation in their nutritional habits. So, the relationship between

gender [male/female] and nutritional habits show significant p-value of 0.010 [<0.05], which represent the effect of gender on diet plan. Surprisingly more females were vegans and more males fraction was non-vegetarian. The results show that among vegetarian, 125 [33.1%] were females and 16 [25%] were males. Non-vegetarian include 62 [16.4%] were females and 21 [32.8%] were males. Students consuming both types of diet include 143 [37.8%] were females and 17 [26.6%] were males. 48 [12.7%] females and 10 [15.6%] males were taking fast foods.

GENDER AND BMI

As nutritional habits of male and female students are different, so they also exhibit variation in their BMI. Based on this hypothesis, the relation between gender and BMI was checked, as a result p-value of 0.022 [<0.05] is obtained, which shows that gender and BMI are inter dependent. Female were observed with more fraction in both of underweight as well as over weight. Results shows that 105 [27.8%] females and 8 [12.5%] males were underweight, 221 [58.5%] females and 40 [62.5%] males were normal, 46 [12.2%] females and 14 [21.9%] males were overweight, and 6 [1.6%] females and 2 [3.1%] males were obese.

RELATION OF HOSTELITE/NON-HOSTELITE WITH NUTRITIONAL HABITS AND BMI

Being a Hostelite/ Non-Hostelite may also affect the nutritional habits and thus BMI of university students. So according to our case study and analysis, the relation between Hostelite/ Non-Hostelite and nutritional habits gives p-value of 0.109 [>0.05], which shows that there is less convincing evidence of relationship between Hostelite/ Non-Hostelite and their nutritional habits. In the same way, the p-value obtained when effect of Hostelite/ Non-Hostelite on BMI is assessed, was 0.559 [>0.05] which again shows that there is not much variation in BMI of either Hostelite and Non-Hostelite students. Hence both nutritional habits and BMI of university students are independent of being Hostelite or Non-Hostelite. Detailed percentages are given in table 2.

CONCLUSION

This field demonstrates the dependence of student BMI on the area and nutrition habits. Students who belong to urban regions, mostly underweight because they depend on fast food and use less fresh vegetables. As compared to students who belong to rural areas because they use fresh fruits and vegetables. These students are mostly healthy but a small fraction is overweight. For the university students, it is necessary to maintain their BMI because it directly affects their academic performance. As university students spent much of their day time at university so the cafeterias should be provided and decorated with posters showing the healthy and poor nutritional habits. *To make understand the importance of BMI on student health and academic performance there should be "healthy nutrition" awareness programs at university level so the students may be benefitted to boost up their healthy life style and academic performances.*

DISCUSSION

Our study contributes to the impact of socio-demographic factors such as gender, area of residence [rural/urban], hostelite/ non-hostelite on nutritional habits and BMI of students in different public sector universities of Pakistan. The questionnaire includes a number of fields depicting the nutritional habits, gender, age, height, weight etc.

In our study, 13.6% students were overweight/ obese. A similar study on BMI was conducted in Dow Medical College Karachi, which shows 17.4% students were overweight.[38] The prevalence of obese/overweight is less in our study as compared to Karachi and foreign countries like UAE and Greece.[39] This may be due to the younger age of the students, environmental or genetic factors.

According to our data, being rural/urban is negatively associated with the BMI, and hence our study is inconsistent with the that conducted Turkey, which reveals that obesity is more in metropolitan than non-metropolitan regions.[40] Further, analysis reveals that gender is significantly associated with both nutritional habits and BMI, but our result is less significant than Taif University KSA study, which may be due to change in lifestyle of male and female students. This is also due the more awareness about weight gain in females than males.[41]

The change in BMI on entering university is attributed to the transition of students from school to the university, where the students tends to reduce their physical activity and live more sedentary lifestyle, which resulted in overweight. A similar study also showed the increase in BMI by entering in university.[42] Conversely, a study shows that there is weight loss in the final year of the degree of the students, which is considered to be due to the increased stress leading to poor eating habits, decreased physical activity. The failure to cope with that stress resulted in weight loss and hence decreased BMI of students. So, further study is needed to explore more reliable relationship.[43]

Being with family or away from family is negatively related to both the eating habits and BMI according to our findings which resembles with the study of Taif University study report.[41] It is generally assumed that eating with family contribute to the low prevalence of obesity among students. Although some studies showed the positive relationship between eating with family or away from family and nutrition, but in our findings, no relation was found between living place and BMI.[44]

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66