Effect of Dietary Intake and Physical Activity on Body Mass Index Among the Students of University of Lahore

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Abstract:

Nutrition has fundamental role in the well-being of any individual. The intake of proper diet along with any kind of regular activity is essential for obtaining good health.

Objective:

To determine the effect of dietary intake and physical activity on Body Mass Index (BMI) among the students of University of Lahore.

Methods:

A cross-sectional study was conducted at The University of Lahore, Lahore and completed within 9 months by using the non-probability convenient sampling technique. The data were collected through pre –tested questionnaire from 369 students (both males and females) between age 20-30 years. Data were analyzed using SPSS version 22.0. Frequencies were calculated, Pearson's chi-square and paired sample t-test was applied.

Results:

Total of 369 respondents were included in the study, out of which 64.8% were having normal weight, 19.2% overweight, 11.4% underweight, and 4.6% were obese. The average age of the respondents was 21 years. Majority of the respondents (69.6%) belonged to the middle class. A considerable association was found between Body Mass Index (BMI) and milkshake consumption (p-value=0.041), french fries consumption (p-value=0.039), 60 minutes of normal walk (p-value=0.005).

Conclusions:

It was concluded that there were variations among the associations between intake of different food items and physical activity and its impact on Body Mass Index (BMI).

Key words:

Dietary intake, Body Mass Index, physical activity, students.

Introduction:

Nutrition has fundamental role in the well – being of any individual. According to World Health Organization (WHO) it is the food intake according to the body's requirements . Nutrition is categorized as good and poor where as good nutrition is the proper intake of food along with any kind of regular activity which is essential for obtaining good health and poor nutrition makes more vulnerable to disease, lessens the immunity, damages physical and mental development and decreases efficiency.[1] Nutrients are taken through diet which refers to the food and drink a person consumes daily,[2] where as balanced diet refers to consuming food and drink in the right quantity from variety of food groups to attain and sustain healthy body weight.[3] Combination of adequate dietary intake and physical activity will lead to weight maintenance and well-being which will consequently prevent from many diseases. Consumption of excessive fatty food and physical inactivity leads to excessive weight gain which can further result in obesity. Globally, there has been a two fold increase in the obesity from year 1980 to 2014. Worldwide, 13% of the adults were obese, of which 11% were men and 15% were women.[4] Obesity leads to many diseases like diabetes mellitus, cardiovascular disease, hypertension, gall bladder disease, and cancer. It is also linked to other issues that interfere with social life like loneliness, loss of mobility, rejection, and increase in stress levels. Obesity causes many skin problems like stretch marks, excessive body hair, and eczema.[5] Obesity and overweight, both, are linked with an elevated threat of mortality.[6] Body Mass Index (BMI) is a guide of weight-for-height that is generally used to categorize underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters square (kg/m^2). Body Mass Index (BMI) < 18.5 refers to under weight which

is further divided into sub – classes that is Body Mass Index (BMI) < 16.00 indicates severe thinness, Body Mass Index (BMI) from 16.00 – 16.99 indicates moderate thinness, and the Body Mass Index (BMI) from 17.00 – 18.49 indicates mild thinness. Body Mass Index (BMI) from 18.50 – 24.99 refers to normal weight. Body Mass Index (BMI) from 25.00 – 29.99 refers to overweight or pre – obese class. Body Mass Index (BMI) ≥ 30 refers to obesity which is further divided into sub – classes that is Body Mass Index (BMI) from 30.00 – 34.99 indicates Obesity class I, Body Mass Index (BMI) from 35.00 – 39.99 indicates Obesity class II, and the Body Mass Index (BMI) ≥ 40 indicates Obesity class III.[7] Physical activity also plays essential role in the well-being. It refers to the body movement generated by skeletal muscles that involves energy spending. Participating in physical activities like cycling, walking, and sport plays vital role in maintaining health.[8]Involving in any kind of physical activity for about 7 hours a week reduces the chance of dying early than those who are active for below 30 minutes a week.[9]

A study was conducted in 2013 by Bank SS et al in order to check the relationship between dairy consumption and obesity in university going female students and the results of the study showed 8.1 % prevalence of increased weight in students and the average value of waist measurement and Body Mass Index (BMI) and dairy intake was 70.37 cm, 21.54 kg/m^2, and 444.24 g/day. There was no considerable association between dairy intake and increased weight, waist circumference or obesity.[10]The results of the study conducted by Majeed F, in 2015 showed strong association between diet and physical activity on Body Mass Index (BMI) among students. According to Body Mass Index (BMI) readings, 63.7 % were normal weight, 11.6 % were overweight and 6 % were obese.[11]In 2015, a study was conducted by Kutty NAM *et al*, which depicted that 68.5 % of university students had normal weight, 18.2 % were underweight, where as 13.6 % were overweight and obese. The consumption of snacks, beverages and water intake showed strong relationship with Body Mass Index (BMI).[12]In 2014, the results of the study carried out by Mani G, revealed that 56.7% students were normal weight, 10% were underweight, 24% were overweight, and 9.3% were obese. The characteristics that had obvious relation with nutritional status were sedentary lifestyle, consumption of fruits, and time span of participating in any kind of physical activity.[13]The findings of the study conducted by Alfawaz HA, in 2012 suggested that there was no notable connection between fast food intake and Body Mass Index (BMI) specially the amount of food eaten and Body Mass Index (BMI). However, students were frequently consuming fast food and a strong association was found between students' education level and their awareness regarding the reason of fast food being unhealthy.[14]In 2015, the results of the research carried out by Song MR, revealed that being physically active has significant relation with body weight and body fat whereas dietary intake has insignificant relation with both body weight and fat.[15]The findings of the research conducted by Barr SI *et al*, in 2015 showed that breakfast intake had no constant effect on Body Mass Index (BMI) as well as on the rate of getting overweight or obese in both genders.[16]The research conducted by Vartanian LR*et al*, in 2007 showed the positive relation between soft drinks consumption and weight gain.[17]The results of the study carried by Ghalae RS *et al*, in 2012 found the negative relationship of eating fruits and vegetable with body weight and Body Mass Index (BMI), but there was no prominent association between fruits and vegetables together or even separately with waist circumference.[18]

The study was aimed to assess the nutritional status of the students and its results might be helpful in preventing the hazards of obesity through education and awareness which will also highlight the importance of physical activity among the students which may give rise to an urge of involving in any sort of physical activity. The study has also guided to take proper measures to minimize the adverse effects of physical inactivity and inadequate dietary intake.

Methods:

A descriptive cross-sectional study was conducted at The University of Lahore, Defence Road Campus, Lahore, over a period of 9 months. A total of 369 students were selected using convenient sampling technique. All males and females students of University between age of 20 – 30 years were included in the study while non – cooperative students and

students suffering from any illness were excluded. Data were collected with the help of pre–tested questionnaire. The students' self-reported height and weight at the time of admission was recorded to calculate their Body Mass Index (BMI) at the time of admission whereas their current weight was recorded by using OMRON HN289 Digital Scale,[19] to the closest 0.1 kg by following the WHO (World Health Organization)standard procedure for measuring weight in order to calculate their current Body Mass Index (BMI).[20] The relationship of dietary intake and physical activity among the students of University of Lahore was observed with Body Mass Index (BMI). The data were analyzed using SPSS version 22.0. Frequencies were calculated and Pearson's Chi-square test was applied to evaluate the association of dietary intake and physical activity with BMI (Body Mass Index). Paired sample t-test was also applied to calculate the difference between the students' current BMI and BMI at the time of admission in University.

Results:

According to table 1 the results highlighted the ages of the 369 respondents. The average age of students was 20.82 years, maximum; 29 years and minimum; 20 years respectively.

Age	N	Minimum	Maximum	Mean	SD
	369	20	29	20.82	1.256

Table 1: Age distribution of Students

As shown in table 2, the BMI of students at the time of admission and Current BMI. 59.6% students had normal weight at the time of admission, 19% were underweight, 17.3% were overweight and 4.1% were obese whereas according to current BMI of students; 64.8% students had normal weight, 19.2% were overweight, 11.4% were underweight, and 4.6% were obese.

Ranges of BMI	BMI at the time of admission		Current BMI	
	f	%	f	%
<18.5 (Underweight)	70	19	42	11.4
1 8.5-24.9 (Normal weight)	220	59.6	239	64.8
25.0-29.9 (Overweight)	64	17.3	71	19.2
=30 (Obese)	15	4.1	17	4.6
Total (%)	369	100	369	100

Table 2: BMI at the time of admission and Current BMI

As shown in table 3 the relation between puri consumption and current BMI of 369 respondents. 44.2% were consuming it out of whom 30.6% were normal weight and 1.9% were obese whereas, 55.8% were not consuming it and 34.1% among them were normal weight and 2.7% were obese. There is a significant association between current BMI of the students and puri consumption (p-value=0.006).

Current BMI	Puri Consumption		Total	P-value
	Yes	No		
Underweight	8(2.2%)	34(9.2%)	42 (11.4%)	0.006
Normal weight	113 (30.6%)	126 (34.1%)	239 (64.8%)	
Overweight	35(9.5%)	36 (9.8%)	71 (19.2%)	
Obese	7(1.9%)	10(2.7%)	17 (4.6%)	
Total	163 (44.2%)	206 (55.8%)	369 (100%)	

Table 3: Association between current BMI and consuming puri

Table 4 shown the relationship between consuming 2 plates of biryani and current BMI of 369 respondents. 13 % were consuming it out of whom 7.3 % were normal weight and 1.4 % were obese whereas, 87 % were not consuming it and 57.4 % among them were normal weight while 3.3 % were obese. There is a significant association between current BMI of the students and consuming 2 plates of biryani (p-value=0.018).

Current BMI	Consuming 2 plates of biryani		Total	P-value
	Yes	No		
Underweight	2(0.5%)	40 (10.8%)	42 (11.4%)	0.018
Normal weight	27(7.3%)	212 (57.4%)	239 (64.8%)	
Overweight	14(3.8%)	57 (15.4%)	71 (19.2%)	
Obese	5(1.4%)	12 (3.3%)	17 (4.6%)	
Total	48(13%)	321 (87%)	369 (100%)	

Table 4: Association between current BMI and consuming 2 plates of biryani

Table 5 represents the relationship between exercising 60 minutes of normal walk and current BMI of 369 respondents. 11.7 % were exercising 60 minutes of normal walk out of whom 6 % were normal weight and 0 % were obese whereas, 88.3 % were not exercising 60 minutes of normal walk and 58.8 % among them were normal weight while 4.6 % were obese. There is a significant association between current BMI and exercising 60 minutes of normal walk (p-value=0.005).

Current BMI	Exercising 60 minutes of normal walk		Total	P-value
	Yes	No		
Underweight	11(3%)	31 (8.4%)	42 (11.4%)	0.005
Normal weight	22(6%)	217 (58.8%)	239 (64.8%)	
Overweight	10(2.7%)	61 (16.5%)	71 (19.2%)	
Obese	0(0%)	17 (4.6%)	17 (4.6%)	
Total	43(11.7%)	326 (88.3%)	369 (100%)	

Table 5: Association between current BMI and exercising 60 minutes of normal walk

Table 6 showed BMI at the time of admission in the University and Current BMI. The results showed the significant difference between BMI at the time of admission in University and Current BMI. 19% of the students were underweight at the time of admission, 59.6% were normal weight, 17.3% were overweight, and 4.1% were obese respectively, whereas, 11.4% students were underweight, 64.8% were normal weight, 19.2% were overweight, and 4.6% were obese according to their Current BMI. There was a significant difference between the student's Current BMI (Body Mass Index) and BMI at the time of admission (p-value=0.000).

Ranges of BMI	BMI at the time of admission	Current BMI	P-value	t-test value
<18.5 (Underweight)	70 (19%)	42 (11.4%)	0.000	-6.869
18.5-24.9 (Normal weight)	220 (59.6%)	239(64.8%)		
25.0-29.9 (Overweight)	64 (17.3%)	71(19.2%)		
≥30 (Obese)	15 (4.1%)	17(4.6%)		
Total %	369 (100%)	369(100%)		

Table 6: Difference between BMI at the time of admission in this University and Current BMI (Paired Sample T-Test)

Discussion:

The results of milk shake consumption as well as the findings of consuming lassi and milkshake from past 6 months showed significant association with BMI (Body Mass Index) which contradicts the results of the study conducted by Bank SS *et al*.[10] The results of the current BMI (Body Mass Index) of the students showed that 64.8% were normal weight which is close to the results of Majeed F, (63.7%)[11] and Kutty NAM*et al* (68.5%).[12] This study showed significant association of normal walk for 60 minutes, running more than 5 km and from past 1 year, playing badminton and table tennis for 2 hours with BMI (Body Mass Index) which strongly supports the findings of the study conducted by Mani G.[13] The results of the current study disclosed considerable association between French fries consumption and BMI (Body Mass Index) but the amount and duration of consuming them did not show any relation with BMI (Body Mass Index) which is in accordance with the results of Alfawaz HA.[14] The findings of study conducted by Song MR, concluded that physical activity has significant association with body weight which is in accordance with this study.[15] Assessment of the association between BMI and breakfast consumption showed non-significant association between both which is similar to the results of Barr SI *et al*.[16] The findings of this study revealed that soft drinks have insignificant association with BMI which opposes the results of study conducted by Vartanian LR *et al*.[17] This study revealed insignificant association between fruits consumption and BMI (Body Mass Index) which is in contradiction to the findings of Ghalae RS *et al*.[18]

Conclusions:

It was concluded that there were variations among the associations between intake of different food items and its impact on Body Mass Index. Most of the food items that showed significant association with Body Mass Index were those that were consumed in large quantities. The same scenario of variations was noticed among the associations between physical activity and its impact on Body Mass Index. It was observed in current study that most of the physical activities like continuous 60 minutes of normal walk had considerable association with Body Mass Index .

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