
STUDIES ON THE RELATION BETWEEN FAST FOOD, SUGAR SWEETENED BEVERAGE CONSUMPTION AND BODYWEIGHT AMONG YOUNG ADULT FEMALES (20-25 YEARS)

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Abstract

Obesity is a condition in which excess body fat accumulates, which leads to various adverse effects on health, particularly cardiovascular diseases, which reduce life expectancy and/or increase health problems. Consumption of FFs (Fast Foods) and SSBs (Sugar Sweetened Beverages) are the factors which have been reported as a cause of obesity. This study focused on the relationship between bodyweight and FF consumption, associated with SSB consumption. Analytical cross-sectional study was conducted in University of Calcutta (Viharilal College of Home Science campus). Fifty students from 2nd year M.Sc. course were included in this study. Self-reported questionnaire was used to collect data on general information, anthropometric measurement, dietary habit, prevalence of consumption of FFs and SSBs and their attitude towards consumption of FFs and SSBs. In the present study, out of 50 students, a total of 49 students (98%) and 48 students (96%) used to have FFs and SSBs. Among these, a total of 11 students (22%) were preobese and obese, 36 students (72%) were in normal weight range, while 3 (6%) students were underweight. For an association between categorical variables, chi-square test was used. The probability level of $P \leq 0.05$ was set for statistical significance. BMI was not significantly associated with FFs consumption and intake of SSBs. But a statistical significance was found between BMI and daily calorie intake (P value-.000) and daily breakfast calorie intake (P value-.000). In this study BMI is not significantly associated

Keywords: Fast food, Sugar sweetened beverage, BMI, body weight.

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1. INTRODUCTION

Nowadays, the prevalence of FF (Fast Food), SSB (sugar sweetened beverage) consumption and overweight/obesity are increasing. FF is defined by a convenience food purchased in self service or carries out eating venues without wait service^[1]. Consumption of FF and SSB leading to excess calorie intake coupled with lack of adequate physical activity has increased the risk of obesity among the world population for the past few decades. Obesity is a condition in which excess body fat accumulates, which leads to various adverse effects on health, particularly cardiovascular diseases, which reduce life expectancy and/or increase health problems. FF and SSB consumption is one of the factors which have been reported as a cause of obesity. College students are highly exposed to unhealthy eating habits leading to body weight gain (Huang et al., 2003)^[2]. Because of life style, time constraints, convenience, cost, menu choice, flavor and taste, FF has become

increasingly an important part of their diet (Paeratakul et al., 2003)^[3] and the growth of FF industry has been an important environment inducement for increasing FF consumption (Block et al., 2004)^[4]. Previous research has identified a strong positive association between the availability of FF and its consumption as well as obesity outcomes^[5]. The results from many studies showed that FF consumption was higher among children, adolescent, young adults and people with higher income (Pereira et al., 2005)^[1]. It has been suggested that FF may encourage soft drink consumption and associated with low intake of vegetables, fruits and milk in both adult and children (Paeratakul et al., 2003)^[3]. Harmful consequences of these foods have found on health; like increased weight gain, higher BMI and insulin resistance which will subsequently lead to increase in the risk of obesity and development of type 2 diabetes. (Pereira et al., 2005; Astrup, 2005; Jeffery et al., 2006; Fraser et al., 2011)^[1, 6, 7, 8].

List of Abbreviations used in this paper

Abbreviations	Definition	Abbreviations	Definition
FF	Fast Food	WHO	World Health Organization
SSB	Sugar Sweetened Beverage	SES	Socio Economic Status
M.Sc	Master of Science	SPSS	Statistical Package for Social Science
BMI	Body Mass Index	KJ	Kilo Joule

BMI is also affected by the breakfast consumption. An inverse relationship has been found between BMI and breakfast consumption. Breakfast eaters tend to have lower BMI than breakfast skippers. It has been found that obese individuals are more likely to skip breakfast or consume less energy at breakfast due to lack of time for the preparation and consumption of food and concerns about excess body weight. In a study it was hypothesized that not only is breakfast consumption (or skipping) itself associated with BMI, but also that how much calorie is taken from breakfast and the type of food eaten at breakfast affects BMI^[9]. In one study it is demonstrated that high calorie breakfast is more beneficial than high-calorie dinner for weight loss, insulin sensitivity, and hunger suppression^[10]. An analysis provides evidence that eating cereal (ready-to-eat or cooked cereal) or quick breads for breakfast is associated with significantly lower BMI compared to eating meats and/or eggs for breakfast or skipping breakfast. Eating a high fat, low fiber breakfast (as in the meat and eggs category), is associated with a higher BMI^[9]. Hanan A. Alfawaz, (2012) showed that there was no significant relationship between FF consumption and BMI pattern. But there was a significant ($P \leq 0.05$) positive relationship between university study level and knowledge in explaining why FF is unhealthy^[10]. Mohammadbeigi et al., (2018) found that FF consumption was associated with abdominal obesity based on Waist Hip Ratio, but did not related to general obesity based on BMI^[11]. Similar results were found by Shah TruShna et al., (2014), where significant

relationship was found between BMI and FF consumption, less physical activity, and intake of soft drinks^[12]. A cross-sectional study conducted by Goon Shatabdi et al., (2014) found that obesity was significantly associated with frequency of fast-food restaurants visits. Obesity was detected among those students who going two or more times per week in FF restaurants^[13].

It was expect that the association between FF consumption and BMI will different in this population as they are suppose to have knowledge in nutrition and less bad dietary habits. The primary objective of the present study is to investigate the relationship between (a) **Consumption of FF and Body Weight**, (b) **Consumption of SSB and Body Weight**.

2.METHODOLOGY

This is an analytical questionnaire-based; cross sectional study. The study was carried out in form of a survey with the aim to identify and assess the relationship between

- Consumption of FF& Body Weight
- Consumption of SSB&Body Weight

Sample collection: 50 female students were interviewed aged 20 to 25 years by using self-administered questionnaire. The subjects were recruited from University of Calcutta (Viharilal College of Home Science campus). All of the subjects were pursuing M.Sc (In Food & Nutrition). The study was explained to each subject who was interviewed.

Data collection: By using a proforma (Enclosed in this thesis), data was collected on general information (like name, age, sex, religion, marital status, educational qualification, type of family, no of family member, head of the family, qualification of parents, total income of the family etc), height, weight, dietary habit and frequency of consumption of FF and SSB.

Anthropometric measurement:

Height:

The height was measured in centimeters with the help of a vertical measuring rod. The subject was asked to stand straight on a flat floor by the measuring rod with feet parallel

and with heels, buttock, shoulder and back of head touching the upright. The subject was asked to hold their head comfortably erect and to hang their hand at the sides in a natural manner.

Weight: The weights of the subjects were taken on a weighing machine (spring balance) in kilogram. The subject was asked to stand straight and the measurement was noted.

BMI: BMI was derived from body weight in kilogram divided by the square of the body height in meters. The BMI was classified into eight groups according to the WHO (2020). Group 1 severe thinness (BMI<16.00), group 2 moderate thinness (BMI=16.00-16.99), group 3 mild thinness (BMI=17.00-18.49), group 4 normal (BMI=18.50-24.99), group 5 pre-obese (BMI=25.00-29.99), group 6 obese class 1 (BMI=30.00-34.99) and group 7 obese class 2 (BMI=35.00-39.99), group 8 obese class 3 (BMI>40.00)[14].

SES: The subjects were classified into high, middle and low SES according to the Kuppaswamy's SES scale. This scale is based on a composite score considering the education and occupation of the head of the family along with monthly income of the family, which yield a score of 3-29. Class 1 upper (score=26-29), class 2 upper middle (score=16-25), class 3 lower middle (score=11-15), class 4 upper lower (score=5-10), class 5 lower (score<5)[15].

Diet survey: 3 days recall method was used to get an overall idea about regular dietary pattern. The subjects were asked to write the information on past dietary habit, the number, frequency and type of meal they have taken. Some most popular name of FF and SSB were mentioned in the proforma and the subjects were asked to write the frequency of intake or rate of consumption of FF and SSB per week. To calculate the total calorie from home based diet, software named food tracker was used[16].

Questionnaire: Questionnaire was done to get information on knowledge, attitude, behavior towards consumption of FF and SSB and the factors affecting the consumption of FF and SSB.

Data analysis: Data were analyzed by using SPSS 16 software. Descriptive data was obtained for all the parameters tested as percentage and in frequency. For association between two categorical variables, chi-square test was used. The probability level of $P \leq 0.05$ was set for statistical significance.

3. RESULTS AND DISCUSSION

Results

A total of 50 female students were participated in the present study. Table-A represents the sociodemographic characteristics of the students which show that mean age is 23 years. All of them are mostly Hindu (94%) and a few Muslims (6%). Socioeconomic status of the students shows that 4% of the students are upper and upper lower, 80% are upper middle and 12% are lower middle. Among 50 students, only 2 students are married.

Table-B shows anthropometric characteristics of the students which show that the mean BMI of the study subjects is 22.6. A majority of the subjects are in normal (or, healthy) weight range (72%), followed by 6% who are underweight (mild thinness=66%, severe thinness=34%), 18% who are overweight and 4% who are obese [obese class 1 (50%), obese class 2(50%)].

A majority of the subjects (98%) ate FF, whereas only 2% did not. Frequency of FF consumption was in the range of 1-2 times per week in majority (74.5%). Consumption of FF was 6%, 72%, 18% and 4% and consumption of SSB was 6%, 68%, 22% and 4% among under weight, normal weight, overweight and obese students respectively. Consumption of FF and SSB were 4%, 80%, 12%, 4% and among upper, upper middle, lower middle and upper lower SES class respectively. Results revealed that large number of the students follow unhealthy food habits. Almost 50% of them ate chips, fried chicken, french fries, whole milk, soft drinks, sweetened milk tea, momo, puri, paratha, pakora, biryani, moglai, chawmin, fuchka, bottled fruit juice.

The mean total calorie intake from FF and SSB were 5241 and 1307 kcal per week.

Out of 50 students more than 80% students agree that they consume fast food because fast foods are ready to eat and 38% students agree that fast foods are convenient. 30% students agree that fast food is inexpensive where 32% do not and 38% students are neutral. More than 96% students like the taste of fast foods. More than 86% agree that fast foods offer variety. 30% students like the environment of fast food outlets. More than 60% students agree that advertisement of fast food influence their fast food consumption. 16% students agree that they consume fast foods for their status symbol where 68% students do not. 16% students take

fast foods as normal meal where more than 79% students do not.

Table-C shows that there is no statistical significance between FF, SSB consumption and BMI. However it is found that there is statistical significance between BMI and daily calorie intake (P value-.000). BMI is also statistically significant with daily breakfast calorie intake (P value-.000). The table-D shows that there is no statistical significance between FF consumption and SES, but there is statistical significance between SSB consumption and SES (P value-.048). Also there is no observed statistical relationship between BMI and SES (Table-E).

Table-A Sociodemographic characteristics of the students (n=50)

	Age (in year)	Frequency	Mean of age(in year)
Age	20	1	23
	21	2	
	22	15	
	23	25	
	24	7	
	Religion	Frequency	
Religion	Hindu	47	
	Muslim	3	
	SES	Frequency	
SES	Upper	2	
	Upper middle	40	
	Lower middle	6	
	Upper lower	2	
	lower	0	

Table-B Anthropometric characteristics of the students (n=50)

	BMI	Frequency	Mean of BMI
BMI	Mild thinness (17.00-18.49)	2	22.6
	Moderate thinness (16.00-16.99)	0	
	Severe thinness (<16.00)	1	
	Normal (18.50-24.99)	36	
	Pre obese (25.00-29.99)	9	
	Obese class 1 (30.00-34.99)	1	
	Obese class 2 (35.00-39.99)	1	
Obese class 3 (≥40)	0		

Discussions

The present study was carried out among 50 subjects with the aim to identify and assess the “relationship between consumption of FF

associated with consumption of SSB and bodyweight among young adult females”. This study showed no correlation between consumption of FF, SSB and BMI which was

in agreement with Hanana. Alfawaz (2012)^[10].

A study exhibited that high BMI was significantly associated with soft drink intake, especially carbonated beverages which were sweetened by using sugar^[17]. Beyond the high sugar content of SSBs, these kinds of beverages may decrease satiety and increase subsequent food intake, which revealed that association between FF intake and obesity was not totally mediated by energy intake^[18]. The present data demonstrated that a majority of the subjects were in normal weight range (72%), followed by 6% who were underweight, 18% who were overweight and 4% who were obese. The obesity prevalence was 4%.

Shatabdi et al (2014) showed that majority of the FF consumers were overweight. Among 426 students, 55.9% students eat FF of which almost 70% students were overweight^[13]. In this study, out of 50 students 98% students were having FF in their diet, but only 22% and 2% students were found to be pre obese and obese respectively.

Study conducted by Islam & Ullah identified that brand reputation, accessibility, taste, cost, quality, food hygiene, and fat and cholesterol level as the factors related to fast food preferences by the university students in Bangladesh^[19]. Another study conducted by Shatabdi et al (2014), reported that convenience, easy accessibility, taste, cost as the factors related to fast food preference among Bangladeshi university students. In this study, the main reason that Bangladeshi university students go to fast food restaurants are FFs are convenient and quick (41.9%)^[13]. In this study, it was found that students eat FF because FFs are ready to eat (80%), convenient (38%), inexpensive (30%), and tasty (96%) and offers variety (86%). Some of them reported that they eat FF because they like the environment of FF outlets (30%) and advertisement of FF influence their FF consumption (60%). They eat FF more frequently when they are outside the home (76%) and in group (86%). Often they take FF as a normal meal (16%).

In 2001 Yoon et al reported that the frequency of eating FF was positively associated with poor self-rated health, low self-efficacy for healthy eating, weight dissatisfaction, perceived difficulties in preparing healthy meals and ordering healthy food in restaurants^[20]. It was also reported that the frequent consumption of FFs was one of the main reason for high intake of saturated fatty acid and trans fatty acid which partially came from using hydrogenated vegetable oil (Mario Fernandez and Juan, 2000)^[21]. This class of fatty acids could cause insulin resistance and type 2 diabetes (Pereira et al., 2005)^[11]. French et al., found that an intake of only one FF meal in a week was associated with a daily energy increase of 234.4 KJ and a weight gain which was over and above the average weight gain of 0.72 kg/week^[22].

Many studies had reported that adults who consume FFs had significantly lower intake of more healthy food such as bread, cereal, grains, milk and legumes (French et al., 2000; French et al., 2001; paeratakul et al., 2003; Al-Rethaiaa et al., 2010)^[23, 24, 25, 26].

It was found that progression in education to higher level is associated with decrease in consumption of FF (Hanana. Alfawaz., 2012; paeratakul et al., 2003)^[10, 25]. In this study, all of the subjects were studying M.Sc in Food & Nutrition and almost 93% students reported that FF was unhealthy, nevertheless, 98% students ate FF. Shah Trushna et al., (2014) conduct a descriptive, cross-sectional study among 147 MBBS 1st year students and found that more than 60% of them were unaware about the fact that FF was unhealthy and more than 90% of students used to have FF, of these 34.05% students were pre obese and obese respectively^[12].

There was statistical significance between BMI and daily calorie intake (P value-.000). There was also statistical significance between BMI and daily breakfast calorie intake (P value-.000). Higher the consumption of FF and SSB, higher is the BMI. A majority of students (92%) consumed excess calorie than their daily requirement, of which 7% students were under weight, 67% students

were in normal weight range, 19% were pre-obese and 7% were obese. There were only 6% students who were in normal weight range taking calorie as their daily requirement. Surprisingly the result showed that 2% obese

students were taking calorie which is less than their daily requirement. There were 84% students who consume excess calorie from their daily breakfast.

Table-C Association between BMI and different variables using Chi square test

• TABLE-C.1: ASSOCIATION BETWEEN BMI AND FF CONSUMPTION (n=50)						
FF CONSUMPTION(IN Kcal/WEEK)	BMI				TOTAL	<ul style="list-style-type: none"> • Chi square value- 8.170 • df-12 • P value-.772 (Statically not Significant)
	UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESE		
<1000	0%	28%	6%	4%	38%	
1000-3000	2%	28%	8%	0%	40%	
3000-6000	2%	12%	2%	0%	16%	
6000-9000	0%	4%	2%	0%	6%	
>9000	0%	0%	0%	0%	0%	
Total	6%	72%	18%	4%	100%	
• TABLE-C.2: ASSOCIATION BETWEEN BMI AND SSB CONSUMPTION (n=50)						
SSB CONSUMPTION(IN Kcal/WEEK)	BMI				TOTAL	<ul style="list-style-type: none"> • Chi square value- 6.343 • df-9 • P value-.705 (Statically not Significant)
	UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESE		
<1000	4%	24%	8%	4%	36%	
1000-2000	2%	30%	6%	0%	42%	
2000-3000	0%	14%	2%	0%	16%	
3000-4000	0%	2%	0%	0%	2%	
>4000	0%	2%	0%	0%	2%	
Total	6%	72%	18%	4%	100%	
• TABLE-C.3: ASSOCIATION BETWEEN BMI AND DAILY CALORIE INTAKE (n=50)						
CALORIE INTAKE (IN Kcal/DA Y)	BMI				TOTAL	<ul style="list-style-type: none"> • Chi square value- .1.532 • df-28 • P value-.000 (Statically Significant)
	UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESE		
<1300	0%	2%	0%	0%	2%	
1300-1600	0%	8%	0%	2%	10%	
1600-1900	4%	14%	2%	0%	20%	
1900-2100	0%	24%	4%	2%	30%	
2100-2300	0%	4%	6%	0%	10%	
2300-2500	0%	12%	4%	0%	16%	
>2500	2%	8%	2%	0%	12%	
Total	6%	72%	18%	4%	100%	
• TABLE- C.4: ASSOCIATION BETWEEN BMI AND DAILY BREAKFAST CALORIE INTAKE (n=50)						
BREAKFAST CALORIE INTAKE (IN Kcal/DA Y)	BMI				TOTAL	<ul style="list-style-type: none"> • Chi square value- .1.453 • df-24 • P value-.000 (Statically Significant)
	UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESE		
100-200	0%	8%	0%	2%	10%	
200-300	0%	6%	0%	0%	6%	
300-400	2%	8%	6%	0%	16%	
400-500	4%	14%	2%	2%	22%	
500-600	0%	14%	4%	0%	18%	
600-700	0%	22%	6%	0%	8%	
Total	6%	72%	18%	4%	100%	

It was found that FFs were present in daily diet of the 68% students, while SSB were present in daily diet of the 58% students of which 24% students were overweight. Shah Trushna et al., found that more than 50% students were having FF and this was more common in overweight groups^[12]. It was found that there was no statistical significance between FF consumption and SES, but there

was statistical significance between SSB consumption and SES (P value-.048).

The limitation of this study is that the sample size is relatively small (50). The advantage of this study is that the relation between FFs consumption and bodyweight has performed in a unique group of female students with background knowledge in nutrition.

Table-D Association between SES and different variables using Chi square test

• TABLE-D.1: ASSOCIATION BETWEEN SES AND FF CONSUMPTION (n=50)							
FF CONSUMPTION(IN Kcal/WEEK)	SES					TOTAL	<ul style="list-style-type: none"> • Chi square value-.13.152 • df-12 • P value-.358 (Statically not Significant)
	UPPER	UPPER MIDDLE	LOWER MIDDLE	UPPER LOWER	LOWER		
<1000	0%	14%	0%	0%	0%	14%	
1000-3000	2%	30%	2%	0%	0%	34%	
3000-6000	2%	28%	6%	2%	0%	38%	
6000-9000	0%	2%	2%	2%	0%	6%	
>9000	0%	6%	2%	0%	0%	8%	
Total	4%	80%	12%	4%	0%	100%	

• TABLE-D.2: ASSOCIATION BETWEEN SES AND SSB CONSUMPTION (n=50)							
SSB CONSUMPTION(IN Kcal/WEEK)	SES					TOTAL	<ul style="list-style-type: none"> • Chi square value-.17.015 • df-9 • P value-.048 (Statically Significant)
	UPPER	UPPER MIDDLE	LOWER MIDDLE	UPPER LOWER	LOWER		
<1000	0%	36%	2%	0%	0%	28%	
1000-2000	2%	30%	4%	4%	0%	40%	
2000-3000	0%	10%	6%	0%	0%	16%	
3000-4000	2%	4%	0%	0%	0%	6%	
>4000	0%	0%	0%	0%	0%	0%	
Total	4%	80%	12%	4%	0%	100%	

Table-E Association between SES and BMI using Chi square test

• ASSOCIATION BETWEEN SES AND BMI (n=50)						
SES	BMI				TOTAL	<ul style="list-style-type: none"> • Chi square value-.12.072 • df-9 • P value-.209 (Statically not Significant)
	UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESITY		
UPPER	2%	2%	0%	0%	4%	
UPPER MIDDLE	2%	58%	16%	4%	80%	
LOWER MIDDLE	2%	10%	0%	0%	12%	
UPPER LOWER	0%	2%	2%	0%	4%	
LOWER	0%	0%	0%	0%	0%	
Total	6%	72%	18%	4%	100%	

4.CONCLUSION

In this study, out of 50 students 98% students were having FF in their diet, but only 22% and 2% students were found to be pre obese and

obese respectively. This study showed that there is no correlation between consumption of FF and SSB and BMI. Frequency of FF consumption was in the range of 1-2 times per week in majority (74.5%). Consumption of FF was 6%, 72%, 18% and 4% and Consumption

of SSB was; 6%, 68%, 22% and 4% among under weight, normal weight, overweight and obese students respectively. Our results revealed that large number of the students follow unhealthy food habits. Almost 50% of them ate chips, fried chicken, french fries, momo, puri, paratha, pakora, biryani, moglai, chawmin, fuchka, bottled fruit juice, sweetened whole milk, soft drinks, sweetened milk tea. The mean total caloric intake from FF and SSB were 5241 and 1307 kcal per week. It was showed that almost 93% students knew that FF were unhealthy, which were expected since they were studying nutrition and had the information about harmful effect of these foods. Result shows statistical significance between BMI and daily calorie intake (P value-.000) and between BMI and daily breakfast calorie intake (P value-.000). In this study, the results also show that SES is significantly associated with SSB consumption (P value-.048), but not with FF consumption. Higher the SES, higher is the SSB consumption.

It can be suggested that if it is necessary to eat FF, then choosing the low fat-items which are available at many FF locations may help in reducing the excess energy intake. A combined initiative from family, university, public health experts and government is much needed to tackle this public health problem.

Declaration of Competing Interest

There are no conflicting interests.

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