



Estimating the Rate of Consumption of Fast Food Among Alexandria University Students and Their Relation with Changes in Body Mass Index and Diet Quality

تقدير معدل استهلاك الوجبات السريعة بين طلبة الجامعة، وفقاً لتغير مؤشر كتلة الجسم وجودة النظام الغذائي

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Abstract

المستخلص

Fast food has become a prominent feature of the diet of university student in Egypt. Throughout the world ,adolescents, as a group, are at risk for nutritional problems both from physiological and psychosocial standpoint ,Adolescent obesity has become a major health concern in university students .An increased frequency of fast food restaurant dining is associated with higher intake of calories from fat .So the aim of this study was to estimate the rate of consumption of fast food among university students with changes in body mass index and diet quality through laboratory estimation of chemical and nutrient content(fat, fatty acids)of fast food, beside distributing a survey of university students in Alexandria university. The results indicated that saturated fatty acids were high in most vegetable, legumes and chicken meals compared to other meals as fast-food consumption has increased among university students. Recommendations contribute in achievement of a high quality of fast food and its safety for students' health.

أصبحت الوجبات السريعة سمة بارزة من سمات النظام الغذائي للطالب الجامعي في مصر وعلى نحو متزايد، حيث أنه في جميع أنحاء العالم يعتبر المراهقين كمجموعة، معرضون لمشاكل التغذية سواء من النواحي الفسيولوجية، النفسية والاجتماعية، وأصبحت البدانة في سن المراهقة من المشاكل الكبرى وترتبط السمنة في طلاب الجامعات بزيادة تناول كمية أكبر من السعرات الحرارية من الدهون في مطاعم الوجبات الجاهزة ولذا كان الهدف من هذه الدراسة هو تقدير معدل استهلاك الوجبات السريعة بين طلاب الجامعة مع التغيير في مؤشر كتلة الجسم (أحد وسائل قياس معدل السمنة) و نوعية النظام الغذائي من خلال تقدير مختبري للمحتوى الكيميائي للدهون والأحماض الدهنية في الوجبات السريعة مع توزيع استبيان على طلاب جامعة الإسكندرية لتحديد معدل الاستهلاك والصفات الديموغرافية التي تؤثر على الطلبة في الاستهلاك المتزايد من الوجبات الجاهزة، وتشير النتائج أنه كانت الأحماض الدهنية المشبعة عالية وزادت في معظم الوجبات النباتية والبقوليات ووجبات الدجاج مقارنة مع الوجبات الأخرى، كما أشارت الدراسة أنه كلما زاد معدل استهلاك طلاب الجامعات للوجبات السريعة كلما زاد مؤشر كتلة الجسم أي زيادة السمنة بينهم. وجاءت التوصيات لتساهم في تحقيق نوعية عالية من الوجبات السريعة كما أوصت الدراسة بضرورة استخدام السلطة والمأكولات المشوية والاتجاه إلى استهلاك الفواكه والخبز الكامل واستبدال زجاجات المياه بدلاً من المشروبات الغازية لأنهم أقل في السعرات الحرارية عن الوجبات السريعة كما أوصت الدراسة بضرورة أن ينهج طلاب الجامعة بتغيير أسلوب تغذيتهم والابتعاد عن الوجبات السريعة للحفاظ على صحتهم من مرض السمنة وذلك للتأكيد على صحة وسلامة طلاب الجامعات.

Keywords: fast food; nutritional quality; body mass index; university students.

الكلمات الدالة: الوجبات السريعة؛ جودة التغذية؛ مؤشر كتلة الجسم؛ طلاب الجامعة.

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Introduction

Fast food has dramatically changed society by becoming efficient in regard to time and service. This efficiency has led to a decrease in traditional family values. Also, fast food has led to the deterioration of individual health and society as a whole. Adolescent must take control and responsibility of their fast-food choices. (David *et al* ,1995 and Abdallah, 2007).

Today, fast food becomes a way of life. Some studies have shown by just eating two fast food meals a week. Breakfast sandwiches, fries, burgers and nuggets all meant a greater risk of obesity and it can increase the chances of obesity by 50%. It is not only fast, cheap and convenient, but it also tasted good, making it harder to resist. It contains high levels of sodium, oil and refined flour. This combination alone can be harmful to one health as well as cause obesity (Heller,2007): Fast food consumption has increased in Egypt over the past three decades. It's extremely difficult to eat in a healthy way at a fast-food restaurant. Despite some of their recent healthful offering's, the menus still tend to include foods high in fat and calories and low in fiber and nutrient. People (university student) need to evaluate how often they eat meals at fast-food restaurants and think about cutting back (Pereira,2009).

The widespread popularity and the increase in consumption of fast-food meals need more research for estimation of the nutritional composition and quality of all fast-food meals available in Egypt in order to include the data to the national food composition data base (EL-Kholie,1973). In 1981 a survey of 290 adolescents in Australia showed that 31% ate more than one take away evening meal per weak and they were generally high in fat, particularly saturated fat, high in kilojoules and low in fiber (Wills and Green Field,1980; Truswell and Daruton-Hill,1981; Green Field *et al*,1982; Wills and Green Field,1982 ; Davis and Carpenter, 2009 and Oexle *et al*,2015).

Away-from-home food (available in fast food places and restaurants) contributes considerably to daily energy intake (Paeratakul *et al*, 2003; Jahan *et al* ,2020 and Evans *et al*, 2022) and accounts for roughly one-third of energy intake among certain sub populations, particularly young adult males (Nielsen *et al*, 2002 and Bowman *et al*, 2004).

Fast food consumption has been associated with adverse health outcomes including increased risk of excess weight, body fatness, poor dietary quality, and insulin resistance/ diabetes (^{Paeratakul} *et al*, 2003; Bowman *et al*, 2004; Pereira *et al*, 2005 and Lindstrom *et al* , 2006).

Mechanisms for the direct contribution of fast-food intake to the development of diabetes and other obesity-related comorbidities have included low unsaturated: saturated fat ratio greater portion sizes (Farzan *et al*, 2013), and lower fiber content of fast food (Parillo and Riccardi, 2004). Fast food consumption has rapidly increased, although a little is known about the independent associations of restaurant food and fast-food intake with body mass index (BMI). Additionally, there has been a significant increase in the percentage of away-from-home food consumption (French *et al*,2001a; Nielsen *et al*, 2002a and Nielsen *et al*,2002b), and it provides from 30-42% of total daily calories. Consumption is particularly high among young adults (Guthrie *et al*,2002).

Typically, away-from-home food, defined as food obtained from fast food or traditional sit-down family style restaurants, is higher in total and saturated fat, total calories, and cholesterol (Guthrie *et al*,2002; Paeratakul *et al*,2003 and Wood, 2009)

Increased consumption of food prepared outside the home has occurred concurrently with rapid weight gain (Alhashemi *et al*,2022). Many small in scale studies, have shown positive association between the frequency of fast food consumption and body fatness, weight gain, overweight or obesity (Jeffery and French,1998; Ma *et al* ,2003 and Paeratakul *et al*,2003), so the aim of this work was

estimate the rate of consumption of fast food among university students with change in body mass index & diet quality through laboratory estimation of chemical and nutrient content (fat, fatty acids) of fast food.

Materials and Methods

1. Materials

1.1. Sampling

A total of 345 fast food samples were collected from the most popular fast-food chains located in Alexandria city for analysis and samples were selected as follow:

Meat products, Chicken products, Fish products, Vegetable and legumes product and Pizza products.

2. Methods of the analysis

2.1. Determination of chemical composition

2.1.1. Determination of total fat

Total fat in fast food samples was carried out by the Soxhlet system. method as described in the AOAC No. (14.018) (Letimer, 2019).

2.1.2. Determination of fatty acids

Fat was first extracted by using Soxhlet. The extracted fat was derivatized to fatty acid methyl esters using boron tri fluoride method previously described by AOAC (Letimer, 2019).

3. The nutritional quality of each food item was calculated based on the results of the chemical composition analysis

- Calculate energy of meal

The food provide different amounts of energy, protein and carbohydrates each provide 4 calories per gram, and fat provides 9 calories per gram, these calories are multiplied by the intake of each ingredient. (FAO and Frey,2022)

4- A questionnaire was distributed to university students in Alex university (n=150) from September to December 2020, questionnaire was designed to include sociodemographic data

Section (1): Includes personal data, gender (male or female), weight (kg), height (cm), BMI, and age.

Section (2): Includes family data; the education level of father, mother, and their work.

Section (3): Includes questions about the rate of consumption of the student for different kind of fast food (meat product, chicken products, fish products and pizza and measures the rate of consumption of fast-food meals by the young adults regarding the body mass index and its effect on their health, Body mass index their height and weight were measured. BMI was computed using the formula $BMI = \text{weight}/\text{height}^2(\text{kg}/\text{m}^2)$ (Shah *et al*,2014).

Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. Qualitative data were described using number and percent. Quantitative data were described using mean and standard deviation for normally distributed data. For normally distributed data, comparison between two independent population were done using independent t-test while more than two population were analyzed F-test (ANOVA) to be used. Correlations between two quantitative variables were assessed using Pearson coefficient. Significance of the obtained results was judged at the 5% level.

Results

This study aimed to estimate the rate of consumption of fast food among university students with change in body mass index and diet quality through laboratory determination of chemical and nutrient content (fat, fatty acids) of fast food and using a results from a mixture of qualitative and quantitative questions in a survey of university students in Alexandria University

Table (1) showed that the fat content of all studied meals ranged between (5.6-15.73 g/100g). The highest mean fat content was that of vegetable and legumes-based meals (12.40 g/100g) followed by fish meal (12.03 g/100g) and meat meals (11.92 g/100g). While the lowest mean value of fat was that of pizza meals (7.24 g/100g).

Table (1): The fat content of all studied meals (g/100g edible portion) of the selected fast-food samples.

Nutrient	Meat Meal		Chicken Meal		Fish Meal		Vegetable & Legume Meal		Pizza Meals		Lowest	Highest
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean		
Fat%	7.54-14.24	11.92	8.43-14.24	10.29	10.50-13.40	12.03	8.45-15.73	12.40	5.60-8.09	7.24	Pizza Vegetable	Mo 'men Potato
Energy meal (K Cal)	229.16-272.86	251.47	212.48-282.76	234.31	256.20-281.10	265.23	212.21-282.42	251.36	226.68-259.57	246.07	Falafel	Mac Chicken

Table (2) shows fatty acid composition of fast foods (total saturated fatty acids) the fatty acid profiles of the studied fast-food samples are presented, whereas general, the mean of the saturated fatty acids percent is slightly higher than the percent of unsaturated fatty acids (mono and polyunsaturated fatty acids). The highest mean value of saturated fatty acids was that of vegetable and legumes-based meals (6.59 g/100g) followed by meat-based meal (4.76 gm/100g) and fish-based meals (4.69 g/100g).

Table (2): The fatty acids composition of fast-food meals

Meal	Saturated fatty acids (%of total fatty acids)						Unsaturated fatty acids (%of total fatty acids)					
	C ₈	C ₁₀	C ₁₂	C ₁₄	C ₁₆	C ₁₈	C ₂₀	C _{16:1}	C _{18:1}	C _{18:2}	C _{18:3}	C _{20:1}
Meat Meal												
Mac Feast	0.17±0.06	0.71±0.31	1.9±0.49	4.17±0.5	17.69±0.96	3.36±1.07	0.23±0.1	1.18±0.44	25.34±1.54	30.59±1.67	10.74±0.83	0.29±0.11
Big Mac	0.35±0.14	1.43±0.76	3.04±1.89	3.71±0.09	21.97±0.41	0.78±0.06	0.58±0.12	3.79±0.38	17.51±1.98	31.27±1.14	13.19±0.76	0.25±0.07
Cheeseburger	0.41±0.13	1.2±0.38	1.9±0.48	5.7±0.85	29.08±1.8	0.75±0.05	0.14±0.03	1.7±0.89	13.35±1.08	27.56±0.86	14.03±2.17	0.28±0.04
O. Pounder & Cheese	0.29±0.14	2.09±1.6	1.16±0.16	9.91±2.29	27.84±1.23	7.44±1	0.69±0.04	1.74±0.84	27.57±4.97	3.61±0.27	13.00±0.81	0.13±0.16
Hamburger	0.14±0.11	0.55±0.19	0.28±0.08	5.98±2.26	31.84±2.14	0.82±0.01	0.16±0.05	2.81±0.71	18.87±0.39	27.61±4.68	11.65±2.79	0.46±0.16
Cofta	0.74±0.09	0.53±0.26	0.50±0.16	5.14±1.45	29.82±2.36	1.25±0.74	0.14±0.02	2.6±1.8	7.61±1.01	30.51±2.74	16.13±3.75	0.26±0.02
Scallop Meat	0.47±0.09	0.74±0.09	1.45±0.79	3.43±1.93	38.66±8.9	7.51±0.89	0.5±0.04	0.35±0.36	23.78±4.92	20.35±4.6	3.43±1.7	0.3±0.1
Shawrma Meat	0.75±0.10	0.82±0.30	1.15±0.05	5.86±0.92	29.2±0.73	8.35±3.97	0.46±0.21	2.34±0.91	30.24±1.49	10.04±2.60	5.88±0.33	0.5±0.13
Hot Dog	0.14±0.09	0.23±0.07	0.12±0.01	2.62±0.89	25.64±0.74	6.81±2.12	0.23±0.02	2.17±0.81	29.98±2.18	25.59±0.80	6.81±3.72	0.16±0.03
Chicken Meals												
Mac Chicken	0.47±0.12	0.27±0.17	0.4±0.2	0.45±0.35	17.48±2.12	1.99±1.04	0.35±0.14	3.41±1.67	35.20±6.28	31.80±1.09	6.82±0.58	0.24±0.16
Mac Nuggets	0.14±0.06	0.30±0.26	1.15±0.02	3.59±0.08	32.71±1.78	1.21±0.39	0.48±0.16	0.18±0.03	30.16±0.53	25.43±1.42	1.85±0.62	0.22±0.01
Mo 'men Nuggets	1.20±0.92	0.66±0.16	1.97±0.36	3.92±1.91	3.089±1.73	2.32±0.51	0.13±0.02	2.07±0.77	28.17±7.94	25.74±4.53	1.78±0.77	0.32±0.12
Chicken Pane	1.08±0.35	1.15±0.42	1.45±0.14	3.61±1.20	32.44±6.52	1.28±0.80	0.69±0.36	1.04±0.82	28.05±7.01	25.9±4.15	0.38±0.09	0.22±0.04
Shish Taook	0.52±0.11	0.46±0.02	0.62±0.29	1.05±0.38	29.17±1.26	2.26±1.08	0.20±0.10	3.42±1.20	26.16±2.41	35.93±1.90	0.25±0.05	0.24±0.17
Shawram Chicken	0.57±0.31	0.64±0.19	1.38±0.84	1.67±0.09	25.28±4.04	1.35±0.2	0.28±0.04	1.88±0.55	35.32±2.22	25.80±2.96	3.99±1.42	0.44±0.12
Fish Meals												
Fielt. O. Fish	0.12±0.01	0.85±0.06	2.13±1.06	5.33±1.61	30.76±3.30	1.34±0.53	0.27±0.05	0.38±0.09	22.91±2.52	31.81±1.37	4.07±2.22	0.18±0.05
Vegetables & Legumes Meals												
Falafel	0.41±0.20	0.25±0.12	1.97±0.07	0.62±0.16	37.38±1.06	1.07±0.07	0.54±0.09	0.92±0.10	18.17±1.34	37.04±0.40	0.77±0.26	0.41±0.13
Mac Fries	0.44±0.23	0.69±0.07	1.26±0.53	3.55±0.80	39.86±1.89	2.63±1.08	0.27±0.16	2.79±0.60	29.82±6.29	17.94±0.96	0.59±0.09	0.29±0.02
Mo' men Potato	0.22±0.04	0.13±0.02	1.38±0.27	2.83±0.30	52.98±11.58	5.09±0.82	0.20±0.07	1.01±0.27	28.64±4.45	5.24±1.98	0.33±0.12	0.11±0.02
Pizza Meals												
Pizza Vegetable	0.6±0.09	2.47±1.20	1.67±0.51	8.50±2.19	29.82±1.08	2.23±0.38	0.20±0.02	1.38±0.05	17.47±0.36	25.61±1.56	8.01±2.67	0.33±0.06
Pizza Margarita	0.39±0.18	1.56±0.21	5.20±1.56	13.95±1.90	28.65±4.46	3.65±1.78	0.26±0.07	0.37±0.17	13.52±0.72	16.42±3.66	7.63±0.80	0.22±0.07
Pizza Hot Dog	0.75±0.09	1.28±0.34	1.29±0.5	6.99±1.24	31.09±0.62	1.81±0.40	0.32±0.29	1.32±0.06	21.54±1.73	24.68±0.23	8.36±1.08	0.51±0.12
Pizza Sea Food	0.64±0.09	1.11±0.62	1.66±0.34	7.53±1.72	28.91±0.37	4.35±1.12	0.17±0.06	1.98±0.89	17.52±1.57	25.27±1.03	7.26±2.55	0.30±0.02

Table (3) shows illustrated that nutritional quality of the studied fast-food meals are assessed by calculating the percentage of satisfaction of the recommended dietary allowances (RDA'S) of the different nutrients that can be taken from consumption of 100g of each meal or from the whole meal. The percent of satisfaction was calculated based on to the RDAs of the nutrition board for adult individuals > 25 years of age.

Table (3): Percent satisfaction of different nutrients from fast food meals

Nutrient	RDAs or ESADDI**	Age/sex	Meat meal		Chicken meal		Fish meal		Veg. leg. Meal		Pizza meal		Lowest	Highest
			Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Protein	63[9]*	Adult male	21.50-44.53	31.08	30.67-63.59	43.19	24.8-30.9	27.87	1.89-14.95	6.65	32.40-45.42	40.52	Mo'men Potato	Mo'men Nuggets
	50 [9]*			39.17	54.42	35.12	8.38	51.06						
		Adult female	27.10-56.11		38.65-80.12		32.9-38.1		2.38-18.83		40.83-57.23			
Energy*	2900 Cal*	Adult male	8.37-19.26	12.87	7.6-17.03	14.07	9.3-15.3	12.33	4.02-8.19	6.18	12.28-19.40	16.59	Mo'men Potato	Pizza sea food
	2200 Cal*			16.97	18.81	16.25	8.16	21.87						
		Adult female	11.03-25.39		10.2-22.45		13.2-19.2		5.30-10.80		16.19-25.57			

*RDA (Recommended dietary allowances)

**ESADDI (Estimated safe and adequate daily dietary intakes)

Demographic data of participant students

Demographic data of participant students is shown in table (4) the distribution of the sample due to gender 58.7% male 41.3% female. Range of weight & height 80.22 kg ,172.27 (cm) respectively. BMI of the most participants students about 75% overweight & obese. The education level found the most sample is university education for both of father 69.3% & mother 64.7%.

Table (4): Distribution of the university students according to demographic data

Demographic data		*No.	%
Gender	male	88	58.7
	Female	62	41.3
**BMI	Under weight	0	0.0
	Normal	40	26.7
	Overweight	72	48.0
	Obese	38	25.3
The educational level of father			
	Illiterate	2	1.3
	Primary	7	4.7
	Average	37	24.7

University	104	69.3
The educational level of mother		
Illiterate	3	2.0
Primary	9	6.0
Average	41	27.3
University	97	64.7
Occupational status		
Works by the father	82	54.7
Both work	60	40.0
Both do not work	8	5.3
Rate of consumption of the student	31.81 ± 19.54	

* **No. of students** :150

** **BMI** 26.99 ± 3.22

Age (years) 20.72 ± 1.67, **Weight (kg)** 80.22 ± 12.28, **Height (cm)** 172.27 ± 9.69.

Table (5) shows the relation between rates of consumption of fast food for the student with demographic data. The highest mean value of the rate of consumption of fast food for the male was 37.41 ± 21.82 followed of female was 23.87 ± 12 , where the results was statistically significant at $P \leq 0.05$, On the other hand, the relation between mean value of the rate of consumption of fast food for the student with the body mass index (BMI) was statistically significant at $P < 0.001$, where the highest rate of consumption was 54.71 ± 20 in obese followed of overweight 25.88 ± 6.69 while the normal was 20.75 ± 16.42 , the highest mean value of the relation between the education level of father with the rate of consumption of the students was 87.0 ± 2.83 at illiterate followed of primary was 49 ± 27.56 while the lowest mean value was 25.06 ± 14.52 at university. All the results were statistically significant at $P \leq 0.05$ and the highest mean value of the rate of consumption of the student for the occupational status was both works, works by the father and both not work. 29.95 ± 15.67 , 36.20 ± 23.30 and 18.0 ± 16.95 respectively.

Table (5): Relation between rates of consumption of the student with demographic data

	Rate of consumption of the student	Test of sig.	p
	Mean ± SD		
gender			
Male	37.41 ± 21.82	$t = 4.868^*$	$<0.001^*$
Female	23.87 ± 12.0		
BMI			
Normal	20.75 ± 16.42	$F = 68.113^*$	$<0.001^*$
Overweight	25.88 ± 6.69		
Obese	54.71 ± 20.68		
The educational level of father			
Illiterate	87.0 ± 2.83	$F = 24.265^*$	$<0.001^*$
Primary	49.0 ± 27.56		

Secondary	44.57 ± 18.0		
College	25.06 ± 14.52		
The educational level of mother		F = 3.984*	0.009*
Illiterate	62.33 ± 29.48		
Primary	37.78 ± 27.86		
Secondary	34.98 ± 19.37		
College	28.98 ± 17.56		
A functional status			
Works by the father	29.95 ± 15.67	F = 4.043*	0.020*
Both work	36.20 ± 23.30		
Both do not work	18.0 ± 16.95		

t: Student t-test

F: F test (ANOVA)

*: Statistically significant at $p \leq 0.05$

Table (6) represents the correlation between rate of consumption of the student with age and BMI, the results show that fast food consumption was positively associated with BMI where Pearson coefficient was 0.623 and statistically significant at $P < 0.001$.

Table (6): Correlation between Rate of consumption of the student with age and BMI

Rate of consumption of the student	
	r (p)
Age (years)	-0.274* (0.001)
BMI	0.623* (<0.001*)

r: Pearson coefficient

*: Statistically significant at $p \leq 0.05$

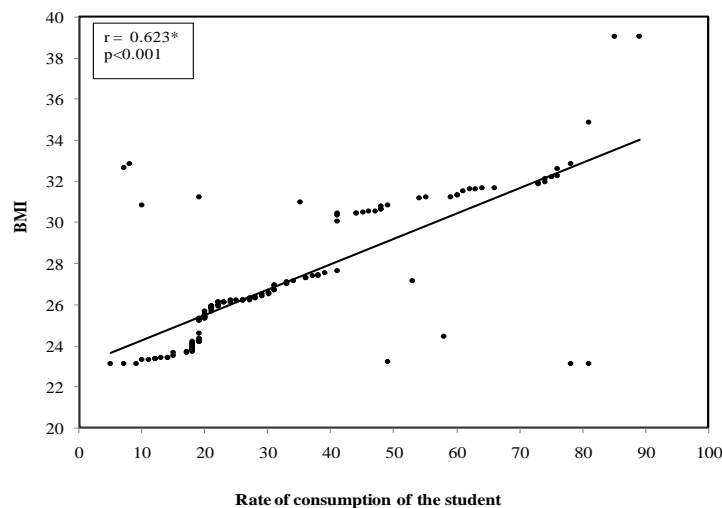


Figure (1): Correlation between Rates of consumption of the student with BMI

Discussion

Fast food has become a prominent feature of the diet of university student in Egypt and increasingly, throughout the world ,adolescents, as a group, are at risk for nutritional problems both from a physiological and a psychosocial standpoint. Adolescent obesity has become a major health concern in university students.

The fat content of the studied meals ranged between 4.65 and 15.73 g/100g. The highest fat content (15.73 g/100g) was that of the Mo 'men fried potato. Potato itself has no or very little fat content, but the oil observed during the deep-frying process is the cause of the high fat content of the final products.

The fat content of the studied meals shows substantial difference with the corresponding meals in other studies. The fat content of falafel meal was 8.41 g/100g compared to only 5.49/100g in Kuwait study (Hoteit *et al*, 2021 and fatsecret). Also, the fats of chicken and meat meals were quite variable in both studies. The variation in the fat content between the same meals is usually due to either the difference in the rate of oil absorption in fried products, or the difference in the fat content of the used ingredients especially in the meat and chicken meals. Additionally, a clear variation was observed in the fat content of the hamburger, cheeseburger and Mac. Chicken meals (10.03, 12.3 and 14.24 g/100g respectively) and the corresponding meals studied in Poland (Katedry, 1996), (16.1, 20.9, 12.8 g/100g for the same meal, prospectively).

Delvin (1992) stated that the problem of high cholesterol in human body from consumption of saturated fatty acids rather than direct consumption of cholesterol. Therefore, the fatty acids profile of the fast-food meals to evaluate their effect on the serum cholesterol levels. The present results tables 2 and 3 suggested that was studied, the saturated palmitic acid (C_{16:0}) and poly unsaturated fatty acid (C_{18:2}) were predominant fatty acids in the studied fast foods compared to all other fatty acids.

In general, saturated fatty acids constituted more than 30% of the fatty acids' composition in most of the studied meals. The total saturated fatty acids ranged between 21.41% in Mac. Chicken as the highest value (62.83) was that of Mo' men fried potato meals. In a recent study conducted in Spain (Mario and Juan, 2002), the commercial Spanish fast food and snack food showed high proportion of saturated fatty acids especially in hamburger and pizzas. The source of the saturation was basically the animal fat, the palm kernel oil, coconut oil and palm oil. The main source of fat in falafel meal was the frying oil and the added tehina. However, Mo 'men potato meals showed the highest degree of saturated fatty acids compared to the other studied meals. It is also noted that palmitic acid (C₁₆) alone constituted 52% of the total fatty acids of the Mo' men potato meal.

In study conducted in Australia to evaluate the quality and safety aspects of deep frying oil in take away food outlets (Somerset *et al*, 1996). The most commonly used frying oil was the palm oil, which contain high percent of saturated fatty acids compared to the most other oils. On the other hand, myristic acid (C_{14:0}) and palmitic acid (C_{16:0}) were the most common saturated fatty acids that have strongly and consistently been shown to raise the plasma cholesterol and presumably LDL levels (Hultunen, 1992). There is overwhelming evidence that saturated fatty acids as a class raised serum cholesterol and more specifically low-density lipoprotein (LDL) (Barr, 1992), Lauric acid (C_{12:0}) also raise serum cholesterol whereas medium – chain fatty acids (C₈-C₁₀) have no effects on the serum cholesterol level. Recent studies suggested that stearic (C_{18:0}) lowers LDL, perhaps as it is rapidly converted to oleic acid (Bonanome and Grandy, 1988 and Mensink, 2006).

On the other hand, serum cholesterols were also affected by the monounsaturated fatty acids and poly unsaturated fatty acids levels in the diet. Oleic acids (C_{18:1}), the predominant monounsaturated fatty acid, lowered the LDL level, but didn't affect the HDL level. In contrast linoleic acid (C_{18:2}), the principal omega – 6 poly unsaturated fatty acids of the diet lower the HDL level. Likewise, omega – 3 poly unsaturated fatty acids have the same effects as 6-polyunsaturated fatty acids, but they also lower the relationship of different fatty acids, saturated, monounsaturated and poly unsaturated in the diet to the serum cholesterol level is of nutritional significance, particularly with respect to coronary heart disease. (Hamilton and Whitney, 1979; Delvin, 1992 and Eshak *et al*, 2018),

Muller *et al* (2003) stated that one can obtain a more significant reduction in the serum cholesterol and triacylglycerol levels by increasing the ratio of polyunsaturated fatty acids/saturated fatty acids in the diet.

Consumption of away – from home food at fast food places has increased substantially over the past 2 decades, concurrent with increase in obesity (Cordova and Murphy,1992 and Ma *et al*,2003). Away – from home food, and particularly fast food, tends to be higher in total calories, fat, cholesterol, and refined carbohydrates, which has been shown to be associated with greater weight and weight change (Mc Crory *et al*,1999; Binkley *et al*,2000; French *et al*,2000; Guthrie *et al*,2002 and Chang and Nayga ,2010).

Table 4 Also showed the educational levels of both father and mother. The rate of consumption of the student was increased 87.0 ± 28.3 , 62.33 ± 29.48 respectively, this may be due to the bad knowledge about fast food between both parents. There results this agree with the results about family knowledge of fast food and uniqueness-seeking characteristics and fast food purchasing intentions (Xue *et al* , 2021).

Table 5 indicated that both male and females obtained different percentages of fast-food consumption, the highest percentage of male was 58.7% followed of female was 41.3%. The highest percentage of BMI was overweight represent (48%) and obese (25.3%), these percentage represent risk hazards on health of young adult. One of the researches has shown that there was a gradual increase in diabetes, hypertension and high serum cholesterol with increasing body weight in nearly all genders, racial and socioeconomic groups (Bowman.and Vinyard ,2004).

This present study also showed that the studied sample according to family specific data, and concluded that most of the sample has high educational level for both father and mother where the percentage of university education level of father was 69.3% while the percentage of university educational level of mother was 64.7%. This means that there are awareness and good knowledge about the bad effects of fast food between both parents.

Moreover, in the present study it was found that the occupational status was 54.7%, 40% respectively for both father and mother jobs. This reflects the bad effects on eating habits of young adults. Fast food may be affordable, but it has changed family values and lifestyles within society. It changes many cultural and ethnic family values that used to promote eating as a shared experience and the total rate of consumption of the students was 31.81 ± 19.54 .

In table 5 also indicates that the relation between rate, of consumption of the fast food among the student with demographic data, the highest mean value of rate of consumption of the student of male 37.41 ± 21.82 followed of females 23.87 ± 12.0 . Research about the relationship between gender and consumption of fast food are limited. However, one study deal with both males and females obtained similar percentage of energy and macronutrient from fast food, although males obtained higher amounts energy and macronutrients from fast food than females. Fast food provided a little more than one-third the day's energy for both genders (Paeratakul *et al*,2002). Another study in Pakistan has shown that men visited fast-food restaurants were more frequently than women and blacks more frequently than whites. Black men reported an average frequency of 2-3 visits per week. white women had the lowest frequency, at an average of 1.3 visits per week (Baig and Saeed, 2012). However fast-food consumption was highly prevalent in both genders, all racial/ethnic groups, and all regions of the country. Controlling for socioeconomic and demographic variables, increased fast food. In another study showed that local health and food ways are exposed to new and problematic elements as corporate fast food becomes increasingly ubiquitous. Local health and foodways are exposed to new and problematic elements as corporate fast food becomes increasingly ubiquitous. A 2005 consumer survey completed by 160 colleges – age women and men in provinces in the Philippines elucidates how fast food is affected on participants health (Matejowsky,2010).

Consumption of fast food was independently associated with male, gender, older age, higher household incomes (Frank *et al*, 2009). Body mass index (BMI) was calculated by dividing weight by height squared and expressed as Kg/m². The present results indicated the relation between rate of consumption of fast food and the student with body mass index where overweight and obese represent 25.88 ± 6.68 and 54.71 ± 20.68 , respectively, these results suggested that university students who consume greater quantities of fast-food meals were heavier and weight gain. In the study of (Taveras *et al*, 2005) reported that there is association between consumption of fast food and weight gain, adolescents who increased their consumption of fast foods gained weight over and above the expected gain from normal growth. In other studies of adults, consumption of foods purchased away from home in fast food outlets was associated directly with body weight and insulin resistance among young black over 15 years and white adults (Howard *et al*, 2011).

In another study, it was observed that both age and gender – specific differences in the relationship between consumption of fast food and BMI. In both cross – sectional and longitudinal analyses, the direct association between consumption of fast food and BMI was greatest among the youngest girls (Howard *et al*, 2011). This finding could be important in developing effective intervention to prevent excessive weight gain during this period of adolescence. However, all the results statistically significant at $p < 0.001$.

Table 6 showed the correlation between rate of consumption of fast food by the student with age and BMI. The result showed the correlation between rates of consumption of the student with age was non-significant correlation, this agree with study of (Paeratakul *et al*, 2002) who showed an increase of fast food consumption was independently associated with male gender, older age. While the correlation between rate of consumption of the student with BMI was statistically significant at $p < 0.001$. In the study of (Taveras *et al*, 2005) showed adults who reported eating fast food on at least one survey day had higher mean body mass index values than those who did not eat fast food on both survey days, positive association was seen between fast food consumption and overweight status.

Recommendations

- 1- It is important to watch carefully what do you eat, especially at a fast-food restaurant. Knowing the nutritional content is important.
- 2- Salads and grilled foods tend to be lower in fat than fried foods.
- 3- Keep portion sizes small, and ask that high fat sauces and condiments, such as salad dressing and mayonnaise, be “on the side” and use them sparingly to reduce calories.
- 4- Fast-food restaurants should begin offering healthier alternatives, including fruit, whole-grains bread, lower-fat fries, salads, as well as bottled water, rather than sodas.
- 5- If you are concerned about whether fast food causes obesity, you can take time to practice healthy lifestyle, make choices for healthy eating and make sure that you go for regular exercise as well.
- 6- Student University who eat frequently at fast food places may reduce the number of visits to fast food places, if they wish to control their energy intakes and improve their overall diet quality.
- 7- Fast food restaurants should that their food cause obesity, should inform their customers that.
- 8- Fast food places should display or make available information on energy and macronutrient content of foods and beverage they sell; consumers should strive to utilize the nutritional information on foods and beverages sold. If no nutrition information is provided, consumers should ask for nutritional information.

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