ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 21 No. 3
April 2021
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Afr. J. Food Agric. Nutr. Dev. 2021; 21(3): 17711-17726 https://doi.org/10.18697/ajfand.98.20245

FOOD CONSUMPTION AND LIFESTYLE HABITS AMONG UNIVERSITY STUDENTS IN SAUDI ARABIA

Sami R[1]*, Bushnaq T[1], Benajiba N[2] and M Helal[3]

Rokayya Sami

*Corresponding author email: rokayya.d@tu.edu.sa

[1]Department of Food Science and Nutrition, College of Sciences, Taif University, P.O. 11099, Taif 21944, Saudi Arabia

[2]Department of Basic Health Sciences, Deanship of Preparatory Year, Princess Nourah Bint Abdulrahman University, P.O. Box 84428, Riyadh 11671, Saudi Arabia

[3]Department of Mechanical Engineering, Faculty of Engineering, Taif University, P.O. 11099, Taif 21944, Saudi Arabia

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

ABSTRACT

Food consumption and lifestyle habits can have a positive or negative direct impact on an individual's health. University students tend to have poor eating habits that are influenced mainly by sensory perceptions. This survey was done to evaluate the status of food consumption and lifestyle habits among Taif university students (males and females). A total of 600 students aged from 18 to 24 years participated in the survey and responded to questions on socio-demographic characteristics, lifestyle habits, eating habits, food consumption frequency, attitude, health and food awareness knowledge. The randomly selected students were from various levels in university representing wide categories and living conditions in Taif Region, Saudi Arabia. The examined students efficiently completed the survey with the help of the university staff. Weight and height were evaluated by a portable standing electronic scale and a portable stadiometer (Seca 879, Germany) to calculate the Body mass index (BMI) classes. Female students recorded 28% of underweight cases, which was higher than the male students (11%) with none significant at $p>0.05$. The rate of overweight in male students was 30% compared with the female students' 26%. The study reported 49% and 64% for normal waist circumference for male and female students, respectively. A higher frequency of moderate physical exercise was reported among male students at 60% compared to that among female students (57%). The number of students who did physical exercise regularly was reported to be higher in females (15%) than males (8%). A percentage of 15% and 7% of the male and female students, respectively were smokers. Male students recorded higher sleeping hours than females. Male students reported high media consumption frequency of more than 3 hours a day 67%, followed by 21% between 3-6 hours a day for female students. About 46% and 55% of male and female students, respectively, reported fast-food consumption at least once a week and about 30% of males and 24% females took only 1 to 2 fast food meals in a month. The major meals skipped were breakfast, followed by lunch and dinner; however, this was not significant $p>0.05$. Meal skipping was high among female students (72%). It was noted that high percentage of male students (72%) reported low consumption levels of vegetables and fruits. The main reason for fast-food consumption was convenience (31%) for males, while females recorded 32% for choices. Female students had a higher score than males in nutrition knowledge. There is a need for awareness creation concerning better food choices, lifestyle habits and weight management that might create a helpful impact on the university student health.

Key words: fast-food consumption, food choices, nutrition knowledge, university populations, survey

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

INTRODUCTION

The recent decades have seen growing global obesity, high cholesterol and metabolic disorders, among adolescents and young adults in many countries including Saudi Arabia [1]. Besides, there is a disturbing increase in public health problems such as heart diseases, cancer and diabetes, which are expected to account for 78% of all deaths as a result of unhealthy lifestyle habits [2]. It was established that about 3,000 teenagers were dying every day because of some preventable illnesses resulting from respiratory infections, nutrition deficiencies and accidents around the world [3]. Saudis have been reported for physical inactivity and dependence on unbalanced diets rich in fats, saturated fats, sodium, carbohydrates and poor dietary fiber due to the frequency of fast-food intake [4]. Fast-food is a category of prepared food purchased outside the home such as pizza, *shawarma* meat, French fries, hamburgers and chicken nuggets [5]. A previous researcher [6], focused on the relationships between the consumption of fast-food and obesity. Another study [7], pointed to cognitive development and academic achievement which can be affected. Moreover, less than a third of fast-food diets can provide the recommended amount of iron (Fe) needed by students [8]. Correspondingly, consuming fast-food twice a week or more was associated with a higher obesity rate, 25% in female students and 31% in male students compared to the population who ate less than twice a week, although it varies from one country to another [9]. The latest studies reported that fast-food places have a propensity to be located around mainly minority neighborhoods and lower-income areas [10,11]. The literature on food consumption and lifestyle habits among students in Taif University is scanty, therefore, this study was undertaken to investigate lifestyle habits; eating habits, fast-food consumption frequency, attitude and health knowledge among students in Taif University, Saudi Arabia.

MATERIALS AND METHODS

Design and subjects

All the students from grades one to four of Taif University, Al-huwayah, Taif, Saudi Arabia were recruited in this study. The randomly selected students were representing wide categories and living conditions in Taif Region, Saudi Arabia. The examined students efficiently completed the survey with the help of the university staff. The multiple-choice questionnaires integrated four divisions, which included socio-demographic characteristics such as age, gender, marital status, residence, monthly income and food expenses/month. Weight and height were evaluated by a portable standing electronic scale and a portable stadiometer (Seca 879, Germany) to calculate the Body mass index (BMI) classes. Lifestyle habits such as physical exercise, smoking, sleeping hours and media consumption were assessed. Eating habits, fast-food consumption frequency, attitude and health, and food awareness knowledge were also determined.

Ethical statements

The study obtained approval number (41-00198) from the ethical committee of Taif University, College of Science, Food Science, and Nutrition Department by using a survey from 5th June to 5th July 2020. A total of randomly selected (300) female and

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

(300) male students, approximately 75 students of each grade (1-4) completed the survey at Taif University.

Statistical analysis

Data were entered, checked, and cleaned before analysis using SPSS software, Version 20.00. Statistical analysis included frequencies, standard deviation (SD) and correlations. Covariates with a *p*-value ($p>0.05$) were considered to be statistically significant.

RESULTS AND DISCUSSION

Socio-demographic characteristics

In total, 600 university students were incorporated into this survey. Majority of the respondents were aged between 19 and 24 years, for both male (77%) and female (67%) students (Table 1). Majority of male students were single (88%) compared with females (85%). About 54% and 52% of male and female students, respectively, lived in an apartment compared to 29% male and 30% female students who lived in a villa. This could probably be due to availability of the accommodation facilities and affordability of the same. Most students (29% males and 30% females) reported a family income in a range of 8000-10000 SR (equals >2000 $) per month. Food expenses ranging from 4000-7000 SR per month (equals >1000 $) was the highest (31%) among female students, followed by 25% among male students and 8000-10000 SR per month (30%) among female students with none significant at $p>0.05$. A statistically significant at $p>0.05$positive association was noted between lower BMI status and high consumption of vegetables and fruits. The lower the residence, family income and food expenses/month, the higher the likelihood of frequent intake of fast-food at $p>0.05$. This meant that the students were in a position to afford better quality meals.

Anthropometric measurements

Female students recorded 28% for underweight cases, which was higher than the male students (11%) with none significant at $p>0.05$. (Table 2). Results showed that the mean height and weight increased gradually with the age (between 19-24) years. The underweight prevalence was higher than the overweight and obese students. These results were similar to the survey done on 'UniversitiBains' Malaysia students [12], which reported that 12% and 27%of university students were overweight and underweight, respectively. That could be related to the high energy consumption of saturated fats and simple carbohydrates.

The study reported 49% and 64% for normal waist circumference for male and female students, respectively, with none significant at $p>0.05$. Female students have extra concerns about body shape and weight and want to be thin or have leaner bodies than male students. Anorexia and bulimia can result in low body weight or even extreme thinness that can increase the risk of anemia and body image distortion among young adults [13]. The overweight in male students (30%) was higher as compared with the female students (26%) with none significant at $p>0.05$. Besides, there were obese students for both genders, which can be a high risk for abdominal obesity because of

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

low-quality diet. Male students preferred to have a large body size, while female students preferred smaller body sizes [12]. The anthropometric values for the students in the current study could be attributed to the eating habits and diets consumed.

Lifestyle habits

The questions were about the number of days of physical activity of at least 45 min during the last week. The data were summarized into four sets: none, < 2 times = light, 2-4 times = moderate, and > 4 times per week = vigorous. The values were at a significant level ($p>0.05$) (Table 3). A higher frequency of moderate physical activity was realized among male students (60%) compared to female students (57%). Those students who did not exercise were reported to be higher in females than males (15% and 8%), respectively. These findings are in agreement with another researcher [14] who assessed the physical exercise levels among Saudi Arabia adults. In general, more male students were involved in light (24%) and moderate (60%) physical exercise than vigorous exercise (9%). Lesser involvement of students in physical exercises could probably be due to the students allocating more time to studies thus ignoring the importance of physical exercise. Lack of physical exercise can be the primary factor contributing to overweight among some Taif University students. Therefore, there is a need to sensitize the students on the importance of physical exercise to their general well-being.

Smoking

Tobacco smoking was reported among 15% and 7% of the male and female students, respectively, with none significant at $p>0.05$. It was not clear however, whether those who smoked begun it before or after joining the university. Tobacco smoking is known to be harmful to health for both active and passive smokers [15]. Smoking among youth was found prevalent globally where boys accounted for 16% almost thrice that of girls (6%) [15]. Tobacco use in youth in the 21st century has resulted in negative social, economic, health and family impacts besides reducing their life expectancy [15].

Sleeping hours

More male students reported sleeping for longer hours (41% slept 7-9hours per day; 11% slept >9hours per day and 48% slept <7hours per day) than the female students did (34% for 7-9hours; 2% >9hours per day and 63% slept <7hours per day) with none significant at $p>0.05$. The number of sleeping hours probably depended on an individual student's study timetable and other non-academic activities involved in per day after study time. Adults should sleep 7hours per night to promote optimal health, while sleeping <7hourshas been associated with diabetes, weight gain, hypertension, heart disease and depression [16]. On the other hand, sleeping >9 hours per night can be suitable for young adults and individuals recovering from sleep debt, and individuals with illnesses [16].

Media consumption

Results from media consumption were summarized into four sets based on time spent watching TV, social media, playing computer games, or even surfing the internet per day. Majority of male students (67%) and female students (62%) reported spending less than 3hours per day on media consumption followed by 17% and 21% of male and

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

female students, respectively who spent between 3-6 hours per day. Values were non-significant at p>0.05. It can be assumed that part of the time spent surfing on the internet (2-4hours) was to find relevant educational material. The amount of time spent surfing the internet and social media could also depend on the availability of internet services. In this study, it was found that the frequency of fast-food consumption could be decreased by awareness creation through education and various media.

Eating habits and attitudes

The results showed that 24% of male and 19% of female students ate > 3 times daily (Table 4). Majority of students (50% male and 39% female) ate three times per day. Meal skipping was high among female students (72%) compared to male students (61%). About 28% and 39% for female and male students, respectively, did not skip meals. It can be noticed that the breakfast meal was the most skipped by the university students as the percentages show (male: 47%, female: 52%) with none significant at p>0.05. Skipping breakfast could be due to lack of enough time in the morning or a formed habit as a result of lack of knowledge on the importance of having the breakfast meal.

The major meals skipped were breakfast, followed by lunch and dinner, however, this was not significant p>0.05. The skipping of breakfast meals has been related to obesity and cardiovascular disease risks [17]. Breakfast is an essential meal that replenishes the brain and body after a night's fast by enhancing academic performance and psychosocial function [17, 18]. Skipping a meal can lead to weight gain due to binge eating at the next meal. Though university students should avoid this kind of habit to achieve well in their education and to maintain better quality of health and life. Approximately 46% and 55% of male and female students, respectively, reported fast-food consumption at least once a week and about 30% and 24% of male and female students only 1 to 2 meals of fast foods per month. The major source of fast foods was delivery (56% among males and 46% among females), followed by restaurants (38% among males and 24% among females), while the university corner obtained the lowest (6%) for male students. Female students preferred getting their fast foods by delivery and university corner due to some social customs. It was also noted that a high percentage (72%) of male students compared to a lower percentage of female students (35%) consumed a low level of vegetables and fruits. This could be because the female students probably had more nutritional knowledge on the importance of fruits and vegetables. Another study elsewhere [19], reported low vegetable and fruit consumption during the survey. Consumption of soda was significantly high ($P \leq 0.05$) compared to the other soft drinks and it can be noticed from the soft drinks frequency list among the students, as soda percentage was the highest (male: 64%, female: 49%). The reason for this could be because soda was readily available and the sugary taste which is most likely appealing to students. Approximately 35% of Saudis have reported daily consumption of soft drinks, 30% reported consumption of fewer than 3 times a week and 3 to 6 times weekly [20]. Soda is considered among empty calorie foods due to its ingredients [21]. University students presented a statistically significant difference at p>0.05in terms of fast-food attitudes as shown in Table 4. The preference for fast foods was because of convenience (31%) for males, while females reported (32%) more for choices. Similar studies revealed that easy accessibility, taste,

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

advertisement and ready-to-eat were the main key factors for high fast-food consumption [3, 22]. Saudis often prefer to eat outside fast foods or even prepared food with soda as custom. It was noted that the body weight and BMI classes differed significantly at p>0.05according to the age of respondents. Results also presented a high percentage of overweight university students who reported low vegetable and fruit consumption. A statistically significant at p>0.05 positive association was noted between lower BMI status and high consumption of vegetables and fruits.

The components of fast-food vary among hamburgers, French fries, fried chicken, *shawarma* meat, pizza as shown in (Figure 1). Hamburger and pizza were consumed more than fried chicken and doughnuts. Hamburgers and French fries were more frequently consumed due to culture (30% and 33%) by male students than female students (27% and 22%), respectively, while female students more frequently consumed *shawarma* meat than males (33% compared to 24%) with none significant at p>0.05. Hamburgers and French fries are unhealthy foods, full of fats, simple carbohydrates and salt. A previous study [23] reported that the most frequent fast-food meal was *shawarma* meat. Consumption of fast foods by the students could be attributed to convenience, cost and taste factors.

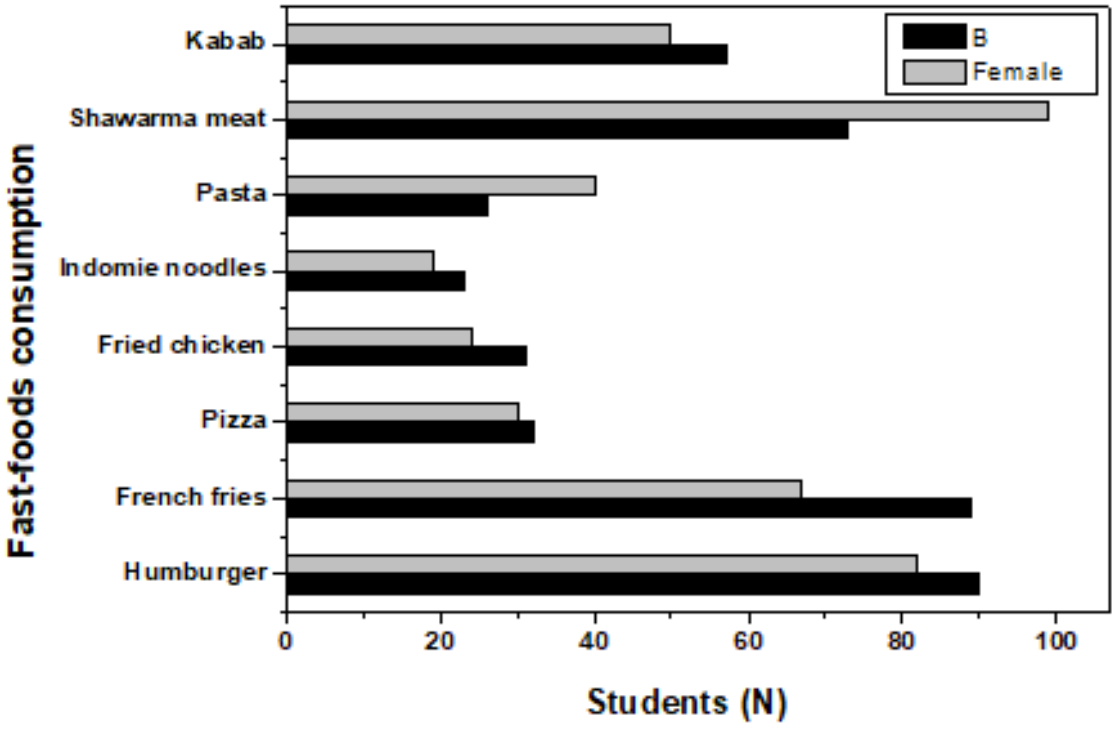

Figure 1: Various Fast-foods consumption by Taif University Students

Health and food awareness knowledge

The mean score of nutritional knowledge is shown in Figure 2A and B. Multiple-choice, true and right questions, and correct statements were used in the nutritional knowledge assessment by a staff member from the food science and nutrition department. Female students had a higher score than males as (22%) for excellent nutrition knowledge, while (34%) performed very well. Male students recorded 21% excellent nutrition knowledge scores, 27% very good and 52% fair with none

significant at p>0.05. Breakfast skipping had been related to lower nutritional knowledge [24, 25]. The findings show that a considerable number of students had little knowledge of nutrition. There is need for nutritional knowledge to be incorporated in the students' studies curriculum to enable them to make better choices on healthy eating for their physical and mental health status. The female students due to culture, stay home longer than males and that is why they found time to be more educated about health.

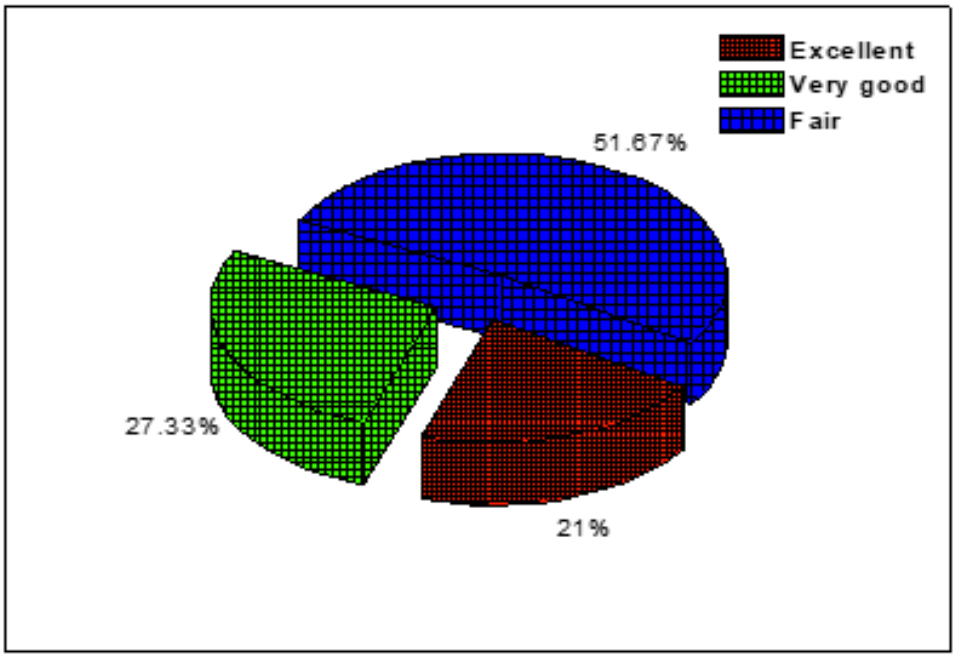

Figure 2A: Nutritional knowledge among male students at Taif University

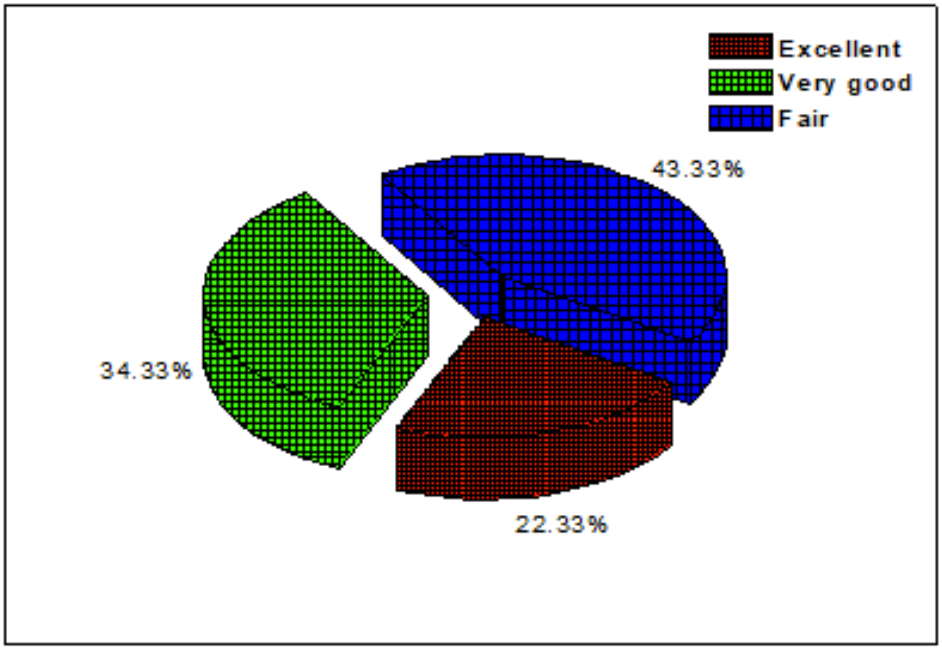

Figure 2B: Nutritional knowledge among female students at Taif University

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 21 No. 3
April 2021
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

CONCLUSION

Food consumption and lifestyle habits among Taif University students did not vary significantly with their gender. Similar trends were observed among both male and female students. Improper lifestyle habits like skipping meals, frequent fast-food consumption, low consumption of vegetables, fruits, and frequent consumption of soft drinks were common practices among both male and female students at Taif University. These practices could predispose the students to poor health status in the long term, if not addressed. It is recommended to educate these students on behavior change so they can embrace healthy food consumption and lifestyle patterns. There is a need for other studies to establish the cause of these unhealthy practices among university students for various stakeholders to address the issues of unhealthy lifestyles and food consumption which could put a heavy burden on the economy of households and the nation.

Conflict of interest
None

https://doi.org/10.18697/ajfand.98.20245

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 1: Socio-demographic characteristics

	Male		Female		X^2Statistic[a]	*P*-Value
	(N)	(%)	(N)	(%)		
Age						
18	68	23	99	33	7.97	0.01*
19-24	232	77	201	67		
Marital Status						
Single	264	88	256	85	2.27	0.52 ns
Married	34	11	39	13		
Divorced	1	<1	4	1		
Widow	1	<1	1	<1		
Residence						
Villa	86	29	90	30	0.18	0.91 ns
Apartment	161	54	156	52		
Others	53	18	54	18		
Family Income/Month						
2000-3000 SR	76	25	60	20	4.25	0.24 ns
4000-7000 SR	75	25	94	31		
8000-10000 SR	87	29	89	30		
Others	62	21	57	19		
Food Expenses/Month						
0-500	162	54	191	64	25.51	0.00*
500-1500	86	29	57	19		
1500-4000	33	11	50	17		
>4000	19	6	2	1		

*Means significant difference between categories at $P \leq 0.05$, Ns; non-significant

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 2: Anthropometric profile

	Male		Female		X^2Statistic[a]	*P*-Value
	(N)	(%)	(N)	(%)		
MBI Classes						
Underweight	34	11	85	28	68.38	0.00*
Normal weight	129	43	50	17		
Overweight	89	30	77	26		
Obesity I	25	8	51	17		
Obesity II	6	2	12	4		
Obesity III	17	6	25	8		
Waist Circumference						
Normal	148	49	192	64	13.14	0.00*
Abdominal obesity high risk	152	51	108	36		

*Means significant difference between categories at $P \leq 0.05$, Ns; non-significant

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 3: Lifestyle habits

	Male		Female		X^2Statistic[a]	*P*-Value
	(N)	(%)	(N)	(%)		
Physical Exercise						
None	23	8	44	15	10	0.02*
Light	72	24	54	18		
Moderate	179	60	170	57		
Vigorous	26	9	32	11		
Smoking						
None	255	85	271	90	7.76	0.51 ns
< 5 cigarettes/day	5	5	12	4		
5-10 cigarettes/day	9	3	5	2		
> 10 cigarettes/day	21	7	8	3		
Sleeping hours						
< 7 h/day	145	48	190	63	24.55	0.00*
7-9 h/day	122	41	103	34		
> 9 h/day	33	11	7	2		
Media consumption						
None	6	2	1	<1	6.41	0.93 ns
< 3 h/day	201	67	185	62		
3-6 h/day	52	17	62	21		
> 6 h/day	41	14	52	17		

*Means significant difference between categories at $P \leq 0.05$, Ns; non-significant

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 21 No. 3 April 2021 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 4: Eating habits, fast-food consumption frequency and attitude

	Male		Female		X^2Statistic[a]	*P*-Value
	(N)	(%)	(N)	(%)		
Eating frequency						
Once/day	15	5	25	8	17.08	0.00*
Twice/day	64	21	102	34		
Thrice/day	150	50	116	39		
> thrice/day	71	24	57	19		
Meal skipping						
Yes	183	61	217	72	8.67	0.00*
No	117	39	83	28		
Meal skipped						
Breakfast	141	47	155	52	1.85	0.40 ns
Lunch	81	27	80	27		
Dinner	78	26	65	22		
Fast-food frequency						
Daily	57	19	49	16	5.1	0.16 ns
Weekly	139	46	165	55		
Monthly	90	30	71	24		
Never	14	5	15	5		
Fast-food sources						
Restaurant	113	38	73	24	55.84	0.00*
University corner	19	6	88	29		
Delivery	168	56	139	46		
Vegetable and fruit consumption						
Low	215	72	106	35	79.6	0.00*
High	85	28	194	65		
Soft drinks frequency						
Soda	193	64	147	49	23.93	0.00*
Juice	55	18	77	26		
Tea	17	6	11	4		
Coffee	17	6	45	15		
Others	18	6	20	7		
Fast food attitude						
Taste	55	18	57	19	9.77	0.02*
Price	65	22	87	29		
Choices	88	29	95	32		
Convenience	92	31	61	20		

*Means significant difference between categories at $P \leq 0.05$

REFERENCES

1. **Ashdown-Franks G, Vancampfort D, Firth J, Smith L, Sabiston CM, Stubbs B and A Koyanagi** Association of leisure-time sedentary behavior with fast food and carbonated soft drink consumption among adolescents aged 12–15 years in 44 low- and middle-income countries. *Int. J. Behav. Nutr. Phys.*2019a;**16 (35).**

2. **World Health Organization.** Non-communicable Diseases (NCD) Country Profiles- Saudi Arabia. 2018. http://www.who.int/nmh/countries/sau_en.pdf *Accessed September 2018*

3. **Upendra KS, Nirma G, Tulsi RB and S Nirma** Educational Intervention of Intention Change for Consumption of Junk Food among School Adolescents in Birgunj Metropolitan City, Nepal, Based on Theory of Planned Behaviors. *J.Nutr. and Met.* 2020; **7932324**: 1-7.

4. **Al-Hazzaa HM, Al-Nakeeb Y, Duncan MJ, Al-Sobayel HI, Abahussain NA, Musaiger AO, Lyons M, Collins P and A Nevill** Cross-Cultural Comparison of Health Behaviors between Saudi and British Adolescents Living in Urban Areas: Gender by Country Analyses. *Int. J. Environ. Res. Public Health*. 2013; **10 (12)**: 6701-6720.

5. **Benajiba N** Fast-food intake among Saudi population: Alarming fact. *Am. J. Food. Nutri.*2016; **6 (2)**: 44-48.

6. **Ashdown-Franks G, Vancampfort D, Firth J, Veronese N, Jackson SE, Smith L, Stubbs B and A Koyanagi** Leisure-time sedentary behavior and obesity among 116,762 adolescents aged 12-15 years from 41 low- and middle-income countries. *Obes. Silver Spring Md.* 2019b; **27**: 830–836.

7. **Heidari Z, Feizi A, Roohafza H, Rabiei K and N Sarrafzadegan** Are dietary patterns differently associated with differentiated levels of mental health problems? Results from a large cross-sectional study among Iranian manufacturing employees. *BMJ Open*. 2019; **9**: e020083.

8. **O'Donnell SI, Hoerr SL, Mendoza JA and EG Tsuei** Nutrient quality of fast-food kids meals. *Am J Clin. Nutr*. 2008; **88**:1288-1395.

9. **Smith KJ, McNaughton SA, Gall SL, Blizzard L, Dwyer T and AJ Venn** Takeaway food consumption and its associations with diet quality and abdominal obesity: a cross-sectional study of young adults. *Int. J. Behav. Nutri. Phy. Activity*. 2009; **6**: 29.

10. **Galvez MP, Morland K, Raines C, Jessica K, Jodi S, James G and B Brenner** Race and food store availability in an inner-city neighborhood. *Public Health Nutr.* 2008;**11 (6)**: 624–631.

11. **Jacob L, Stubbs B and A Koyanagi** Consumption of carbonated soft drinks and suicide attempts among 105,061 adolescents aged 12-15 years from 6 high-income, 22 middle-income, and 4 low-income countries. *Clin. Nutr. Edinb. Scotl.*2020;**39 (3)**:886-892.

12. **Huda N and A Ruzita** Preliminary survey on BMI profile among USM main campus students. *Pak. J. Nutr.,*2011;**9**:125-127.

13. **Ministry of Health.** Malaysian dietary guidelines. National Coordinating Committee on Food and Nutrition, Ministry of Health Malaysia. 2010.

14. **Al-Zahrani MS, Bissada NF and EA Borawski** Obesity and periodontal disease in young, middle-aged, and older adults. *J Periodontal* 2003; **74(5)**:610-5.

15. **Ranabhat CL, Kim C-B, Park MB and M(M) Jakovljevic** Situation, Impacts and Future Challenges of Tobacco Control Policies for Youth: An Explorative Systematic Policy Review. *Front. Pharmacol*. 2019; **10**:981.

16. **Nathaniel FW, Safwan B, Gregory B, Donald LB, Orfeu MB, Daniel B, David FD, James G, Michael AG, Clete K, Raman KM, Jennifer LM, Sanjay RP, Stuart FQ and T Esra** Recommended Amount of Sleep for a Healthy Adult: A Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society. *J Clin Sleep Med.* 2015; **11(6):**591-592.

17. **Lampert T, Hoebel J, Kuntz B, Müters S and K Lars** Socioeconomic status and subjective social status measurement in KiGGS Wave 2. *J. Health Monit.* 2018;**3 (1)**:108-125.

18. **Ming MF, Ying GC and SZM Kassim** Eating patterns of school children and adolescents in Kuala Lumpur. *Mal. J. Nutr.,*2006; **12**: 1-10.

19. **Caleyachetty R, Echouffo-Tcheugui JB, Tait CA, Schilsky S, Forrester T and AP Kengne** Prevalence of behavioural risk factors for cardiovascular disease in adolescents in low-income and middle-income countries: an individual participant data meta-analysis. *Lancet Diabetes Endocrinol.* 2015;**3**: 535-544.

20. **Murad MA, Abdulmageed SS, Iftikhar R and BK Sagga** Assessment of the common risk factors associated with type 2 diabetes mellitus in Jeddah. *Int. J. Endocr.* 2014.

21. **Benajiba N and R Sami** Exploring attitudes related to sweetened soft drinks consumption among adults in Saudi Arabia. *Nutri. Food Sci.* 2018;**48 (3)**: 433-441.

22. **Sami R, Alshehry G, Elgarni E and M Helal** Saudi community care awareness food facts, nutrients, immune system and covid-19 prevention in Taif City among different age categories. *Afr. J. Food, Agric. Nutr. Dev.*2021; **21(1)**:17213-17233.

23. **Alfawaz HA** The relationship between fast-food consumption and BMI among university female students. *Pak J Nutr* 2012; **11**:406-10.

24. **Sami R, Khojah E, Elgarni E and N Benajiba** Evaluation of Nutritional Status for some Sensitive Sets and it is Relationship to Natural Antioxidants. *J. King Abdulaziz University – Medical Sciences.* 2016, **24(1)**: 1-9.

25. **Sami R, Bushnaq T, Radhi K, Benajiba N and M Helal** Prevalence of thinness cases and dietary diversity among learners of various education stages in Taif Region, Saudi Arabia. *Afr. J. Food, Agric. Nutr. Dev.*2021, **20(7)**: 17081-17094.