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Original Article

The association of eating habits and lifestyle with overweight and obesity among health sciences students in Taif University, KSA

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الملخص

أهداف البحث: درس هذا البحث آثار العادات الغذائية ونمط الحياة على مدى انتشار زيادة الوزن والسمنة بين طلبة العلوم الصحية في جامعة الطائف بالمملكة العربية السعودية.

طرق البحث: أُجري مسح مقطعي على ٢٢٨ من طلبة العلوم الصحية في إطار جامعي باستخدام استبانة التردد الغذائي. كما أُستخدم مؤشر كتلة الجسم لتقييم زيادة الوزن، بينما استخدم محيط الخصر لتقييم السمنة في منطقة البطن.

النتائج: كانت نسبة انتشار كل من زيادة الوزن والسمنة ٢٥.٩٪ و١٠.٩٪ على الترتيب، بنسبة انتشار كلية نسبتها ٣٦.٨٪. وكان تأثير جميع المتغيرات الديموغرافية ضئيلا على محيط الخصر. وكانت هناك ارتباطات ذات قيمة بين الجنس، والعام الدراسي، والتخصص وبين مؤشر كتلة الجسم. على الرغم من اعتراف ٤٨.٢٪ من الطلبة بأنهم غير نشطين بدنيا، إلا أن هذا المؤثر لم يكن ذا قيمة على كلا المؤشرين. وكان لكل من التدخين، والجهد، ومدة مشاهدة التلفاز، والنوم الليلي والنهاري أثر على كل من مؤشر كتلة الجسم ومحيط الخصر إلا أنه لم يكن ذا قيمة إحصائية. كما كان للإفطار، والوجبات الخفيفة، والأكل مع العائلة، والوجبات السريعة، والمشروبات الغازية العادية والخالية من السكر تأثيرات لم تكن ذات قيمة على مؤشر كتلة الجسم. ولوحظت علاقة كبيرة بين استهلاك الكبد ومؤشر كتلة الجسم، في حين لم يكن لتناول اللحوم، والبيض، والحليب، والفواكه، والخضروات، والحبوب أي أثر ذا قيمة على مؤشر كتلة الجسم. كما أن جميع أنواع الأطعمة لم يكن لها أي أثر ذا قيمة على محيط الخصر.

الاستنتاجات: كانت نسبة انتشار زيادة الوزن والسمنة ٣٦.٨٪. وكان لكل من جنس المشارك، وعامه الدراسي، وتخصصه، واستهلاكه للكبد آثارا ذات قيمة على مؤشر كتلة الجسم. وأظهرت جميع المتغيرات الأخرى التي تمت دراستها علاقات لا اعتبار لها مع محيط الخصر.

الكلمات المفتاحية: زيادة الوزن؛ السمنة؛ مؤشر كتلة الجسم؛ العادات الغذائية؛ نمط الحياة

Abstract

Objectives: This work investigated the impacts of food habits and lifestyle on the prevalence of overweight (OW) and obesity (OB) among health sciences students (HSS) at Taif University, KSA.

Methods: A cross-sectional survey was conducted with 228 HSS in a university setting using a food frequency questionnaire. Body mass index (BMI) was used to assess weight gain, and waist circumference (W_C) was employed for the assessment of abdominal adiposity.

Results: The prevalences of OW and OB were 25.9% and 10.9%, respectively, with an overall prevalence of 36.8%. All demographic variables had an insignificant ($P > 0.05$) effect on W_C. There were significant links between gender, academic year and discipline and BMI ($P < 0.05$). Smoking, stress, duration of TV viewing, daylight and night sleep had an effect on BMI and W_C but were statistically insignificant ($P > 0.05$). Breakfast, light meals, eating with a family, fast food, and regular and diet soft drinks had insignificant impacts on BMI ($P > 0.05$). A considerable relationship was observed between consumption of liver and BMI ($P < 0.05$), while meat, egg, milk, fruit and vegetable, and grain intake had

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no significant effect on BMI ($P > 0.05$). All varieties of foods had no significant impact on W_C ($P > 0.05$).

Conclusions: The prevalence of OW and OB was 36.8%. The participants' gender, academic year, discipline, and liver intake had a significant impact on BMI. All other tested variables showed a nonsignificant relationship with W_C.

Keywords: Body mass index; Food habits; Lifestyle; Obesity; Overweight

Introduction

The World Health Organization (WHO) has stated that in 2014, approximately 39% of the world's adults (38% of males and 40% of females) were overweight,[1] while in KSA, the corresponding percent was 68.2% (67.5% of men and 69.5% of women).[1] The overall percent of obese adults in the world aged 18 years and more reached 13% (11% of males and 15% of females). The percent of obese adults in KSA was 2.6× higher than the world's population (33.7% vs. 13%). The percent of obesity (39.5%) among adult females in KSA was higher than that of males (29.5%). The same trend was noted for the world's population.

Overweight (OW) and obesity (OB) can affect the health and socio-economic status of those at risk. Increased rates of OW and OB is a main risk factor for non-communicable disorders such as heart disease, hypertension, type 2 diabetes mellitus, and some types of cancer (e.g., breast, colon, and endometrial).[2] The socio-economic consequences of OW/OB include the following: poor self-image, decreased self-esteem, and restriction in production and mobility.[2]

Many research studies have investigated the impacts of food habits, lifestyle, and eating behaviours on the prevalence of OW/OB among university students across the globe.[3,4] For instance, a Canadian study revealed that 22.9% of university students and 37.3% of staff were either obese or overweight.[3] Regina et al.[5] showed that only a small number of university students in Hong Kong participated in health-promoting behaviours.

While obesity intervention studies in a university settings have been conducted, they are fewer in number compared to epidemiological studies. For example, Hivert et al.[4] conducted a randomized-controlled study in a Canadian university over a 2-year period. The participants received a health-promotion programme through educational/behavioural seminars. After 2 years, the results indicated a considerable improvement in blood lipid chemistry, body mass composition, and weight gain prevention.[4] In another study, Emrich and Mazier[6] found that taking a nutrition education course may result in a decrease of total and saturated fat intake by university students.

In KSA, several epidemiological studies have been conducted among university students. For example, Al-Reethaiaa et al.[7] found that the prevalence of OW and OB among male HSS at a Saudi University was 21.8% and 15.7%, respectively.[7] El-Quadh[8] showed that the prevalence of OB among male HSS was higher than females (16.7% vs. 6.7%). A large percentage of the population of KSA is youth.[9] The population of KSA has experienced significant changes in their lifestyles, which could be due to many factors such as rapid socio-economic changes, rapid urbanization, wide use of cars, and increased reliance on computers and other telecommunication.[10] These factors have significant effects on lifestyle and food habits among the people of KSA, as society trends towards a more "Western diet". Many research studies have shown that eating habits are the most crucial factors affecting the nutritional and health condition of schoolchildren and adolescents in the kingdom. For example, in a study conducted in Riyadh City, it was found that skipping breakfast was more prevalent among obese/overweight schoolgirls than among normal-weight schoolgirls. In another study conducted in Abah (KSA), it was shown that 28% of schoolchildren skipped breakfast. Furthermore, obesity and overweight rates were linked with infrequent intake of breakfast, frequent intake of fast food and sugary drinks, and low consumption of fruits/vegetables, eggs, and milk.[7,10–16]

Furthermore, no similar studies have been conducted among male university students at Taif University. To the best of our knowledge this is the first study that combined a questionnaire and anthropometric measurements as tools of investigation. The aim of the present study was to determine the prevalence of OW/OB and related risk factors in a Saudi university community. The detailed objectives were: to assess impacts of participant's demographic characteristics on BMI and W_C and to evaluate the effects of participant's dietary habits and lifestyle on BMI and W_C. The outcomes of the present study will be the basis of a second study, which is simply an intervention study.

Materials and Methods

Study design and study population

A cross-sectional study was carried out among HSS at Taif University from July to December 2015. The investigation methods included a pretested questionnaire and anthropometric measurements. All students attending HS colleges were invited to participate in this study. A random sample of 228 students from both sexes agreed to participate, signed written consents and completed the questionnaires.

Study instrument and methods

The study tools

The questionnaire was organized into two parts. The first part obtained the demographic characteristics of the respondents. Anthropometric measurements including height (metres), weight (kg), and waist circumferences (cm) were also collected in this part of the questionnaire. Height of the participants was determined to the nearest 0.2 cm using a measuring scale equipped with a sliding head component.

Body weight was determined using a calibrated digital balanced to the closest 0.1 kg after asking subjects to take off their shoes and heavy clothes if possible. BMI was calculated using the standard equation.[17] Cut off values for waist circumference are as follows: if W_C < 88 cm, then women were at lower risk of developing health problems; if W_C ≥ 88 cm, the women were at high risk.[17] Similarly, the cut off values for adult males are as follows: if W_C < 102 cm, then men were at lesser risk of developing health problems; if W_C ≥ 102 cm, the men were at increased risk.[17] Although BMI is a widely used screening tool, it has major restrictions as it cannot differentiate between lean and fat (muscle); it has been suggested that percent body fat plays a more important role in differentiating healthy from unhealthy subjects.[18] Therefore, W_C was used as another instrument for assessing abdominal adiposity. Part two investigated the lifestyle and food habits among students. The questionnaire was designed by investigators to meet the needs of the Saudi community and subsequently revised by members of the Research Ethical Committee at Taif University. The questionnaire was tested on 30 students from the same colleges to ensure validity and respondents' understanding. The results of the pilot study were not included in the study results.

The consent form was designed to meet the criteria of the Research Ethics Review committee (WHO ERC). The form consisted of information regarding the purpose of the study, participant selection, voluntary participation, study duration, possible side effects and risks. This form also provided the participant with information concerning benefits and confidentiality and the participant's rights to refuse or withdraw from the study. Certificate of consent was the last section of the consent form.

Ethical consideration

This study had obtained ethical approval (No: 85310) from the Research Ethical Committee at Taif University, KSA. Each student read and signed a written consent before filling the questionnaire.

Analysis of data

The data obtained were coded, entered and analysed via the Statistical Package for the Social Sciences (IBM SPSS, version 22, Armonk, NY: IBM Corp.). Means, frequencies and percentages were employed to explain different factors. Chi-square analysis was utilized to determine the link between the students' demographic characters, lifestyle, eating patterns and BMI and W_C. A P-value < 0.05 was considered significant.

Results

Effects of student's demographic characteristics on BMI & W_C

A total of 228 students from the HS Colleges completed the questionnaire. All students gave signed consent prior to participating in this study. Slightly more than half (79, 51.8%) of the students had a normal BMI (48.8% of males and 53.4% of females), while 59 (25.9%) were overweight (33.8% of males and 21.6% of females). A total of 25 (10.9%) of subjects were obese. The combined OW/OB was much higher among males than females (50.1% vs. 26.7%). The results showed that gender had a significant effect on BMI ($P = 0.001$) (Table 1).

The highest rate of combined OW/OB reported for the sixth year students was 8 students (72.7%). Moreover, 81.8%

Table 1: Effects of demographic characteristics on body mass index among health sciences students, Taif University, KSA.

		Body mass index					P-value
		Freq. (%)	Under-weight	Normal-weight	Over-weight	Obesity	
Gender	Male	80 (35.1%)	1 (1.3%)	39 (48.8%)	27 (33.8%)	13 (16.30%)	0.001
	Female	148 (64.9%)	25 (16.9%)	79 (53.4%)	32 (21.6%)	12 (8.1%)	
Academic year	1st	57 (25%)	11 (19.3%)	25 (43.9%)	14 (24.6%)	7 (12.3%)	0.005
	2nd	39 (17.1%)	4 (10.3%)	24 (61.5%)	9 (23.1%)	2 (5.2%)	
	3rd	48 (21.1%)	3 (6.3%)	32 (66.7%)	9 (18.8%)	4 (8.3%)	
	4th	41 (18%)	5 (12.2%)	22 (53.7%)	91 (18.8%)	4 (8.3%)	
	5th	32 (14%)	2 (6.3%)	13 (40.6%)	11 (34.4%)	6 (18.8%)	
	6th	11 (14.8%)	1 (9.1%)	2 (18.2%)	6 (54.5%)	2 (18.2%)	
Academic discipline	Medicine	32 (14%)	2 (6.3%)	15 (46.9%)	12 (37.5%)	3 (9.4%)	<0.001
	Pharmacy	147 (64.5%)	13 (8.8%)	83 (56.5%)	34 (23.1%)	17 (11.6%)	
	Health Sciences	4 (1.8%)	1 (25.0%)	2 (50.0%)	0 (0.0%)	1 (2.5%)	
	Preparatory	45 (19.7%)	10 (22.2%)	18 (40.0%)	13 (28.9%)	4 (8.9%)	
Location of residency	Taif North	51 (22.4%)	6 (11.8%)	29 (56.9%)	11 (21.6%)	5 (9.8%)	0.629
	Taif South	68 (29.8%)	9 (13.2%)	32 (47.1%)	17 (25.0%)	10 (14.7%)	
	Taif East	61 (26.8%)	8 (13.1%)	33 (54.1%)	14 (23.0%)	6 (9.8%)	
	Taif West	48 (21.1%)	3 (6.3%)	24 (50.0%)	17 (35.4%)	4 (8.3%)	
Family income	<SAR 5000	19 (8.3%)	1 (5.3%)	10 (52.6%)	6 (31.6%)	2 (10.5%)	0.186
	SAR 5000–10,000	55 (24.1%)	4 (7.3%)	28 (50.9%)	19 (34.5%)	4 (7.3%)	
	SAR 10,000–15,000	52 (22.8%)	3 (5.8%)	35 (67.3%)	9 (17.3%)	5 (9.6%)	
	SAR >15,000	102 (44.7%)	18 (17.6%)	45 (44.1%)	25 (24.5%)	14 (13.7%)	
Living with family	Yes	214 (93.9%)	26 (12.1%)	113 (52.8%)	52 (24.3%)	23 (10.8%)	0.288
	No	14 (6.1%)	0 (0.0%)	5 (35.7%)	7 (50.0%)	2 (14.3%)	
Total		228 (100%)	26 (11.4%)	118 (51.8%)	59 (25.9%)	25 (10.9%)	

of the previous year's students had an abnormal weight (Table 1). This means that 4 out of 5 students in their senior year had an abnormal weight. There was a strong relationship ($P = 0.005$) between academic level and BMI. Although most of the participants (n = 147, 64.5%) were from the College of Pharmacy, the rate of OW and OB (34.7%) in this college was ranked second after medical school students (n = 15, 46.9%). A significant ($P < 0.001$) association was noted between academic discipline and BMI (Table 1).

The southern part of Taif had the highest number (68, 29.8%) of residents included in the study. Only 32 (47.1%) of them had a normal BMI, while 27 (39.7%) were either overweight or obese. Location of residency had an insignificant effect on BMI ($P = 0.629$) (Table 1).

The OW and OB among students in low-income families were 42.1%, while 38.2% of high-income students were obese or overweight. Furthermore, 55.8% of students from high-income families had abnormal body weight. Family income had insignificant impact on body weight ($P = 0.186$) (Table 1).

Majority of subjects 214 (93.9%) lived with their families, while only 14 (6.1%) did not. Of those who lived away from families, 9 (60.3%) were either overweight or obese. Living with families had an insignificant ($P = 0.288$) impact on BMI. There was an insignificant difference between living with family and BMI ($P = 0.446$) or W_C ($P = 0.941$) (Table 1).

Effects of student's lifestyle on BMI & W_C

Although the majority of participants were non-smokers (n = 204, 89.5%), smoking rate did not affect BMI ($P = 0.720$) or W_C ($P = 0.435$) (Tables 2 and 3). More than half (121, 53.1%) of student suffered from stress in their lives (Table 2). Of these students, 46 (38.1%) were either overweight or obese, but no significant ($P = 0.402$) link was noted between stress and BMI (Table 2).

Regarding physical activity; 110 (48.2%) of students did not exercise. The prevalence of OW and OB among them was 24 (21.8%) and 12 (10.9%), respectively (Table 2). The same trend was noted for W_C, as only 9 (8.2%) subjects were at risk of developing health problems ($P = 0.936$) (Table 3). Running was the most frequent activity (63, 52.9%), while swimming (8, 6.7%) was the least common type of physical activity practiced by the participants (Table 2). No significant effect was observed for type of exercise on BMI ($P = 0.14$) (Table 2) and on W_C ($P = 0.543$) (Table 3).

Forty-two of the student respondents watch TV 4–6 h per day, but the highest (19, 38.0%) rate of OW and OB was reported by those who watch TV 2–4 h a day (Table 2). Furthermore, the effects of TV watching on BMI was statistically insignificant ($P = 0.880$). Although, the highest risk (6, 10.9%) of developing health problems was among those who spent > 8 h of watching TV, the link between TV viewing and W_C was insignificant ($P = 0.590$) (Table 3).

The majority of participants (144, 64.4%) sleep more than 2 h, and more sleep during the day, with 20 (55.6%) of these individuals being overweight, while the rate of obesity was 13 (16.8%). The highest percent of subjects (86, 38.2%) sleep 6–8 h per night, however, the highest rates of OW (26, 30.2%) and different types of obesity (12, 14.0%) were noted for this category (Table 2).

Effects of eating habits on BMI & W_C

The results showed that breakfast intake was relatively common among students. Approximately half (106, 46.5%) of them have breakfast daily, and only 17 (7.5%) never have breakfast (Table 4). Against expectations, the highest rate of OW and OB (47.1%) was for those who ate breakfast 4 times a week, while for those who skipped breakfast, the rate was (29.8%) (Table 2). No significant association with BMI ($P = 0.936$) or with W_C ($P = 0.889$) was noted (Tables 4 and 5).

Overall 145 (63.6%) of participants had their meals with their families daily. Of these individuals, 34.5% were obese or overweight, while 17 (7.5%) rarely have meals with their families. Nonetheless, there was an association between eating with family and BMI, but it was statistically insignificant ($P = 0.222$). The results of this study did not find a significant link between having meals with family and W_C ($P = 0.495$) (Table 4).

Students who used to eat fast food more than 2–3 times per week (104, 45.6%) suffered from obesity (10, 10.6%) more than who never ate fast food (0, 0.00%). The same pattern was noticed when W_C was used. However, fast food intake affected neither BMI ($P = 0.572$) (Table 4) nor W_C ($P = 0.674$) (Table 5).

The OW and OB prevalence among students who ate light meals on a daily basis was 29.0%, almost half compared to those who never ate light meals (55.5%). Again, no considerable relationship was found between light meals uptake and BMI ($P = 0.104$) (Table 4) or W_C ($P = 0.584$) (Table 5).

Approximately one-fourth 56 (24.6%) of students consumed soft drinks 1–3 times per week. The highest rate of OW and OB (48.6%) was reported by students who never drank sugary drinks (Table 4). The results showed that students who consumed soft drinks 3–4 times per day had an increased risk (15.4%) of developing health-related problems (Table 5). Soft drinks had no significant effect on either measurement ($P > 0.05$).

Results related to the consumption of diet drinks and the possibility of developing health problems was also examined, since the highest risk (15.8%) was among those who drink 4–6 times per week. However, this link was statistically insignificant ($P = 0.476$) (Table 5).

Meat intake had no significant effects on BMI ($P = 0.108$) or W_C ($P = 0.141$) (Tables 4 and 5).

Fish and seafood intake had an insignificant effect on obesity rate ($P = 0.170$). Normal body weight was higher (64.7%) among those who ate seafood than among students who never ate seafood (32.1%). The obesity and overweight rate was the highest (39.3%) among subjects who never ate fish and seafood. Consumption of fish and seafood had an insignificant ($P = 0.789$) effect on W_C (Table 6).

The highest (45.4%) rate of OW and OB was found among students who never ate fried food, while the lowest rate was found among those who consumed fried food on a daily basis. However, this effect was statistically insignificant ($P = 0.458$). These results could be inconsistent with expectations. Fried food intake had no considerable ($P = 0.547$) impact on W_C (Table 7).

Table 2: Effects of demographic characteristics and lifestyle on waist circumference among health sciences students, Taif University, KSA.

Demographic characteristics		Waist circumference				Life-style variables		Waist circumference			
		Freq. (%)	No risk	Risk	*P*-value			Freq. (%)	No risk	Risk	*P*-value
Gender	Male	80 (35.1%)	76 (95.0%)	4 (5.0%)	0.181	Smoking	Yes	24 (10.5%)	23 (95.8%)	1 (4.2%)	0.435
	Female	148 (64.9%)	133 (89.9%)	15 (10.1%)			No	204 (89.5%)	186 (91.2%)	18 (8.8%)	
Academic discipline	Medicine	32 (14%)	28 (87.5%)	4 (12.5%)	0.566	Smoking of a family member	Yes	79 (34.6%)	72 (91.1%)	7 (8.9%)	0.834
	Pharmacy	147 (64.5%)	134 (91.2%)	13 (8.8%)			No	149 (65.4%)	137 (91.9%)	12 (8.1%)	
	Health Sciences	4 (1.8%)	4 (100.0%)	0 (0.0%)		Role of stress	Yes	121 (53.1%)	112 (92.6%)	9 (7.4%)	0.603
	Preparatory	45 (19.7%)	43 (95.6%)	2 (4.4%)			No	107 (46.9%)	97 (90.7%)	10 (9.3%)	
Academic year	1st	57 (25%)	51 (89.5%)	6 (10.5%)	0.208	Physical activity	Yes	118 (51.8%)	108 (91.5%)	10 (8.5%)	0.936
	2nd	39 (17.1%)	37 (94.9%)	2 (5.1%)			No	110 (48.2%)	101 (91.8%)	9 (8.2%)	
	3rd	48 (21.1%)	46 (95.8%)	2 (4.2%)		Duration of	< 1 h/wk.	45 (37.5%)	42 (93.3%)	3 (6.7%)	0.990
	4th	41 (18%)	39 (95.1%)	2 (4.9%)		Physical activity	2 h or less/wk.	22 (18.3%)	20 (90.9%)	2 (9.1%)	
	5th	32 (14%)	26 (81.3%)	6 (18.8%)			3 h/wk.	20 (16.7%)	18 (90.0%)	2 (10.0%)	
	6th	11 (14.8%)	10 (90.9%)	1 (9.1%)			4 h/wk.	10 (8.3%)	9 (90.0%)	1 (10.0%)	
Family income	<SAR 5000	19 (8.3%)	18 (94.7%)	1 (5.3%)	0.790		> 5 h/wk.	23 (19.2%)	21 (91.3%)	2 (8.7%)	
	SAR 5−10,000	55 (24.1%)	51 (92.7%)	4 (7.3%)							
	SAR 10−15000	52 (22.8%)	46 (88.5%)	6 (11.5%)							
	SAR >15,000	102 (44.7%)	94 (92.2%)	8 (7.8%)		kind of exercise	Running	63 (52.9%)	56 (88.9%)	7 (11.1%)	0.543
Location of residency in Taif	North	51 (22.4%)	46 (90.2%)	5 (9.8%)	0.348		Swimming	8 (6.7%)	8 (100%)	0 (0.0%)	
	South	68 (29.8%)	62 (91.2%)	6 (8.8%)			Soccer	21 (17.6%)	19 (90.5%)	2 (9.5%)	
	East	61 (26.8%)	59 (96.7%)	2 (3.3%)			Dancing	27 (22.7%)	26 (21.8%)	1 (3.7%)	
	West	48 (21.1%)	42 (87.5%)	6 (12.5%)		TV viewing	<2 h/day	28 (12.3%)	25 (89.3%)	3 (10.7%)	0.590
Living with family	Yes	214 (93.9%)	197 (92.1%)	17 (7.9%)	0.406		2−4 h/day	50 (21.9%)	48 (96.0%)	2 (4.0%)	
	No	14 (6.1%)	12 (85.7%)	2 (14.3%)			4−6 h/day	95 (41.7%)	87 (91.6%)	8 (8.4%)	
							>8 h/day	55 (24.1%)	49 (89.1%)	6 (10.9%)	
						Duration of	Never	27 (12.0%)	26 (96.3%)	1 (3.7%)	0.775
						day time sleep	<1 h	13 (5.8%)	11 (84.6%)	2 (15.4%)	
							1−2 h	41 (18.2%)	38 (92.7%)	3 (7.3%)	
							2−3 h	71 (31.6%)	65 (91.5%)	6 (8.5%)	
							≥ 4 h	73 (32.4%)	66 (90.4%)	7 (9.6%)	
						Duration of	< 4 h	29 (12.9%)	26 (89.7%)	3 (10.3%)	0.583
						night sleep	4−6 h	76 (33.8%)	70 (92.1%)	6 (7.9%)	
							6−8 h	86 (38.2%)	77 (89.5%)	9 (10.5%)	
							> 8 h	76 (33.8%)	33 (97.1%)	1 (2.9%)	
Total		228 (100%)	209 (91.7%)	19 (8.3%)		Total		228 (100%)	209 (91.7%)	19 (8.3%)	

Table 3: Effects of participant's lifestyle on body mass index among health sciences students, Taif University, KSA.

		Freq. (%)	Body mass index				*P*-value
			Under-weight	Normal-weight	Over-weight	Obesity	
Smoking	Yes	24 (10.5%)	3 (12.5%)	15 (62.5%)	3 (12.5%)	3 (12.5%)	0.720
	No	204 (89.5%)	23 (11.3%)	103 (50.5%)	56 (27.5%)	22 (10.8%)	
Smoking of a family member	Yes	79 (34.6%)	13 (16.5%)	38 (48.1%)	19 (24.1%)	9 (11.4%)	0.488
	No	149 (65.4%)	13 (8.7%)	80 (53.7%)	40 (26.8%)	16 (10.8%)	
Role of stress	Yes	121 (53.1%)	12 (9.9%)	63 (52.1%)	36 (29.8%)	10 (8.3%)	0.402
	No	107 (46.9%)	14 (13.1%)	55 (51.4%)	23 (21.5%)	15 (13.9%)	
Physical activity	Yes	118 (51.8%)	11 (9.3%)	59 (50%)	35 (29.7%)	13 (11.0%)	0.443
	No	110 (48.2%)	15 (13.6%)	59 (53.6%)	24 (21.8%)	12 (10.9%)	
Duration of Physical activity per week	< 1 h	45 (37.5%)	3 (6.7%)	26 (57.8%)	13 (28.9%)	3 (6.7%)	0.376
	2 h or less	22 (18.3%)	1 (4.5%)	13 (59.1%)	4 (18.2%)	4 (18.2%)	
	3 h	20 (16.7%)	3 (15%)	11 (55%)	5 (25%)	1 (5%)	
	4 h	10 (8.3%)	1 (10%)	5 (50%)	2 (20%)	2 (20.0%)	
	> 5 h	23 (19.2%)	3 (13%)	6 (26.1%)	11 (47.8%)	3 (13%)	
Kind of exercise	Running	63 (52.9%)	4 (6.3%)	31 (49.2%)	22 (34.9%)	6 (9.5%)	0.142
	Swimming	8 (6.7%)	2 (25%)	4 (50%)	2 (25%)	0 (0.0%)	
	Soccer	21 (17.6%)	0 (0.0%)	12 (57.1%)	4 (19%)	5 (23.8%)	
	Dancing	27 (22.7%)	5 (18.5%)	13 (48.1%)	7 (25.9%)	2 (7.4%)	
TV viewing, using computer or play video games	<2 h/day	28 (12.3%)	6 (21.4%)	12 (42.9%)	7 (25.0%)	3 (10.7%)	0.880
	2–4 h/day	50 (21.9%)	6 (12.0%)	25 (50.0%)	15 (30.0%)	4 (8.0%)	
	4–6 h/day	95 (41.7%)	9 (9.5%)	51 (53.7%)	24 (25.3%)	11 (11.6%)	
	>8 h/day	55 (24.1%)	5 (9.1%)	30 (54.5%)	13 (23.6%)	7 (12.7%)	
Duration of day time sleep	Never	27 (12.0%)	4 (14.8%)	13 (48.1%)	8 (29.6%)	2 (7.4%)	0.552
	< 1 h	13 (5.8%)	1 (7.7%)	9 (69.2%)	0 (0.0%)	3 (23.1%)	
	1–2 h	41 (18.2%)	1 (2.4%)	22 (53.7%)	11 (26.8%)	7 (17.1%)	
	2–3 h	71 (31.6%)	11 (15.5%)	34 (47.9%)	20 (28.2%)	6 (8.4%)	
	≥ 4 h	73 (32.4%)	9 (12.3%)	37 (50.7%)	20 (27.4%)	7 (9.6%)	
Duration of night sleep	< 4 h	29 (12.9%)	2 (6.9%)	17 (58.6%)	8 (27.6%)	2 (6.9%)	0.936
	4–6 h	76 (33.8%)	9 (11.8%)	41 (53.9%)	18 (23.7%)	8 (10.5%)	
	6–8 h	86 (38.2%)	9 (10.5%)	39 (45.3%)	26 (30.2%)	12 (14%)	
	> 8 h	76 (33.8%)	6 (17.6%)	18 (52.9%)	7 (20.6%)	3 (8.8%)	
Total		228 (100%)	26 (11.4%)	118 (51.8%)	59 (25.9%)	25 (10.9%)	

Others types of food, namely, milk, fruits/vegetables, grains, and eggs, had insignificant effects on BMI and on W_C ($P > 0.05$) (Tables 6 and 7).

Discussion

This study indicated that 36.8% of participants were overweight and obese. Similar results were reported in different areas of KSA. For example, Al-Qahtani and his team[19] showed that the prevalence of OB and OW was 24.9% and 15.2%, respectively. The prevalence of OW and OB (40.1%) was higher than ours (36.8%), which could be attributed to environmental and genetic factors. Al-Rethaiaa et al.[7] found that 21.8% of males from HS at Qassim University were overweight, while 15.7% were obese. The prevalence of OW and OB (37.5%) in that study was similar to our results. When the authors used body composition to determine obesity, the results showed that 38.4% of participants were obese (BMI indicated 15.7% were obese).[7] El-Quadh[8] surveyed 72 males and 74 females HSS in Tabuk, KSA. This study showed that the percentages of overweight among males and females were 25% and 20.3%, respectively, while the prevalence of obesity (16.7%) among male students was much higher than that among females (6.7%).

There was a considerable link ($P = 0.001$) between participants' gender and their BMI; 50.1% of males and only 29.7% of females were overweight and obese. Obesity and overweight among males was 1.7× higher than females, likely due to awareness of females about their body appearance[20] as well as the fact that males and females differ in regards to lifestyles. These results agreed with those of Al-Hazzaa and his colleagues in KSA.[21] Results of this study disagreed with the findings of Farghly et al.[20] In a study conducted in a Canadian university, the prevalence of OW and OB among males was higher than that among females (29.3% vs. 20.9%),[3] which agreed with our findings.

The order of OW and OB from highest to lowest was as follows: 6th > 5th > 1st > 2nd > 3rd (4th). Although the lowest percent of participants were from the sixth year, this group of students had the highest rate of OW and OB (72.7%), while the second highest (53.2%) was reported for the 5th-year students. Several studies indicate those particular periods of our lives that are more likely to affect lifestyle and hence body mass.[3] For example, the transition period from high school to university seems to be linked with a decrease in physical activities and an increase in sedentary activates, leading students to gain weight.[22] The term "freshman 15" refers to the concept that 1st year students gain 15 pounds during their freshman year.[22] Similarly, Hovell et al.[23] and Racette et al.[24] found considerable weight gain after entry into a university. In contrast, Morrow et al.[25] indicated a weight decrease (2.4 pounds) among females entering their freshman year. The highest rate of OW and OB among the 6th-year students could be

Table 4: Effects of participants' eating habits on body mass index among health sciences students, Taif University, KSA.

		Freq. (%)	Body mass index				*P*-value
			Under-weight	Normal-weight	Over-weight	Obesity	
Breakfast intake	Never	17 (7.5%)	3 (17.6%)	9 (52.9%)	3 (17.6%)	2 (11.8%)	0.697
	2/wk.	34 (14.9%)	6 (17.6%)	19 (55.9%)	7 (20.6%)	2 (5.9%)	
	3/wk.	37 (16.2%)	2 (5.4%)	20 (54.1%)	9 (24.3%)	6 (16.2%)	
	4/wk.	34 (14.9%)	1 (2.9%)	17 (50.0%)	11 (32.4%)	5 (14.7%)	
	≥5/wk.	106 (46.5%)	14 (13.2%)	53 (50.0%)	29 (27.4%)	10 (9.4%)	
Light meals (snacks) intake	Daily	62 (27.2%)	10 (16.1%)	34 (54.8%)	10 (16.1%)	8 (12.9%)	0.104
	4–6/wk.	43 (18.9%)	1 (2.3%)	22 (51.2%)	14 (32.6%)	6 (13.9%)	
	1–3/mo.	66 (28.9%)	5 (7.6%)	39 (59.1%)	16 (24.2%)	6 (9.1%)	
	1–2/mo.	30 (13.2%)	7 (23.3%)	14 (46.7%)	6 (20.0%)	3 (10.0%)	
	Never	27 (11.8%)	3 (11.1%)	9 (33.3%)	13 (48.1%)	2 (7.4%)	
Eating with family	Daily	145 (63.6%)	13 (9.0%)	82 (56.6%)	37 (25.5%)	13 (10%)	0.222
	3–4/wk.	47 (20.6%)	7 (14.9%)	24 (51.1%)	8 (17.0%)	8 (17.0%)	
	1–2/wk.	19 (8.3%)	5 (26.3%)	7 (36.8%)	6 (31.6%)	1 (5.3%)	
	Rarely	17 (7.5%)	1 (5.9%)	5 (29.4%)	8 (47.1%)	3 (17.6%)	
Fast food intake	Daily	16 (7.0%)	2 (12.5%)	9 (56.3%)	3 (18.8%)	2 (12.5%)	0.572
	4–6/wk.	33 (14.5%)	3 (9.1%)	16 (48.5%)	7 (21.2%)	7 (21.2%)	
	2–3/wk.	104 (45.6%)	14 (13.5%)	50 (48.1%)	29 (27.9%)	11 (10.6%)	
	1–2/mo.	69 (30.3%)	7 (10.1%)	41 (59.4%)	16 (23.2%)	5 (7.2%)	
	Never	6 (2.6%)	0 (0.0%)	2 (33.3%)	4 (66.7%)	0 (0.0%)	
Soft drink intake	More than 4 cans per day	8 (3.5%)	1 (12.5%)	4 (50.0%)	3 (37.5%)	0 (0.0%)	0.336
	3–4 cans per day	13 (5.7%)	1 (7.7%)	6 (46.2%)	3 (23.1%)	3 (23.1%)	
	1–2 cans daily	36 (15.8%)	4 (11.1%)	18 (50.0%)	9 (25.0%)	5 (13.9%)	
	4–6 times/wk.	33 (14.5%)	6 (18.2%)	15 (45.5%)	7 (21.2%)	5 (15.1%)	
	1–3 times/wk.	56 (24.6%)	11 (19.6%)	26 (46.4%)	14 (25.0%)	5 (8.9%)	
	1–2 times/mo.	47 (20%)	3 (6.4%)	31 (66.0%)	8 (17.0%)	5 (10.6%)	
	Never	35 (15.4%)	0 (0.0%)	18 (51.4%)	15 (42.9%)	2 (5.7%)	
Diet soft drink intake	Daily	20 (8.8%)	2 (10.0%)	10 (50.0%)	4 (20.0%)	4 (20.0%)	0.395
	4–6/wk.	19 (8.3%)	3 (15.8%)	8 (42.1%)	4 (21.1%)	4 (21.1%)	
	1–3/wk.	29 (12.7%)	2 (6.9%)	16 (55.2%)	8 (27.6%)	3 (10.3%)	
	1–2/mo.	29 (12.7%)	1 (3.4%)	14 (48.3%)	10 (34.5%)	4 (13.8%)	
	Never	131 (57.5%)	18 (3.4%)	70 (53.4%)	33 (25.2%)	10 (7.7%)	
Meat intake	Daily	67 (29.4%)	7 (10.4%)	37 (55.2%)	15 (22.4%)	8 (11.9%)	0.108
	1–2/wk.	65 (28.5%)	7 (10.8%)	35 (53.8%)	15 (23.1%)	8 (12.3%)	
	3–4/wk.	57 (25.0%)	7 (12.3%)	23 (40.4%)	22 (38.6%)	5 (8.8%)	
	5–6/wk.	24 (10.5%)	2 (8.3%)	13 (54.2%)	5 (20.8%)	4 (16.7%)	
	Never	15 (6.6%)	3 (20.0%)	10 (66.7%)	2 (13.3%)	0 (0.0%)	
Liver intake	Daily	2 (0.9%)	0 (0.0%)	1 (50%)	1 (50%)	0 (0.0%)	0.022
	1–2/wk.	113 (49.6%)	11 (9.7%)	57 (50.4%)	30 (26.5%)	15 (13.3%)	
	3–4/wk.	10 (4.4%)	0 (0.0%)	8 (80%)	1 (10%)	1 (10%)	
	5–6/wk.	10 (4.4%)	2 (20%)	5 (50%)	0 (0.0%)	3 (30%)	
	Never	93 (40.8%)	13 (14%)	47 (50%)	27 (29%)	6 (6.5%)	
Total		228 (100%)	26 (11.4%)	118 (51.8%)	59 (25.9%)	25 (10.9%)	

explained as follows: students in their senior year have completed all courses requirements and all their efforts towards training. This year is a transition period between university setting and the job market. Thus, this period could be accompanied with an increase in physical inactivity and sedentary behaviours, poor eating habits, and stress-related eating. A failure of students in their senior year to adapt to stress may negatively affect their eating behaviours. Therefore, further studies should be conducted to investigate these results.

Socio-economic status had insignificant effect on rates of OW and OB, which disagreed with those of Amin et al.[13] and the findings of Al-Hazzaa et al.[21]

Physical activity is defined as any movement of body skeletal muscles that results in energy expenditures over the basal level.[26] It is well known that physical activity is of great importance for normal growth as well as development and maintenance of healthy children and adolescents. Moderate and vigorous are two levels of physical activities. A moderate level is when the heart rate exceeds 139 beat per minute, while the vigorous level is when the heart rate exceeds 159 beat per minute.[26] According to the American Heart Association, these two levels should be performed by children and youths for at least 60 min a day.[26] In physically active students, OW and OB (39.7%) were higher than the corresponding rates (32.7%) in physically inactive students, which was against expectation. Nonetheless, the difference was statistically insignificant ($P = 0.628$). Recent published data showed that the majority of Saudi children (60%) and adolescents (71%) were physically inactive.[26] Omer et al.[10] reported much higher rates of physical inactivity (91.7%). Collison

Table 5: Effects of participants' eating habits on waist circumference of health sciences students, Taif University, KSA.

		Waist circumference			
		Freq. (%)	No risk	Risk	*P*-value
Breakfast intake	Never	17 (7.5%)	16 (94.1%)	1 (5.9%)	0.889
	2/wk.	34 (14.9%)	32 (94.1%)	2 (5.9%)	
	3/wk.	37 (16.2%)	33 (89.2%)	4 (10.8%)	
	4/wk.	34 (14.9%)	32 (94.1%)	2 (5.9%)	
	≥5/wk.	106 (46.5%)	96 (90.6%)	10 (9.4%)	
Light meals intake	Daily	62 (27.2%)	57 (91.9%)	5 (8.1%)	0.584
	4–6/wk.	43 (18.9%)	37 (86%)	6 (14%)	
	2–3/mo.	66 (28.9%)	61 (92.4%)	5 (7.6%)	
	1–2/mo.	30 (13.2%)	29 (96.7%)	1 (3.3%)	
	Never	27 (11.8%)	25 (92.6%)	2 (7.4%)	
Eating with family	Daily	145 (63.6%)	134 (92.4%)	11 (7.6%)	0.495
	3–4/wk.	47 (20.6%)	44 (93.6%)	3 (6.4%)	
	1–2/wk.	19 (8.3%)	17 (89.5%)	2 (10.5%)	
	Rarely	17 (7.5%)	14 (82.4%)	3 (17.6%)	
Fast food intake	Daily	16 (7.0%)	16 (100%)	0 (0.0%)	0.674
	4–6/wk.	33 (14.5%)	30 (90.9%)	3 (9.1%)	
	2–3/wk.	104 (45.6%)	95 (91.3%)	9 (8.7%)	
	1–2/mo.	69 (30.3%)	62 (89.9%)	7 (10.1%)	
	Never	6 (2.6%)	6 (100%)	0 (0.0%)	
Soft drink intake	More than 4 cans per day	8 (3.5%)	7 (87.5%)	1 (12.5%)	0.499
	3–4 cans per day	13 (5.7%)	11 (84.6%)	2 (15.4%)	
	1–2 cans daily	36 (15.8%)	3 (86.1%)	5 (13.9%)	
	4–6/wk.	33 (14.5%)	29 (87.9%)	4 (12.1%)	
	2–3/wk.	56 (24.6%)	53 (94.6%)	3 (5.4%)	
	1–2/wk.	47 (20%)	44 (93.6%)	3 (6.4%)	
	Never	35 (15.4%)	34 (97.1%)	1 (2.9%)	
Diet soft drink intake	Daily	20 (8.8%)	18 (90%)	2 (10%)	0.476
	4–6/wk.	19 (8.3%)	16 (84.2%)	3 (15.8%)	
	1–3/wk.	29 (12.7%)	27 (93.1%)	2 (6.9%)	
	1–2/mo.	29 (12.7%)	25 (86.2%)	4 (13.8%)	
	Never	131 (57.5%)	123 (93.9%)	8 (6.1%)	
Meat intake	Daily	67 (29.4%)	62 (92.5%)	5 (7.5%)	0.141
	1–2/wk.	65 (28.5%)	55 (84.6%)	10 (15.4%)	
	3–4/wk.	57 (25.0%)	54 (94.7%)	3 (5.3%)	
	5–6/wk.	24 (10.5%)	23 (95.8%)	1 (4.2%)	
	Never	15 (6.6%)	15 (100.0%)	0 (0.0%)	
Liver intake	Daily	2 (0.9%)	2 (100%)	0 (0.0%)	
	1–2/wk.	113 (49.6%)	101 (89.4%)	12 (10.6%)	0.318
	3–4/wk.	10 (4.4%)	10 (100%)	0 (0.0%)	
	5–6/wk.	10 (4.4%)	8 (80%)	2 (20%)	
	Never	93 (40.8%)	88 (94.6%)	5 (5.4%)	
Total		228 (100%)	209 (91.7%)	19 (8.3%)	

et al.[11] found that the frequency of physical activity decreased as age increased in both sexes and that boys were more active than females. Racette et al.[24] found that the percent of university students engaging in aerobic exercise declined considerably from 62% to 55% by the second year. Keating et al.[27] found that approximately 40–59% of university students were physically inactive. Lee and Yuen Loke[5] found that 68.8% of university students in Hong Kong engaged in any form of physical activity, and only 13.8% of students exercised on a regular basis.

Although 41.7% of overweight and obese students spent 4–6 h watching TV, the highest OW and OB was noted for students who spent 2–4 h a day on TV viewing. A similar effect was reported by Omer et al.[10] Our results did not find a significant link between BMI and TV watching, computer or other electronic devices. All tested lifestyles in this study showed insignificant ($P > 0.05$) effects on W_C, thus, further study is recommended to investigate such results.

Breakfast is considered to be the most significant meal throughout the day for many reasons, including the fact that breakfast intake provides children, especially those attending school, with enough energy for proper brain functions, enhancing learning skills.[15] Without breakfast, body energy reserves will be depleted over a 12-h gap between dinner and breakfast; thus, it results in a decrease in the level of glucose in the blood. If this decline is significant, it can result in a quick disturbance in cerebral function.[15] The highest percentage of OW and OB (47.1%) was for students who ate breakfast 4 times a week, while the combined one (29.8%) was for those who skipped their breakfast. Breakfast intake had an insignificant effect ($P = 0.936$) on BMI or W_C ($P = 0.856$), which agrees with the finding of both Omer et al.[10] and Al-Rethaiaa et al.[7] EL-Qudah

Table 6: Effects of participants' food patterns on body mass index of health sciences students, Taif University, KSA.

		Freq. (%)	Body mass index				
			Under-weight	Normal-weight	Over-weight	Obesity	*P*-value
Egg intake	≥12/wk.	10 (4.4%)	1 (10%)	4 (40%)	4 (40%)	1 (10%)	0.170
	8–11/wk.	8 (3.5%)	1 (12.5%)	6 (75%)	1 (12.5%)	0 (0%)	
	5–7/wk.	36 (15.8%)	1 (2.8%)	16 (44.4%)	10 (27.8%)	9 (25%)	
	2–4/wk.	58 (25.4%)	6 (10.3%)	35 (60.3%)	11 (19%)	6 (10.3%)	
	<2/wk.	84 (36.8%)	10 (11.9%)	43 (51.2%)	25 (29.8%)	6 (7.1%)	
	Never	32 (14%)	7 (21.9%)	14 (43.8%)	8 (25%)	3 (9.4%)	
Fish and seafood intake	1–2/mo.	123 (53.9%)	8 (6.5%)	67 (54.5%)	32 (26%)	16 (13%)	0.170
	3–4/mo.	48 (21.1%)	7 (14.6%)	24 (50%)	11 (22.9%)	6 (12.5%)	
	5–6/mo.	12 (5.3%)	2 (16.7%)	7 (58.3%)	3 (25%)	0 (0%)	
	>6/mo.	17 (7.5%)	1 (5.9%)	11 (64.7%)	5 (29.4%)	0 (0%)	
	Never	28 (12.3%)	8 (28.6%)	9 (32.1%)	8 (28.6%)	3 (10.7%)	
Fried food intake	Daily	16 (7%)	1 (6.3%)	10 (62.5%)	2 (12.5%)	3 (18.8%)	0.458
	1–2/wk.	101 (44.3%)	10 (9.9%)	57 (56.4%)	25 (24.8%)	9 (8.9%)	
	3–4/wk.	59 (25.9%)	9 (15.3%)	27 (45.8%)	16 (27.1%)	7 (11.9%)	
	5–6/wk.	30 (13.2%)	2 (6.7%)	16 (53.3%)	7 (23.3%)	5 (16.6%)	
	Never	22 (9.6%)	4 (18.2%)	8 (36.4%)	9 (40.9%)	1 (4.5%)	
Milk intake	Daily	43 (18.9%)	4 (9.3%)	29 (67.4%)	10 (23.3%)	0 (0%)	0.469
	1–2/wk.	86 (37.7%)	12 (14%)	40 (46.5%)	20 (23.3%)	14 (16.4%)	
	3–4/wk.	43 (18.9%)	5 (11.6%)	22 (51.2%)	9 (20.9%)	7 (16.3%)	
	5–6/wk.	31 (13.6%)	4 (12.9%)	16 (51.6%)	9 (29%)	2 (6.5%)	
	Never	25 (11%)	1 (4%)	11 (44%)	11 (44%)	2 (8%)	
Fruit/vegetable intake	≥5/d.	13 (5.7%)	2 (15.4%)	3 (23.1%)	6 (46.2%)	2 (15.4%)	0.051
	3–4/d.	51 (22.4%)	2 (3.9%)	29 (56.9%)	11 (21.6%)	9 (17.7%)	
	1–2/d.	126 (55.3%)	19 (15.1%)	71 (56.3%)	25 (19.8%)	11 (8.7%)	
	Never	38 (16.7%)	3 (7.9%)	15 (39.5%)	17 (44.7%)	3 (7.9%)	
Grain intake	≥5 servings/d.	25 (11%)	2 (8%)	13 (52%)	8 (32%)	2 (8%)	0.168
	3–4 servings/d.	55 (24.1%)	12 (21.8%)	30 (54.5%)	7 (12.7%)	6 (10.9%)	
	1–2 servings/d.	134 (58.8%)	11 (8.2%)	71 (53%)	37 (27.6%)	15 (11.1%)	
	Never	14 (6.1%)	1 (7.1%)	4 (28.6%)	7 (50%)	2 (14.3%)	
Total		228 (100%)	26 (11.4%)	118 (51.8%)	59 (25.9%)	25 (10.9%)	

et al.[8] reported that approximately 15.7% of Saudi college students skipped their breakfast.

The results support the initial hypothesis that eating with family has a negative impact on W_C. It is rational to assume that frequent intake of family meals would be linked with a low prevalence of OW/OB. Several possible mechanisms were cited by Utter et al.[28] for the positive links between eating with family and youth nutrition, including the availability of healthy food choices at home, family discussions concerning food and nutrition, and/or parental modelling healthy eating. Conversely, no such considerable impact was noted on BMI. Amin et al.[13] showed a positive correlation between consumption of food away from family and BMI. These results contradicted those of Al-Rethaiaa et al.,[7] who found a considerable negative correlation between BMI and taking meals with family among HSS in a Saudi university. Surprisingly, no association was noted between fast food, soft drinks, diet soft drinks and BMI. The same trend was observed for W_C.

Results indicated no positive relationship between high-calorie drink intake and BMI. Surprisingly, the highest rate of OW and OB (48.6%) was for those who never consumed such drinks. Theoretically, high-calorie drinks are expected to increase BMI.[29] One probable explanation of the theoretical positive link between soft drinks and BMI could be that excessive sugars are stored as fat in the body, leading to weight increase and obesity.[29] Furthermore, diets high in sugar have contributed to the development of other disorders, such as dyslipidaemia and insulin resistance diabetes.[30] Collison et al.[11] found a positive correlation between consumption of sugary drinks and BMI and W_C among male students aged 10–19 years in Riyadh City (KSA). Moreover, Collison et al.[11] suggested that as the age of schoolchildren increases, there is a trend towards sugary foods and less healthy food options.

Unlike fatty meats, seafood is considered a good source of protein with a low content of saturated lipids. Furthermore, fish contains a good amount of beneficial n-3 fatty acids. The results showed an insignificant ($P = 0.170$) effect of seafood on BMI and on W_C ($P = 0.789$). Seafood with the beneficial n-3 fatty acids has been shown to be efficient in weight reduction and loss of abdominal adiposity in a number of trials. For example, in a randomized controlled trial of calorie-limited diets, the inclusion of fish (either lean or fatty) or fish oil in the energy-restricted diet resulted in an almost 1 kg weight reduction in young overweight men.[31]

It is well known that fruits/vegetables play a very important role in reducing overall energy uptake, because of high contents of water and fibres. Thus, adding fruits and vegetables to the meals is beneficial in weight control. The highest rate of OW and OB (61.6%) was reported for those who consumed fruits and vegetables more than 5 times a day. It is logical to assume that more frequent intake of fruits and

Table 7: Effects of participants' food habits on waist circumference of health sciences students, Taif University, KSA.

		Waist circumference			
		Freq. (%)	No risk	Risk	*P*-value
Egg intake	≥12/wk.	10 (4.4%)	10 (100%)	0 (0%)	0.386
	8–11/wk.	8 (3.5%)	8 (100%)	0 (0%)	
	5–7/wk.	36 (15.8%)	30 (83.3%)	6 (16.7%)	
	2–4/wk.	58 (25.4%)	53 (91.4%)	5 (8.6%)	
	<2/wk.	84 (36.8%)	78 (92.9%)	6 (7.1%)	
	Never	32 (14%)	30 (93.8%)	2 (6.3%)	
Fish and seafood intake	1–2/mo.	123 (53.9%)	113 (91.9%)	10 (8.1%)	0.789
	3–4/mo.	48 (21.1%)	43 (89.6%)	5 (10.4%)	
	5–6/mo.	12 (5.3%)	12 (100%)	0 (0%)	
	>6/mo.	17 (7.5%)	16 (94.1%)	1 (5.9%)	
	Never	28 (12.3%)	25 (89.3%)	3 (10.7%)	
Fried food intake	Daily	16 (7%)	15 (93.8%)	1 (6.3%)	0.547
	1–2/wk.	101 (44.3%)	90 (89.1%)	11 (10.9%)	
	3–4/wk.	59 (25.9%)	54 (91.5%)	5 (8.5%)	
	5–6/wk.	30 (13.2%)	28 (93.3%)	2 (6.7%)	
	Never	22 (9.6%)	22 (100%)	0 (0%)	
Milk intake	Daily	43 (18.9%)	42 (97.7%)	1 (2.3%)	0.339
	1–2/wk.	86 (37.7%)	80 (93%)	6 (2.6%)	
	3–4/wk.	43 (18.9%)	37 (86%)	6 (14%)	
	5–6/wk.	31 (13.6%)	28 (90.3%)	3 (9.7%)	
	Never	25 (11%)	22 (88%)	3 (12%)	
Fruit/vegetable intake	≥5/d.	13 (5.7%)	11 (84.6%)	2 (15.4%)	0.162
	3–4/d.	51 (22.4%)	44 (86.3%)	7 (13.7%)	
	1–2/d.	126 (55.3%)	120 (95.2%)	6 (4.8%)	
	Never	38 (16.7%)	34 (89.5%)	4 (10.5%)	
Grain intake	≥5 servings/d.	25 (11%)	23 (92%)	2 (8%)	0.302
	3–4 servings/d.	55 (24.1%)	50 (90.9%)	5 (9.1%)	
	1–2 servings/d.	134 (58.8%)	125 (93.3%)	9 (6.7%)	
	Never	14 (6.1%)	11 (78.6%)	3 (21.4%)	
Total		228 (100%)	209 (91.7%)	19 (8.3%)	

vegetables would be linked with a low prevalence of OW/OB, but the results indicated the opposite, possibly due to, in Saudi society, the fact that the intake of raw fruits and vegetables during meals is not a common eating habit. Vegetable consumption in the majority of Saudi diets is too little to influence the overall calorie intake,[7] and since most Saudis consume fruits at the end of their meals as a treat, it therefore results in losing their "satiety impact".[7] Amin and his team[13] found that OW and OB male schoolchildren consume fewer servings of fresh fruits (26.5% vs. 41.4% in lean) and vegetables (36.8% vs. 39.4%) compared to their normal classmates in Al-Hassa (KSA). Lee and Yuen Loke[5] found that over 60.0% of university students in Hong Kong failed to consume fruits on a daily basis, but female students eat 3–5 servings of vegetables per day.

In the present study, when W_C was used to assess nutritional status, it was found that 95.2% of participants were at no health risk linked with excess abdominal lipids since they consumed 1–2 or more servings of fruits and vegetables per day.

Study limitations

This study relied on BMI as a widely used screening tool for body weight, but it could not detect changes in percent body fat, total fat weight as well as total fat-free weight. The precision of self-reported data is one of the main drawbacks of cross-sectional studies like this one. Another possible limitation could be that the sample size was relatively small (n = 228). If the sample size was increased, then the accuracy of the study would be increased. Although this study reported a high rate of overweight and obesity (36.8%) among university students, this study did not investigate body composition, since some of this increase could be due to increases in muscle mass.

Conclusions

The prevalence of OW and OB was 25.9% and 10.9%, respectively, while the combined one was 36.8%; 11.4% of students were underweight. All demographic variables had an insignificant ($P > 0.05$) effect on W_C. Meanwhile, there was a significant link between gender, academic year and discipline and BMI. Although 48.2% of students admitted that they were physical inactive, this effect was insignificant on both indicators. Smoking, stress, duration of TV viewing, and daylight and night sleep had an effect on BMI and W_C, but this was statistically insignificant. Breakfast, light meals, eating with a family, fast food, and regular and diet soft drinks had an insignificant effect on BMI. All eating habits tested had insignificant effect on W_C. A considerable relationship was observed between consumption of liver and BMI. Meat, egg, milk, fruit and vegetable and grain intake

had no significant effect on BMI. All varieties of foods had no significant effect on W_C. This study recommends the creation of health awareness plan to educate university students concerning healthy lifestyle and healthy food options. It also recommends a health education programme to tackle high rates of overweight and obesity.

Conflict of interest

The authors have no conflict of interest to declare.

Authors' contributions

FAH was actively involved in planning and designing this work, and writing this manuscript. ASE was actively involved in data analysis, research design and writing. AAA, WAY, SSA, and FSB were actively involved in designing the questionnaire, data collection and analysis among male students. They were also active in writing the manuscript. Additionally, the authors of this research critically reviewed this manuscript and approved the final version.

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References

1. WHO Documents. Diabetes country profiles 2016: WHO facts about overweight, obesity and diabetes in KSA. http://www.who.int/mediacentre/factssheets/fs311/en/. Accessed on Jan 27, 2016 at 3 pm.
2. Ebbeling CB, Pawlak DB, Luwig DS. Childhood obesity: public-health crisis, common sense cure. **Lancet 2002**; 360: 473–482.
3. Pérusse-Lachance E, Tremblay A, Vicky Drapeau V. Lifestyle factors and other health measures in a Canadian university community. **Appl Physiol Nutr Metab 2010**; 35(4): 498–506.
4. Hivert M-F, Langlois MF, Bérard P, Cuerrier JP, Carpentier AC. Prevention of weight gain in young adults through a seminar-based intervention program. **Inter J Obes 2007**; 31(8): 1262–1269.
5. Lee RL, Loke AJ. Health-promoting behavior and psychosocial well-being of university students in Hong Kong. **Public Health Nurs 2005**; 22(3): 209–220.
6. Mazier MJP, Mcleod SL. Impact of nutrition education on university students' fat consumption. **Can J Diet Pract Res 2009**; 70(4): 187–192.
7. Al-Rethaiaa1 AS, Fahmy A-E, Al-Shwaiyat NM. Obesity and eating habits among college students in Saudi Arabia: a cross sectional study. **Nutr J 2010**; 9(1): 39–48.
8. El-Qudah JM, Al-Omran H, Abu-Alsoud B, Al-Shek Yousef TOI. Nutritional status among a sample of Saudi College students. **Curr Res J Bio Sci 2012**; 4(5): 557–562.
9. General Census of Population and Housing [Internet]. Riyadh: Central Department of Statistics and Information 2015 Feb [cited 2015 Feb 8]. Available from: http://www.stats.oov.sa/en.
10. Omer EOM, Al Sheri MA, Al Bakri UM. Nutritional status of public elementary school boys in Al-Baha City, Saudi Arabia. **J Nutr Food Sci 2013**; 3(1): 1–5.
11. Collison KS, Zaidi MZ, Subhani SN, Al-Rubeaan K, Shoukri M, Al-Mohanna FA. Sugar-sweetened carbonated beverage consumption correlates with BMI, waist circumference, and poor dietary choices in school children. **BMC Public Health 2010**; 10(234): 1–13.
12. Abahussain NA, Musaiger AO. Nutritional status of adolescent girls in the Eastern Province of Saudi Arabia. **Nutr Health 1999**; 13(3): 171–177.
13. Amin TT, A-Sultan AI, Ali AA. Overweight and obesity and their relation to dietary habits and socio-demographic characteristics among male primary school children in Al-Hassa, Kingdom of Saudi Arabia. **Eur J Nutr 2008**; 47(6): 310–318.
14. El-Hazmi MAF, Warsy AS. The prevalence of obesity and overweight in 1-18-year-old Saudi children. **Ann Saudi Med 2002**; 22(5–6): 303–307.
15. AL-Oboudi LM. Impact of breakfast eating pattern on nutritional status glucose level, iron status in blood and test grades among upper primary schoolgirls in Riyadh City, Saudi Arabia. **Pak J Nutr 2010**; 9(2): 106–111.
16. Abahussain NA. Was there a change in the body mass index of Saudi adolescent girls in Al-Khobar between 1997 and 2007? **J Fam Community Med 2011**; 18(2): 49–53.
17. Kuczmarski RJ, Ogden CL, Guo SS, et al. 2000 CDC growth charts for the United States: methods and development. National Center for Health Statistics. **Vital Health Stat 2002**; 11(246): 2002.
18. Goonasegaran AR, Nabila F, Shuhada NS. Comparison of the effectiveness of body mass index and body fat percentage in defining body composition. **Singap Med J 2012**; 53(6): 403–440.
19. Al-Shehri JA. Childhood obesity prevalence among primary schoolboys at Al-iskan sector, Holly Makkah, Saudi Arabia. **Int J Med Sci Public Health 2014**; 3(2): 150–154.
20. Farghaly NF, Ghazali BM, Al-Wabel HM, Sadek AA, Abbag FI. Life style and nutrition and their impact on health of Saudi school students in Abha, Southwestern region of Saudi Arabia. **Saudi Med J 2007**; 28(3): 415–421.
21. Al-Hazzaa HM, Al-Sobayel HI, Qahwaji DM, Alsulaiman NA, Musaiger AO. Prevalence of overweight, obesity, and abdominal obesity among urban Saudi adolescents: gender and regional variations. **J Health Popul Nutr 2014**; 32(4): 634–645.
22. Crombie AP, Gareth JZI, Dutton GR, Panton LB, Abood DA. The freshman weight gain phenomenon revisited. **Nutri Rev 2009**; 67(2): 83–94.
23. Hovell MF, Mewborn CR, Randle Y, Fowler-Johnson S. Risk of excess weight gain in university women: a three year community controlled analysis. **Addict Behav 1985**; 10(1): 15–28.
24. Racette SB, Deusinger DS, Strube MJ, Highstein GR, Deusinger RH. Weight changes, exercise, and dietary patterns during freshman and sophomore years of college. **J Am Coll Health 2005**; 53(6): 245–251.
25. Morrow ML, Heesch KC, Dinger MK, Hull HR, Kneehans AW, Fields DA. Freshman 15: fact or fiction? **Obesity 2006**; 14(4): 1438–1443.
26. Al-Hazzaa HM. Physical activity, fitness and fatness among Saudi children and adolescents. **Saudi Med J 2002**; 23(2): 144–150.
27. Keating XD, Guan J, Pinero JC, Bridges DM. A meta-analysis of college students' physical activity behaviors. **J Am Coll Health 2005**; 54(2): 116–125.
28. Utter J, Scragg R, Schaaf D, Mhurchu CN. Relationships between frequency of family meals, BMI and nutritional aspects

of the home food environment among New Zealand adolescents. **Int J Behav Nutr Phys Act 2008**; 5(1): 1–7.
29. Minehira K, Bettschart V, Vidal H, Vega N, Di Vetta V, Rey V, Schneiter P, et al. Effect of carbohydrate overfeeding on whole body and adipose tissue metabolism in humans. **Obes Rev 2003**; 11(9): 1096–1103.
30. Basciano H, Fedserico L, deli K. Fructose, insulin resistance, and metabolic dyslipidemia. **Nutr Metab 2005**; 2(1): 5–14.
31. Thorsdottir I, Tomassan H, Gunnarsdottir I, Gisladottir E, Kiely M, Parra MD, Bandarra NM, Schaafsma G, Martinéz JA. Randomized trial of weight-loss-diets for young adults varying in fish and fish oil content. **Inter J Obes 2007**; 31(S1-S238): 1560–1566.

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