Research Article

Queen Arwa University Journal

مجلة جامعة الملكة أروى

QAUSRJ

Research Article Data:	
PUBLISHER	Queen Arwa University
DOI	10.58963/qausrj.v30i30.332
P-ISSN	2226-5759
E-ISSN	2959-3050
Reception Date	01 December 2025
Accepted Date	25 December 2025
Published Date	31 December 2025
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Citation:

Alsebaeai, M., Al-Rahbi, L., Taher, A., Al-Absi, M., Al-Hamwi, L., Sharyan, M., Zaidan, M., Othman, S., Al-Zubairi, S., Al-Baydani, S., Abu Al-Rijal, S., & Al-Hamli, W. (2025). Body Composition and Junk Food Intake among Queen Arwa University Students: A Bioelectrical Impedance Study. Queen Arwa University Journal, 30(30), 15. https://doi.org/10.58963/qausrj.v30i30.332

Corresponding authors:

Author: *Mohammed Alsebaeai*

Phone: 967774488038+

Published Email: malsobaee22@gmail.come

Organization/University/ Center:

Affiliation: *Queen Arwa University*

Research funder: *Not found.*

Research field/specialization:

Nutrition and Dietetics.

QR code:

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امسح الكود لزيارة موقع المجلة

Body Composition and Junk Food Intake among Queen Arwa University Students

A Bioelectrical Impedance Study

Mohammed Alsebaeai[12] Lutf Al-Rahbi[3] Abdo Taher[4],Marwa Al-absi[2] Layal Al-Hamwi[2] Malak Sharyan[2] Manar Zaidan[2] Samar Othman[2] Shahd Al-Zubairi[2] Shatha Al-Baydani[2] Sundus Abu Al-Rijal [2] Wijdan Al-Hamli[2]

[1]Department of Food Science and Technology, Faculty of Agriculture and Food Science, Ibb University.
[2]Department of Therapeutic Nutrition, Faculty of Medical Sciences, Queen Arwa University.
[3]Department of Dentistry, Faculty of Medical Sciences, Queen Arwa University
[4]Department of Pharmacy, Faculty of Medical Sciences, Queen Arwa University.

2025

Abstract:

Junk food consumption among university students is rising and is often accompanied by unhealthy behaviors such as physical inactivity, inadequate sleep, smoking, and khat chewing, which may influence body composition, including fat mass, muscle mass, and visceral fat, even among individuals with normal BMI. Limited evidence exists regarding these associations among Yemeni students. This cross-sectional study aimed to examine junk food intake patterns and their relationship with body composition among 368 undergraduate students at Queen Arwa University, Sana'a, Yemen. Data on sociodemographic characteristics, junk food consumption, and lifestyle behaviors were collected via a structured questionnaire, while BMI, body fat percentage, muscle mass, and visceral fat were measured using bioelectrical impedance analysis (BIA). Data were analyzed using SPSS v25 with significance set at $p < 0.05$. Frequent consumption of fried foods and sugar-sweetened beverages was observed alongside high rates of physical inactivity, short sleep, smoking, and khat chewing. Although most students had normal BMI and visceral fat, elevated body fat was common, and junk food intake was significantly associated with muscle mass and lifestyle behaviors. These findings highlight the potential health risks of unhealthy diet and lifestyle patterns and underscore the need for targeted interventions among university students.

Keywords:

Junk Food, Body Composition, Bioelectrical Impedance Analysis, University, Students, Yemen.

ISSN : 2226 - 5759

ترجمة الى العربية

التركيب الجسمي واستهلاك الوجبات السريعة بين طلاب جامعة الملكة أروى

دراسة باستخدام التحليل بالممانعة الكهربائية الحيوية

محمد السباعي[1,2]، لطف الرحبي[1,2]،عبدة طاهر[3] مروة العبسي[2]، ليال الحموي[2]، ملاك شريان[2]، منار زيدان[2]، سمر عثمان[2]، شهد الزبيري[2]، شذى البيضاني[2]، سندس أبو الرجال[2]، وجدان الحملي[2]

1. قسم علوم وتكنولوجيا الأغذية، كلية الزراعة وعلوم الأغذية، جامعة إب.
2. قسم التغذية العلاجية، كلية العلوم الطبية، جامعة الملكة أروى.
3. قسم طب وجراحة الفم والاسنان، كلية العلوم الطبية، جامعة الملكة أروى.
4. قسم الصيدلة، كلية العلوم الطبية، جامعة الملكة أروى.

2025

الملخص

يزداد استهلاك الوجبات السريعة بين طلاب الجامعات، وغالبًا ما يكون مصحوبًا بسلوكيات غير صحية مثل قلة النشاط البدني، النوم غير الكافي، التدخين، ومضغ القات، والتي قد تؤثر على التركيب الجسمي بما في ذلك كتلة الدهون، وكتلة العضلات، والدهون الحشوية، حتى بين الأفراد ذوي مؤشر كتلة الجسم الطبيعي. توجد أدلة محدودة حول هذه العلاقة بين الطلاب اليمنيين. هدفت هذه الدراسة المقطعية إلى استكشاف أنماط استهلاك الوجبات السريعة وعلاقتها بالتركيب الجسمي لدى 368 طالبًا جامعيًا بجامعة الملكة أروى، صنعاء، اليمن. جُمعت البيانات المتعلقة بالخصائص الاجتماعية والديموغرافية، واستهلاك الوجبات السريعة، والسلوكيات الحياتية عبر استبيان منظم، بينما تم قياس مؤشر كتلة الجسم، ونسبة الدهون في الجسم، وكتلة العضلات، والدهون الحشوية باستخدام تحليل الممانعة الكهربائية الحيوية (BIA). تم تحليل البيانات باستخدام برنامج SPSS الإصدار 25 مع مستوى دلالة إحصائية $p < 0.05$. لوحظ استهلاك متكرر للأطعمة المقلية والمشروبات المحلاة بالسكر، إلى جانب معدلات مرتفعة من قلة النشاط البدني، قلة مدة النوم، التدخين، ومضغ القات. على الرغم من أن معظم الطلاب كانوا يتمتعون بمؤشر كتلة جسم ودهون حشوية طبيعية، إلا أن ارتفاع نسبة الدهون في الجسم كان شائعًا، كما ارتبط استهلاك الوجبات السريعة بشكل ملحوظ بكتلة العضلات والسلوكيات الحياتية. تشير هذه النتائج إلى المخاطر الصحية المحتملة للأنماط الغذائية ونمط الحياة غير الصحي، وتؤكد الحاجة إلى تدخلات موجهة بين طلاب الجامعات.

الكلمات المفتاحية

:الوجبات السريعة، التركيب الجسمي، تحليل الممانعة الكهربائية الحيوية، طلاب، جامعة، اليمن.

1. Introduction

The increasing consumption of junk food and fast food has become a significant public health concern worldwide, particularly among young adults and university students (ElBarazi & Tikamdas, 2023). Junk food is typically energy-dense, rich in saturated fats, refined carbohydrates, and added sugars, but poor in essential nutrients and dietary fiber. Such eating habits have been strongly associated with overweight, obesity, and other metabolic disturbances (Sachithananthan, 2015) .Several studies have highlighted the link between fast food consumption and weight gain. For instance, Mohammad beigi et al. (Mohammadbeigi et al., 2018) reported a strong association between frequent fast food intake and both general and abdominal obesity among students. Similarly, Bano et al. (Bano et al., 2015) found that body mass index (BMI), percent body fat, and visceral fat were significantly influenced by dietary patterns, particularly high fat and low fiber intake. More recently, Arslan et al. (Arslan et al., 2022) confirmed that sociodemographic factors and dietary behaviors, including frequent fast food consumption, play a key role in determining BMI and dietary habits among university populations.

Beyond BMI, which is a widely used but limited indicator, body composition analysis provides a more comprehensive assessment of health, including fat mass, lean mass, and visceral fat. Herrera et al. (Herrera et al., 2003) emphasized that dietary energy intake is a determinant of BMI in university students, while Androutsos et al. (Androutsos et al., 2014) demonstrated that eating and drinking patterns can significantly influence body composition measurements assessed through

bioelectrical impedance analysis (BIA). Recent research by Petřeková et al. (Petřeková et al., 2022) and Pescari et al. (Pescari et al., 2024) further underscores the importance of evaluating body composition alongside BMI, as BIA allows for a more accurate understanding of dietary impacts on health.

In Yemen, limited research has been conducted on the relationship between junk food intake and body composition, particularly among university students. Queen Arwa University, with its diverse student population, provides an important setting to explore this issue. The present study aimed to assess the association between junk food intake and body composition among undergraduate students using bioelectrical impedance analysis (BIA), with the goal of identifying at-risk groups and providing evidence to inform targeted nutrition and lifestyle interventions.

2. Research methodology

2.1. Study Design

This study employed a cross-sectional analytical design to investigate the association between junk food intake and body composition among undergraduate students at Queen Arwa University, Sana'a, Yemen.

2.2. Study Setting

The study was conducted across multiple faculties of Queen Arwa University, including Engineering, Economics, Medical Sciences, and Arts. The university campus provided a practical and accessible environment for data collection, as it enabled recruitment of students from different academic backgrounds and years..

2.3. Study Population and Sample

Based on the total number of students enrolled at Queen Arwa University, the sample size for this study was determined using Yamane's formula (Madow & Yamane, 1968) at a 95% confidence level and a 5% margin of error. Assuming a target population of approximately 5,500 students, the calculated sample size was 372, which was rounded down to 368 participants to account for potential non-response and incomplete data. A random sampling technique was employed to select students from all academic levels, ensuring that the sample was representative of the broader university population.

2.4. Inclusion and Exclusion Criteria

Inclusion criteria included all undergraduate students aged 18 years and above who were enrolled at Queen Arwa University during the study period and who provided informed consent to participate. Students were included regardless of faculty or year of study to ensure a representative sample. Exclusion criteria encompassed students with chronic medical conditions that could affect dietary habits or body composition (e.g., diabetes, endocrine disorders), pregnant or lactating students, and individuals who did not complete the questionnaire or refused BIA assessment. These criteria ensured the study focused on typical student populations while minimizing confounding factors.

2.5. Data Collection Instrument

Data were collected using a structured questionnaire that included:

2.5.1. The demographic information

The demographic information including age, gender, marital status, academic year, faculty, and residence area.

2.5.2. junk food consumption frequency

junk food consumption frequency for items such as shawarma, falafel, instant noodles, broasted chicken, pizza, crispy rolls, French fries, salabia, beverages, and sweet pastries. Questions included portion sizes, reasons for consumption (e.g., taste, convenience, social influence, stress, price), and preferred times of consumption (Nkosi et al., 2020; Mumena, 2021)

2.5.3. lifestyle factors

The evaluated lifestyle factors, including physical activity levels, sleep duration, smoking habits, and khat chewing, as these factors are known to influence appetite and dietary behavior (Kilani et al., 2013).

2.5.4. The anthropometric and body composition measurements

Anthropometric and body composition measurements were obtained using a validated bioelectrical impedance analyzer (Omron BCM-500, Japan) at the Nutrition Clinic of Queen Arwa University (QAU). Measurements included body mass index (BMI), body fat percentage, muscle mass, and visceral fat level. To improve measurement reliability, participants' measurements were taken early in the morning before eating or drinking, with instructions to maintain adequate hydration and abstain from exercise, caffeine, and qat prior to assessment. For female participants, measurements were scheduled considering the menstrual cycle phase. Device-specific thresholds for body fat, muscle mass, and visceral fat were applied according to sex- and age-specific cutoffs provided by the manufacturer, ensuring accurate classification and comparability across sexes (Kitchlew et al., 2017).

2.6. Validity and Reliability

The questionnaire was reviewed for content validity by experts in nutrition and public health to ensure that all items were relevant and accurately captured the study constructs. A pilot study was conducted on 10% of the sample (approximately 36 students) to test clarity, comprehensibility, and internal consistency. Adjustments were made based on pilot feedback to improve item wording and response options. Reliability of the junk food consumption section was confirmed using Cronbach's alpha, which exceeded 0.80, indicating good internal consistency. The use of BIA provided objective and reliable measures of body composition, complementing self-reported dietary data.

2.7. Statistical Analysis

Data were analyzed using IBM SPSS Statistics for Windows, Version 25 (IBM Corp., Armonk, NY, USA; released 2017). Descriptive statistics were used to summarize participant characteristics, junk food consumption patterns, and lifestyle behaviors. Frequencies, percentages, means, and standard deviations were calculated to provide a comprehensive overview. Inferential statistics were conducted to examine relationships between junk food consumption and sociodemographic, academic, and lifestyle factors using Chi-square tests for categorical variables (S et al., 2024). Associations with body composition variables (BMI, body fat percentage, muscle mass, visceral fat) were similarly assessed. A p-value of less than 0.05 was considered statistically significant, allowing identification of factors that were meaningfully associated with higher junk food intake and altered body composition.

2.8. Ethical Considerations

Ethical approval was obtained from Queen Arwa University. Participation was voluntary, and all students provided written informed consent. Participants were assured of anonymity and confidentiality, and data were used exclusively for research purposes. Students could withdraw at any stage without any consequences.

3. Results and Discussion

3.1. Demographic Characteristics among students sample

The sociodemographic characteristics of the study participants, as presented in Table 1. indicate that the sample was predominantly composed of young adults, with 95.6% of students aged between 18 and 25 years. This age distribution is particularly relevant in nutritional and body composition research, as young adulthood represents a critical period marked by increased independence, lifestyle transitions, and exposure to unhealthy dietary practices (Lawrence et al., 2017). University students in this age group commonly exhibit irregular meal patterns, frequent snacking, and a higher intake of energy-dense and processed foods, behaviors that may contribute to unfavorable alterations in body composition, including increased body fat and reduced diet quality (Jurado-Gonzalez et al., 2025).

The gender distribution of the sample was nearly equal, with males accounting for 51.1% and females 48.9%, allowing for meaningful gender-based comparisons. Gender is a well-established determinant of dietary behavior and body composition, as males typically consume higher total energy and demonstrate greater lean body

mass, while females often present with a higher percentage of body fat even at similar body mass index levels, influenced by both physiological and behavioral factors (Turrell, 1997). In terms of marital status, the vast majority of participants were single (91%), a factor that may significantly influence eating behaviors and lifestyle choices. Single students are more likely to depend on convenience foods and fast-food meals due to time constraints, limited cooking skills, and independent living arrangements, which may result in increased caloric intake and adiposity compared with married students, who often follow more structured meal patterns (Hamade et al., 2023).

Table 1 Demographic Characteristics among students' sample (N= 368)

Variable	Category	Frequency	Percent (%)
Age	18–20	183	49.7
	21–25	169	45.9
	26–30	13	3.5
	More than 30	3	0.8
Gender	Male	188	51.1
	Female	180	48.9
Marital status	Single	335	91.0
	Married	27	7.3
	Others	6	1.6
Faculty	Medical sciences	72	19.6
	Engineering Science	170	46.2
	Economic	89	24.2
	Art	37	10.1
Academic year	1st Year	137	37.2
	2nd Year	93	25.3
	3rd Year	61	16.6
	4th Year	67	18.2
	5th Years	10	2.7
Residence area	Urban	350	95.1
	Rural	18	4.9

Regarding academic characteristics, nearly half of the students were enrolled in Engineering Sciences, followed by Economics, Medical Sciences, and Arts. Field of study may reflect differences in health literacy, academic stress, and daily routines, all of which can affect dietary choices (Kim, 2022), Students in medical-related disciplines are generally more knowledgeable about nutrition and health guidelines, which may moderate junk food consumption, whereas students in non-health fields may experience irregular schedules and higher stress levels, increasing reliance on convenience foods (Kosendiak et al., 2024). Additionally, most participants were in their first or second academic year, a stage commonly associated with adaptation to university life, increased academic pressure, and lifestyle instability. Early-year students are particularly vulnerable to unhealthy eating behaviors, including meal skipping and frequent fast-food consumption, which may negatively impact body composition (Khanom et al., 2015).

3.2. Frequency of Specific Junk Food among students' sample

The frequency of consumption of specific junk food items among the students, as presented in Table 2 reveals distinct dietary patterns that may have important implications for body composition. Shawarma consumption was generally low to moderate, with the majority of students reporting either no consumption or intake only once during the assessed period, indicating that it is consumed occasionally rather than habitually. In contrast, Falafel showed higher repeated consumption, with a substantial proportion of students reporting intake two to three times or more, suggesting that it

represents a commonly consumed fried snack among the study population. Due to its preparation method and high carbohydrate and fat content, frequent Falafel consumption may contribute to increased fat mass and visceral adiposity.

Instant noodles were consumed infrequently by most students; however, a notable subgroup reported repeated intake, which is nutritionally relevant given their high sodium and saturated fat content that may influence fluid retention and fat accumulation. Broasted chicken demonstrated a moderate consumption pattern, with most students reporting consumption once or occasionally. Despite this relatively low frequency, its energy-dense nature resulting from deep frying suggests a potential contribution to increased body fat when consumed regularly. Pizza consumption was generally low across all varieties, particularly chicken and beef pizza, while cheese pizza showed limited single-time consumption, indicating that pizza is not a staple component of students' diets. Similarly, crispy rolls were rarely consumed, suggesting a minimal contribution to habitual energy intake at the population level, although their high fat content remains relevant for individual dietary assessments.

French fries emerged as one of the most frequently consumed junk foods, with a considerable proportion of students reporting intake multiple times per week. This highlights their substantial contribution to dietary fat and refined carbohydrate intake and their likely association with increased body mass index and body fat percentage. Salabia showed moderate consumption as a sweet snack, reflecting occasional indulgence that may cumulatively increase total caloric intake, particularly in relation to fat mass. The consumption of soft drinks and sweetened beverages was notable, with a significant proportion of students reporting frequent intake, especially ice tea and coffee, which are commonly sugar-sweetened.

Table 2 Frequency of Specific Junk Food among students' sample (N= 368)

Food Item	Never	1 time	2–3 times	4–5 times	6–7 times
Shawarma	131 (35.6%)	159 (43.2%)	58 (15.8%)	11 (3.0%)	9 (2.4%)
Falafel	81 (22.0%)	105 (28.5%)	106 (28.8%)	49 (13.3%)	27 (7.3%)
Indomie	139 (37.8%)	106 (28.8%)	68 (18.5%)	29 (7.9%)	26 (7.1%)
Broasted	135 (36.7%)	142 (38.6%)	60 (16.3%)	20 (5.4%)	11 (3.0%)
Cheese pizza	197 (53.5%)	124 (33.7%)	34 (9.2%)	2 (0.5%)	11 (3.0%)
Chicken pizza	265 (72.0%)	81 (22.0%)	14 (3.8%)	6 (1.6%)	2 (0.5%)
Beef pizza	309 (84.0%)	47 (12.8%)	7 (1.9%)	2 (0.5%)	3 (0.8%)
Crispy rolls	261 (70.9%)	72 (19.6%)	20 (5.4%)	9 (2.4%)	6 (1.6%)
Fries	35 (9.5%)	63 (17.1%)	94 (25.5%)	72 (19.6%)	104 (28.3%)
Salabia	125 (34.0%)	101 (27.4%)	75 (20.4%)	27 (7.3%)	40 (10.9%)
Soft drinks	116 (31.5%)	77 (20.9%)	86 (23.4%)	31 (8.4%)	58 (15.8%)
Ice tea / Coffee	122 (33.2%)	53 (14.4%)	47 (12.8%)	36 (9.8%)	110 (29.9%)
Mojito	273 (74.2%)	65 (17.7%)	17 (4.6%)	7 (1.9%)	6 (1.6%)
Energy drink	210 (57.1%)	77 (20.9%)	38 (10.3%)	18 (4.9%)	25 (6.8%)
Pancake	177 (48.1%)	102 (27.7%)	60 (16.3%)	12 (3.3%)	17 (4.6%)

Food Item	Never	1 time	2–3 times	4–5 times	6–7 times
Baghlawa	217 (59.0%)	97 (26.4%)	31 (8.4%)	10 (2.7%)	13 (3.5%)
Gatoo cake	137 (37.2%)	124 (33.7%)	61 (16.6%)	23 (6.3%)	23 (6.3%)

Regular intake of these beverages may contribute to excess sugar consumption and increased visceral fat accumulation. Mojito and energy drinks were consumed less frequently, limiting their overall impact at the population level. Sweet pastries and cakes, including pancakes, Baghlawa, and Gatoo cake, were consumed occasionally rather than regularly, indicating episodic intake; nevertheless, their high sugar and fat content may exacerbate unfavorable body composition outcomes when combined with frequent consumption of other junk foods.

3.3. Lifestyle and Health Factors among selected students' sample (N= 368)

The lifestyle characteristics of the students, as shown in Table 3, indicate a high prevalence of physical inactivity and other behaviors that may influence body composition. Nearly half of the participants reported no physical activity, while only a small proportion engaged in exercise three or more times per week, suggesting that sedentary behavior is common among the study population. Low levels of physical activity are known to disrupt energy balance, promoting fat accumulation and reducing lean body mass, particularly when combined with frequent junk food consumption (Hill & Commerford, 1996).

Table 3 Lifestyle and Health Factors among selected students sample (N= 368)

Variable	Category	Frequency	Percent (%)
Physical activity (per week)	None	166	45.1
	1–2 times	113	30.7
	3–4 times	51	13.9
	5 or more times	38	10.3
Sleep duration per night	<5 hours	102	27.7
	5–6 hours	136	37.0
	7–8 hours	92	25.0
	>8 hours	38	10.3
Smoke habits	Yes	130	35.3
	No	238	64.7
Chew khat	Yes	163	44.3
	No	205	55.7

Sleep duration among students was generally inadequate, with more than half reporting less than six hours of sleep per night. Short sleep duration has been associated with increased appetite, preference for energy-dense foods, and metabolic disturbances, which may contribute to increased body fat accumulation (Akhlaghi & Kohanmoo, 2023). In addition, over one-third of the students reported smoking, a behavior that may influence body composition through its association with irregular eating habits, increased junk food intake, and reduced physical activity, despite the appetite-suppressing effects of nicotine in some individuals.

Khat chewing was reported by nearly half of the participants, highlighting its relevance as a lifestyle factor in this population. Although khat may temporarily suppress appetite, it is commonly associated with disrupted sleep, irregular meal patterns, and reduced physical activity, which may negatively affect body composition. Overall, these

findings emphasize the combined impact of lifestyle behaviors on dietary patterns and body composition among university students.

3.4. Anthropometric and Body Composition Profile in Relation to Junk Food Intake

Among the students of Queen Arwa University, the assessment of body composition using anthropometric and bioelectrical impedance methods indicated that most participants had a generally healthy profile, even in the context of widespread junk food availability. Table 4 shows that 58.2% of students fell within the normal BMI range, while 26.1% were classified as underweight. Overweight and obesity were relatively uncommon, together accounting for only 15.7% of the population. This distribution contrasts with reports from adult and occupational populations, where obesity predominates, but is consistent with university-based samples described by Davar (Davar, 2015) who also reported lower obesity prevalence among students compared with the general population. These findings reinforce the concept that young adulthood represents a metabolically resilient life stage, even in the presence of unhealthy dietary exposures.

Table 4 Anthropometric and Body Composition Measures among selected students sample

Variable	Category	Frequency	Percent (%)
BMI	Underweight	96	26.1
	Healthy	214	58.2
	Overweight	48	13.0
	Obesity	10	2.7
Body Fat Percentage	Low	58	15.8
	Normal	169	45.9
	High	78	21.2
	Very high	63	17.1
Muscle Mass	Low	84	22.8
	Normal	136	37.0
	High	78	21.2
	Very high	70	19.0
Visceral Fat Level	Normal	355	96.5
	High	13	3.5
Junk Food Consumption Level	Low	308	83.7
	Moderate	55	14.9
	High	5	1.4

When compared with BMI-centered interpretations, the inclusion of body fat percentage (BFP) in the present study provides additional insight. Although nearly half of students had normal BFP (45.9%), a considerable proportion exhibited high or very high fat percentages (38.3%) despite relatively normal BMI values. This pattern supports the argument advanced by Pescari et al. (Pescari et al., 2024) that BMI may underestimate adiposity in certain individuals and that BIA-derived fat measures capture hidden risk not evident from weight-based indices alone. However, unlike their adult cohort—where obesity classification differed substantially between BMI and BFP—our young population showed limited translation of elevated fat mass into overt obesity, suggesting a lag between fat accumulation and BMI-defined risk.

Muscle mass distribution in our sample further contextualizes these findings. While 37.0% of students had normal muscle mass, nearly 40% exhibited high or very high muscle levels. This relatively favorable lean-mass profile likely contributes to the maintenance of normal BMI values despite variable junk food intake. In contrast, Purwaningtyas et al. (Purwaningtyas et al., 2025) reported no significant association between junk food consumption and muscle mass among sedentary university staff, highlighting how age, occupational activity, and baseline fitness modify the relationship between diet and body composition. Our results therefore emphasize that in

student populations, higher energy intake may coexist with preserved or elevated lean mass rather than manifesting as excess fat alone.

Visceral fat levels were overwhelmingly normal in our study (96.5%), with only 3.5% of participants exhibiting elevated values. This sharply contrasts with findings from older or clinical populations, such as those reported by Popescu et al. (Popescu et al., 2025), where visceral fat accumulation was strongly associated with fast-food intake, BMI, and metabolic syndrome. The discrepancy underscores the protective role of youth and shorter exposure duration to unhealthy dietary patterns. It also supports the interpretation that visceral adiposity develops later and may require sustained metabolic stress before becoming clinically evident.

The very high proportion of students reporting low junk food consumption (83.7%), with only 1.4% classified as high consumers, provides further explanation for the generally favorable anthropometric outcomes observed. Unlike studies in working adults or clinical samples—where frequent junk food intake was directly associated with obesity, visceral fat, and metabolic risk—our findings suggest that limited exposure frequency, combined with higher activity levels and lean mass, may buffer against early adverse body-composition changes. This observation aligns with experimental and methodological work by Androutsos et al. (Androutsos et al., 2014) and validation studies such as Wan et al. (Wan et al., 2014) and Howe et al. (Howe et al., 2021), which emphasize that BIA is particularly useful for detecting subtle shifts in body compartments at the group level, even when overt obesity is not yet present.

3.5. Relationship Between Junk Food Consumption and Sociodemographic Factors

In the present study among students of Queen Arwa University, junk food consumption did not show a statistically significant association with key sociodemographic variables, including age, gender, marital status, and area of residence (Table 5). Although students aged 18–20 years reported the highest frequency of junk food intake, age was not a significant determinant (p = 0.325). These findings suggest that chronological age alone may not strongly influence dietary choices within this relatively homogeneous university population. Similar observations were indirectly supported by Davar (Davar, 2015), who emphasized that body composition variations among university students are more strongly influenced by lifestyle and environmental factors than by age itself.

Table 5 Relationship Between Junk Food Consumption and Sociodemographic Factors (n=368)

Variable	Category	Low (n, %)	Moderate (n, %)	High (n, %)	P Value
Age (years)	18–20	154 (50.0)	24 (43.6)	5 (100.0)	0.325
	21–25	141 (45.8)	28 (50.9)	0 (0.0)	
	26–30	10 (3.2)	3 (5.5)	0 (0.0)	
	>30	3 (1.0)	0 (0.0)	0 (0.0)	
Gender	Male	154 (50.0)	32 (58.2)	2 (40.0)	0.472
	Female	154 (50.0)	23 (41.8)	3 (60.0)	
Marital Status	Single	278 (90.3)	52 (94.5)	5 (100.0)	0.731
	Married	24 (7.8)	3 (5.5)	0 (0.0)	
	Others	6 (1.9)	0 (0.0)	0 (0.0)	
Residence Area	Urban	295 (95.8)	50 (90.9)	5 (100.0)	0.267

Variable	Category	Low (n, %)	Moderate (n, %)	High (n, %)	P Value
	Rural	13 (4.2)	5 (9.1)	0 (0.0)	
Faculty	Medical	69 (22.4)	3 (5.5)	0 (0.0)	0.023*
	Engineering	135 (43.8)	33 (60.0)	2 (40.0)	
	Economic	71 (23.1)	15 (27.3)	3 (60.0)	
	Art	33 (10.7)	4 (7.3)	0 (0.0)	
Academic Year	1st Year	117 (38.0)	17 (30.9)	3 (60.0)	0.458
	2nd Year	72 (23.4)	19 (34.5)	2 (40.0)	
	3rd Year	50 (16.2)	11 (20.0)	0 (0.0)	
	4th Year	60 (19.5)	7 (12.7)	0 (0.0)	
	5th Year	9 (2.9)	1 (1.8)	0 (0.0)	

Gender differences in junk food intake were also non-significant (p = 0.472), despite slightly higher moderate intake among males and higher high-level intake among females. This aligns with findings from Pescari et al. (Pescari et al., 2024), where gender differences in obesity prediction varied depending on whether BMI or body fat percentage was used, indicating that consumption behaviors may not directly translate into measurable adiposity differences. Likewise, marital status and residence area showed no meaningful associations, supporting the notion that urban living or being single does not independently drive unhealthy eating patterns among young adults—an observation consistent with earlier university-based studies.

Academic characteristics revealed more nuanced associations. Faculty type demonstrated a significant relationship with junk food intake (p = 0.023), with students from Engineering and Economics faculties exhibiting higher moderate and high consumption levels, while Medical Sciences students predominantly reported low intake. This finding underscores the role of nutritional awareness and academic environment in shaping dietary behaviors, echoing conclusions by Davar (Davar, 2015), that educational exposure influences nutritional status and body composition outcomes.

In contrast, academic year was not significantly associated with junk food consumption (p = 0.458), despite higher intake clustering in first- and second-year students. This suggests that the disciplinary context may be more influential than academic seniority, a pattern not directly addressed in prior BIA-focused studies but complementary to behavioral findings reported by Gupta et al. (Gupta et al., 2026), where eating behaviors were independent of certain demographic strata.

3.6. Relationship Between Junk Food Consumption and Lifestyle Factors

Lifestyle variables showed some of the strongest associations with junk food intake is show in Table 6. Physical activity was not significantly related (p = 0.521), aligning with Gupta et al. (Gupta et al., 2026), who also reported no association between eating behaviors and physical activity levels. This reinforces the idea that unhealthy dietary patterns can persist regardless of exercise habits.

Table 6 Relationship Between Junk Food Consumption and Lifestyle Factors (n=368)

Variable	Category	Low (n, %)	Moderate (n, %)	High (n, %)	P Value
Physical Activity (per week)	None	139 (45.1)	25 (45.5)	2 (40.0)	0.521
	1–2 times	94 (30.5)	19 (34.5)	0 (0.0)	
	3–4 times	43 (14.0)	6 (10.9)	2 (40.0)	
	5+ times	32 (10.4)	5 (9.1)	1 (20.0)	
Sleep Duration	<5 hrs	82 (26.6)	18 (32.7)	2 (40.0)	0.000*
	5–6 hrs	122 (39.6)	14 (25.5)	0 (0.0)	
	7–8 hrs	82 (26.6)	8 (14.5)	2 (40.0)	
	>8 hrs	22 (7.1)	15 (27.3)	1 (20.0)	
Smoking Habit	Yes	99 (32.1)	28 (50.9)	3 (60.0)	0.014*
	No	209 (67.9)	27 (49.1)	2 (40.0)	
Khat Chewing	Yes	126 (40.9)	35 (63.6)	2 (40.0)	0.007*
	No	182 (59.1)	20 (36.4)	3 (60.0)	

Sleep duration, however, showed a highly significant association (p = 0.000), with both short sleep (<5 hours) and irregular sleep durations (7–8 hours) linked to higher junk food consumption. This finding strongly supports the work of Purwaningtyas et al. (Purwaningtyas et al., 2025) who identified poor sleep quality as a key risk factor for obesity and adverse body composition outcomes, likely mediated through hormonal dysregulation affecting appetite and cravings.

Smoking and khat chewing were also significantly associated with higher junk food intake (p = 0.014 and p = 0.007, respectively), indicating a clustering of unhealthy lifestyle behaviors. This pattern mirrors broader lifestyle-diet interactions reported in metabolic and dietary studies, including the work of Popescu et al. (Popescu et al., 2025), where unhealthy dietary habits coexisted with other risk-enhancing behaviors contributing to adverse metabolic profiles.

3.7. Relationship Between Junk Food Consumption and Anthropometric and Body Composition Factors

As shown in Table 7, junk food consumption was not significantly linked to BMI (p = 0.630), body fat percentage (p = 0.319), or visceral fat levels (p = 0.653). Regardless of their level of junk food intake, the majority of students maintained a healthy BMI and normal visceral fat range, suggesting that in this university population, junk food consumption alone did not have a measurable impact on these body composition indicators. These findings support arguments by Pescari et al. (Pescari et al., 2024) that BMI alone may not be sensitive enough to capture dietary risk patterns, particularly in young populations.

Table 7 Relationship Between Junk Food Consumption and Anthropometric & Body Composition Factors (n=368)

Variable	Category	Low (n, %)	Moderate (n, %)	High (n, %)	P Value
BMI	Underweight	82 (26.6)	14 (25.5)	0 (0.0)	0.630
	Healthy	175 (56.8)	34 (61.8)	5 (100.0)	
	Overweight	42 (13.6)	6 (10.9)	0 (0.0)	
	Obesity	9 (2.9)	1 (1.8)	0 (0.0)	
Body Fat Percentage	Low	52 (16.9)	4 (7.3)	2 (40.0)	0.319
	Normal	138 (44.8)	29 (52.7)	2 (40.0)	
	High	63 (20.5)	14 (25.5)	1 (20.0)	
	Very High	55 (17.9)	8 (14.5)	0 (0.0)	
Muscle Mass	Low	75 (24.4)	8 (14.5)	1 (20.0)	0.003*
	Normal	109 (35.4)	27 (49.1)	0 (0.0)	
	High	64 (20.8)	14 (25.5)	0 (0.0)	
	Very High	60 (19.5)	6 (10.9)	4 (80.0)	

Variable	Category	Low (n, %)	Moderate (n, %)	High (n, %)	P Value
Visceral Fat Level	Normal	298 (96.8)	52 (94.5)	5 (100.0)	0.653
	High	10 (3.2)	3 (5.5)	0 (0.0)	

Interestingly, muscle mass showed a significant association with junk food intake (p = 0.003), with high consumers predominantly exhibiting very high muscle mass. This finding suggests that increased energy intake from junk food may be partially offset by higher lean mass, possibly among physically larger or more active students. This aligns conceptually with Wan et al. (Pescari et al., 2024), and Howe et al. (Howe et al., 2021), who emphasized that BIA-derived lean mass parameters are critical for interpreting nutritional status beyond fat-centric measures. Furthermore, the lack of association between junk food intake and visceral fat contrasts with findings in older or clinical populations, such as Popescu et al. (Popescu et al., 2025), where fast-food consumption was strongly linked to visceral fat accumulation. This discrepancy highlights the protective role of youth and higher metabolic flexibility among university students, reinforcing the importance of age- and population-specific interpretations of BIA data.

4. Conclusion

The study demonstrates that while the majority of undergraduate students at Queen Arwa University maintain normal BMI and visceral fat levels, a substantial proportion exhibit elevated body fat percentages, indicating hidden adiposity. Frequent consumption of fried foods and sugar-sweetened beverages, combined with unhealthy lifestyle behaviors such as low physical activity, short sleep duration, smoking, and khat chewing, may contribute to future adverse health outcomes. These findings underscore the importance of implementing comprehensive interventions focused on improving dietary habits, promoting regular physical activity, ensuring adequate sleep, and reducing substance use to support optimal body composition and long-term health among university students. Future research should explore longitudinal relationships between dietary patterns, lifestyle behaviors, and body composition to inform targeted health promotion strategies.

5. Limitations

This cross-sectional study cannot establish causality between junk food intake, lifestyle behaviors, and body composition. Self-reported dietary and lifestyle data may be affected by recall or social desirability bias. The study was limited to a single university in Sana'a, which may reduce generalizability to other populations. Although bioelectrical impedance analysis (BIA) is reliable, factors like hydration can influence results. Additionally, potential confounders such as socioeconomic status, psychological stress, and family dietary habits were not fully assessed. Despite these limitations, the study provides valuable insights into the relationship between junk food consumption, lifestyle, and body composition among Yemeni students.

6. References

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