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Food Intake Based on Coffee Consumption and Body Mass Index Among Male University Students

تناول الطعام بناءً على استهلاك القهوة ومؤشر كتلة الجسم بين طلاب الجامعات الذكور

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الملخّص

الملخص
تُعتبر القهوة من أكثر المشروبات استهلاكًا حول العالم، وتحتوي على أكثر من ألف مكون فعال، مثل الكافيين وحمض الكلوروجينيك وكحولات الديتربين. وتُعد القهوة والمشروبات التي تحتوي على الكافيين من أبرز المشروبات التي خضعت للدراسة، إلا أن الدراسات المتعلقة بتأثير القهوة و/أو الكافيين على استهلاك الطاقة والتحكم في وزن الجسم محدودة.
تهدف هذه الدراسة إلى تقييم العادات الغذائية بين مستهلكي القهوة في عينة الدراسة، بالإضافة إلى استكشاف العلاقة بين استهلاك القهوة وتناول بعض المواد الغذائية.
أجريت دراسة مقطعية شملت 150 طالبًا من كلية الزراعة في جامعة جرش الخاصة، وطُلب منهم تعبئة استبيانات ذاتية التعبئة. تضمنت الاستبيانات بيانات حول معلومات المشاركين العامة، واستهلاكهم للقهوة، وقياساتهم الجسمية، بالإضافة إلى بيانات غذائية جُمعت باستخدام استبانة نوعية دقيقة لتكرار تناول الطعام.
أظهرت النتائج أن الاستهلاك الأسبوعي كان النمط السائد في جميع المجموعات الغذائية، مع تناول يومي محدود يقتصر في الغالب على المواد الغذائية الأساسية مثل الخبز الأبيض والبيض. كان استهلاك الفاكهة والخضراوات دون المستوى الأمثل في مجموعتي مؤشر كتلة الجسم والقهوة، حيث أظهر الطلاب الذين يعانون من السمنة استهلاكًا أقل للبرتقال والخضراوات يوميًا. ولوحظت فروقات ملحوظة في استهلاك الذرة والمكسرات والآيس كريم تبعًا لمؤشر كتلة الجسم وتكرار تناول القهوة. وبشكل عام، كان استهلاك الأطعمة المصنعة فائقة المعالجة أسبوعيًا أو شهريًا في الغالب، مع وجود فروق جوهرية قليلة بين المجموعتين.
في الختام، أظهر طلاب الجامعات أنماطًا غذائية دون المستوى الأمثل، اتسمت بعدم كفاية تناول الفاكهة والخضراوات يوميًا، وكثرة تناول الأطعمة المكررة والمصنعة. وبينما كانت أنماط الاستهلاك العامة متسقة بين مجموعات مؤشر كتلة الجسم واستهلاك القهوة، تشير اختلافات محددة إلى أن كلا العاملين قد يؤثر على خيارات غذائية معينة.
تسلط هذه الرؤى الضوء على الحاجة إلى تدخلات غذائية محددة لتحسين جودة النظام الغذائي لدى هذه الفئة.

ABSTRACT

Abstract

Coffee is one of the most consuming beverage worldwide that consists of more than 1000 active ingredients such as caffeine, chlorogenic acid, and diterpene alcohols. Co□ee and ca□einated beverages are among the top beverages that have been studied, however there are a limited number of studies regarding the effect of coffee and/or caffeine consumption on energy intake and body weight control.
The aims of the this study are to evaluate the dietary habits among coffee consumers in study population, as well as to explore the association between coffee consumption and the intake of certain food items.
A cross-sectional study was conducted that included 150 male students from faculty of agriculture in Jerash Private University whom were asked to fill out a self-filled questionnaires. The questionnaires included data about participants□s general information, coffee consumption, anthropometric measurements, and the dietary data were collected by using a valid qualitative food frequency questionnaire.
The results showed that weekly consumption was the predominant pattern across all food groups, with limited daily intake mostly restricted to staples like white bread and eggs. Fruit and vegetable intake was suboptimal across BMI and coffee groups, with obese students showing lower daily orange and vegetable consumption. Notable differences were observed in corn, nut, and ice cream intake by BMI and coffee frequency. Overall, ultra-processed foods were consumed mostly weekly or monthly, with few significant differences between groups.
As a conclusion, university students showed predominantly suboptimal dietary patterns characterized by insufficient daily intake of fruits and vegetables and frequent consumption of refined and processed foods. While overall intake patterns were consistent across BMI and coffee consumption groups, specific differences suggest that both factors may influence certain food choices.
These insights highlight the need for targeting nutritional interventions to improve diet quality in

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this population.

Food Intake Based on Coffee Consumption and Body Mass Index Among Male University Students

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Abstract

Coffee is one of the most widely consumed beverages worldwide that consists of more than 1000 active compounds. It considered among the top beverages that have been studied, however there are a limited number of studies regarding the effect of coffee and/or caffeine consumption on energy intake and body weight control.

The aims of this study were to evaluate the dietary habits among coffee consumers in study population, as well as to explore the association between coffee consumption and the intake of certain food items. A cross-sectional study was conducted that included 150 male students from faculty of agriculture in Jerash Private University (JPU) who completed self-filled questionnaires. The questionnaires included data about participants general information, coffee consumption, anthropometric measurements, as well as the dietary data.

The results showed that non-obese students who drank coffee less than once daily reported significantly higher weekly prevalence of green or red pepper consumption (65.6%) than obese (21.6%, p=0.003). Over half of the students consumed white bread daily; however, a significant difference was observed among daily coffee consumers, who where obese students and reported higher daily (70.5% vs. 62.2%) and weekly (25.0% vs. 10.8%) intake compared to non-obese students. Also, the results revealed that coffee consumers less than once daily, non-obese individuals were significantly more likely to report never (46.9%) or monthly (28.1%)

consumption of whole wheat bread compared to their obese counterparts (40.5% and 13.5%, respectively; p=0.026).

As a conclusion, university students showed predominantly suboptimal dietary patterns characterized by insufficient daily intake of fruits and vegetables and frequent consumption of refined and processed foods. While overall intake patterns were consistent across BMI and coffee consumption groups, specific differences suggest that both factors may influence certain food choices. These insights highlight the need for targeting nutritional interventions to improve diet quality in this population.

Key words: Coffee, Body Mass Index, Eating Behavior, Food Group, University Students.

Introduction

Coffee is the most widely consumed beverages worldwide, therefore, coffee and caffeinated beverages are among the top beverages that have been studied recently (Gonzalez et al., 2014). Coffee consists of more than 1000 active ingredients. Caffeine one of the most important non-volatile compounds which give coffee its bitterness, strength,and fullness (Al-Shnaigat& Obeidat,2022).

Other compounds include carbohydrates, lipids, nitrous compounds, vitamins, minerals, phenolic compounds, flavonoids, melanoidin, lipid resoluble compounds, diterpene alcohols (serum cholesterol stimulant) and chlorogenic acid (Esquivel & Jimenez, 2012;Bhatti et al., 2013). The above mentioned components work as antioxidants particularly chlorogenic acid which protects the human body from coronary heart disease (Cai et al., 2012; Ran et al., 2016). Coffee oil includes diterpenes of the kaurene family in proportions of up to 20% of the total lipids. Body cholesterol levels could be affected by diterpenoid alcohols such as cafestol and kahweol which are among the coffee lipids (Al- Shnaigat & Obeidat, 2022).

There is an inverse relationship between coffee intake and several diseases, however the underlying mechanisms are not fully understood yet (Elhadad, et al., 2020). In addition, there are a limited number of studies regarding the effect of coffee and/or caffeine consumption on energy intake and body weight control, in spite of the general consensus that coffee has an appetite suppressing effect (Gavrieli, et al., 2012). With an increasing rate of coffee consumption, especially among adults, a lot of studies has exhibited its physicochemical properties, as well as its quality and sensory features. However, there are limited studies about the association between coffee consumption and the intake of food and nutrient (songa et al., 2016).

In a study of Yoshioka and his coworkers (2007) they found that consumption of 800 mg of caffeine with 6 g of red pepper resulted in a decrease of daily energy intake by 880 kcal. On the other hand the results of the study of Jessen et al. (2004) revealed that having 50 and 100 mg of caffein amplified the hunger suppressing effect of nicotine.

In their study, Bamia and her colleagues (2015) found that the group of highest coffee intake had the highest energy intake, and the group of the lowest coffee intake had the highest average daily intake of protein and thiamine, and significantly lower niacin intake. A similar results were obtained in a study of songa and his colleagues (2016) who found that the group with no coffee and group of lowest coffee consumption, had the highest average daily protein and vitamin B1 intake, and had the lowest average daily intake from niacin, whereas the group with the highest coffee consumption, had the highest level of average daily energy intake, and they consumed more calories from fat, and niacin.

In a study about the relation of metabolites, nutrients, and lifestyle factors to coffee consumption, Elhadad and his coworkers (2020) have found a positive correlation between regular (caffeinated) coffee consumption and active and passive smoking, serum lead and urinary cadmium concentrations, dietary intake of potassium and magnesium, and aspirin intake. On the other side, regular coffee consumption was inversely correlated with serum folate and red blood cell folate levels, serum vitamin E and C, and beta-cryptoxanthin concentrations, Healthy Eating Index score, and total serum bilirubin.

In other studies, it was revealed that consuming of coffee containing 3 mg of caffeine/kg of body weight showed no acute effect on energy intake and had only little effect on appetite-related feelings in nonobese participants compared to decaffeinated coffee and water (Gavrieli, et al., 2011). However, in a later study of the same author regarding dose of caffeinated coffee on dietary intake and appetite feelings, in normal-weight and overweight/obese volunteers, the results showed that a moderate coffee amount (6 mg caffeine/kg body weight) had effectively reduced energy intake in the following meal and in the total day compared to lower (3 mg caffeine/kg body weight) or no coffee intake in overweight/obese participants, but not the normal weight participants (Gavrieli, et al., 2012).

The aims of this study were to evaluate and describe dietary habits among coffee consumers in study population, as well as to explored the association between coffee consumption and the intake of certain food items.

Materials and Methods

Study Design

A cross-sectional study that included 150 male students from faculty of agriculture in Jerash Private University was conducted between November and May in 2023. The participating students were selected randomly and the inclusion criteria were as follows: (1) being an undergraduate student in the faculty of agriculture at Jerash Private University, (2) possessing the awareness and ability to understand and respond accurately to the questions, and (3) willingness to participate in the study and expressed their agreement orally, Whereas, the exclusion criteria were all the female students in the faculty of agriculture at Jerash Private University. The study protocol was submitted to the Ethics Committee of the Institutional Review Board (IRB) of the Deanship of Scientific Research at Jerash Private University and was approved by the resolution number (2025/2024/5/2). The study was conducted in strict accordance with the Declaration of Helsinki and a written consent form distributed to participants, but their consents were collected verbally. To preserve their anonymity and confidentiality, the data collected were processed anonymously.

Sample Size

The sample size was calculated by calculator Raosoft (online certified website for calculating sample size) based on the total number of male students in the faculty of agriculture in Jerash University in 2023 which was 491. With a 5% margin of error, 85% CI, and 50% response distribution, and after the addition of 10%, the minimum sample size was 150.

Data Collection

Self-filled questionnaires were distributed to agriculture students randomly. Randomization was conducted based on students' number, and the students number were selected randomly

from the list of the students name that was provided from the registration section in the university.

The questionnaire included general information that include socio-demographic data such as: age, physical activity, and smoking habits, as well as data about coffee consumption based on a valid questionnaire (Loftfield, et al., 2015).

Anthropometrics and Dietary Data Collection

After asking male students of the faculty of agriculture for their permission to participate in the study and giving them a written consent form, general anthropometric data were collected in a face-to-face interview by nutritionists. All participants underwent physical examinations to determine their height (cm) weight (kg), and waist circumference (cm).

Body mass index (BMI) (kg/ m2) was calculated, and subjects were categorized as underweight (<18.5), normal weight (18.5-24.9), overweight (25-29.9), or obese (> 30) according to the international classification used by the World Health Organization WHO (2000).

Body height was measured using stadiometer (Height Measurement Medical Portable Stadiometer Height Rod 8-82 inch/20-210 cm/Unit with cm & inch, Accurate Scale Height Measuring Tool for Office Home Wall Adults), where the subjects had no shoes on to ensure accuracy in measuring the height. The stadiometer also contained a digital scale Where it was used to take students' weights.

The measurements were recorded to the nearest 0.1 cm and 0.1 kg, respectively. Waist circumference (WC) was measured to the nearest 0.1 cm, by flexible ruler sewing tape (High Quality 120in/300cm Body Measuring Ruler Sewing Tailor Tape Measure Centimeter Meter Sewing Measuring Tape Soft Ruler). (Nieman, 2019). WC was divided into two category which were "risk' and "No risk" according to the cut-off point for WC (<102 cm for men) (Bohmann, et al., 2024).

Dietary data were collected by using a valid qualitative food frequency questionnaire (Willett & Hu, 2007) consists of food items from the different food groups such as: meat and meat substitutes, milk and dairy foods, fruits and their juices, vegetables, Sweets and baked goods, bread, grains and starches, beverages, and miscellaneous like: peanut butter, popcorn, mayonnaise, olive oil, seeds, nuts, chocolate, candy, and jams.

In addition, the participants selected one of following options that represent the frequency of food consumption like: never eat, 1-3 times a month, once a week, 2-4 times a week, once a day, 2-3 times a day, and more that 4 times a day. The serving size in each food group was determined based on food exchange system.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS) version 26 (IBM, Chicago, IL, USA) was used to analyse the data. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as means and standard deviations. Chi-square tests were used to assess the differences between categorical variables. Independent t-tests were used to assess the mean differences of continuous variables. The statistical significance was set at $p<0.05$.

Results

Table 1 summarizes the sociodemographic and health-related characteristics of university students based on coffee consumption frequency. Individuals who consumed coffee daily had a mean age of 27.26 ± 7.48 years, while those consuming it less than once daily had a mean age of 26.03 ± 7.4 years (p=0.315). No significant differences were observed in weight (80.41±19.66 kg vs. 79.38±16.38 kg, p=0.730), height (173.6±6.97 cm vs. 175.23±7.54 cm, p=0.177), waist circumference (93.3 ± 15.23 cm vs. 92.39 ± 12.01 cm, p = 0.690), or BMI (26.67 ± 6.27 kg/m² vs. 25.85±5.16 kg/m², p=0.389). In terms of disease status, 7.4% of daily coffee consumers and 10.1% of less frequent consumers reported having a disease (p=0.553). Medication use was 11.1% of daily consumers and 13.0% of less frequent consumers (p=0.717). Exercise habits also showed no significant difference (23.5% vs. 24.6%, p=0.866). However, 72.8% of daily coffee consumers were smokers compared to 56.5% of those consuming less than once daily (p=0.036). Based on WC, 71.6% of daily consumers and 76.8% of less frequent consumers had a low risk of cardiovascular (p=0.469). In terms of BMI categories, 53.6% of less than once daily coffee consumers and 54.3% of daily coffee consumers were obese.

Food group consumption patterns among daily and less than once daily coffee consumption for different BMI groups are illustrated in Table 2. The findings indicated that the consumption of fruit among students, regardless of their habitual coffee consumption or their classification in terms of body weight, was predominantly low and insufficient, with the majority consuming fruit weekly. The prevalence of students who consumed fruits daily was notably low. For instance, among students with a coffee consumption frequency of less than once per day, 50.0% of nonobese individuals and 32.4% of those classified as obese reported weekly consumption of oranges, while between 40.6% and 65.9% of these groups, respectively, reported weekly consumption of bananas, among other fruits. In a similar vein, among students who consumed coffee daily, 45.9% of nonobese and 59.1% of obese individuals reported a weekly intake of oranges, while 54.1% and 65.9% of these populations, respectively, consumed bananas weekly. 45.9% of nonobese and 59.1% of obese individuals had a weekly intake of oranges, with 54.1% and 65.9% respectively, consuming bananas on a weekly basis.

Moving to vegetable consumption patterns, the consumption of vegetables, including tomato, carrot, spinach, broccoli, and green beans, showed a trend of monthly or weekly consumption as the dominant pattern across both coffee consumption and BMI categories. Daily consumption was relatively infrequent, suggesting that the majority of participants did not incorporate vegetables into their daily diet. On the other hand, cabbage, cauliflower, and zucchini were more commonly consumed monthly. Interestingly, among all vegetables, non-obese students who drank coffee less than once daily reported significantly higher weekly prevalence of green or red pepper consumption (65.6%) than obese (21.6%, p=0.003). In contrast, the obese who drank coffee less than once daily had higher monthly consumption of green or red pepper (40.5% vs. 18.8% for non-obese).

The analysis of general consumption patterns of carbohydrate-rich foods such as white bread, whole wheat bread, white rice, macaroni, popcorn, and corn bread was predominantly consumed weekly or daily, with white bread exhibiting a notably high rate of daily intake across various groups. Furthermore, popcorn, potatoes, and corn were consumed with greater consistency monthly. In contrast, sweet potatoes and peas/white beans demonstrated a relatively low frequency of consumption overall. In more detail, notably, white bread recorded the highest rate of daily intake, as evidenced by 75.7% of obese students consuming coffee less than once a day, and 70.5% of obese students consuming coffee daily. Across all groups, over half of the students consumed white bread daily; however, a significant difference was observed among daily coffee consumers, who where obese students and reported higher daily (70.5% vs. 62.2%) and weekly (25.0% vs. 10.8%) intake compared to non-obese students. Conversely, a greater

proportion of non-obese students reported not consuming white bread at all (16.2% vs. 2.3%, p=0.026). On the other hand, whole wheat bread was consumed daily by 15.6–27.3% of participants, and approximately 35–43% weekly. Among students consuming coffee less than once daily, non-obese individuals were significantly more likely to report never (46.9%) or monthly (28.1%) consumption of whole wheat bread compared to their obese counterparts (40.5% and 13.5%, respectively; p=0.026). Popcorn, macaroni, and corn bread were primarily consumed weekly (30–56%), with daily intake remaining below 15%. White rice, pasta, lentils, and peas were also most frequently consumed weekly (35–48%), with daily intake typically less than 27%. Sweet potatoes and peas/white beans had the lowest overall intake frequencies. For corn consumption, students who consume coffee less than once daily, the non-obese ones reported significantly higher weekly corn consumption (43.8%) and lower monthly consumption (37.5%) compared to the obese ones (13.5% and 59.5%, respectively; p=0.048).

The consumption patterns of milk and yogurt were predominantly consumed on a weekly or monthly basis across all BMI and coffee consumption groups, with daily intake being relatively uncommon. Transitioning to the meat group, the consumption of eggs and poultry was commonly either weekly or daily. Labneh was also predominantly consumed weekly by the majority of participants, while intake of red meat was mainly observed weekly, suggesting a moderate intake across all groups. In examining the consumption patterns of the Fat and Oil Group, it was observed that butter, ghee, olive oil, and mayonnaise were the predominant items consumed on a weekly or monthly basis. Additionally, nuts and sunflower seeds were primarily consumed weekly, indicating a moderate dietary intake of foods rich in fats and oils. Notably, a substantial disparity was identified in the weekly consumption of nuts between obese participants who consumed coffee daily (63.6%) in contrast to non-obese participants (32.4%; p=0.034). Finally, the consumption patterns of the other carbohydrate category, which includes items such as jams, cakes, donuts, ice cream, chocolate, cereals, biscuits, cupcakes, chips, and candies, were predominantly reported as being consumed on a monthly or weekly basis. The frequency of daily consumption was observed to be comparatively low, suggesting that the ultra-processed carbohydrate-dense products were not ingested daily by the majority of the participants. Among the daily coffee consumption group, Non-obese students reported significantly higher jam intake (43.2%) compared to obese (20.5%, p=0.002). While among the less than once daily coffee consumption group, Non-obese reported significantly higher weekly ice cream consumption (43.8%) than obese (13.5%) (p = 0.013).

Table 1. Study sample description based on coffee consumption

Variables	Mean±SD		p-value*
	< Daily (n=69)	once or more daily (n=81)	
Age (years)	26.03±7.4	27.26±7.48	0.315
Weight (kg)	79.38±16.38	80.41±19.66	0.730
Height (cm)	175.23±7.54	173.62±6.97	0.177
Waist circumference (cm)	92.39±12.01	93.3±15.23	0.690
Body mass index (kg/m^2)	25.85±5.16	26.67±6.27	0.389
	n (%)		
Disease			

Yes	7 (10.1)	6 (7.4)	0.553
No	62 (89.9)	75 (92.6)	
Medication			
Yes	9 (13)	9 (11.1)	0.717
No	60 (87)	72 (88.9)	
Exercises			
Yes	17 (24.6)	19 (23.5)	0.866
No	52 (75.4)	62 (76.5)	
Smoker			
Yes	39 (56.5)	59 (72.8)	**0.036**
No	30 (43.5)	22 (27.2)	
Waist circumference categories			
No risk for CV	53 (76.8)	58 (71.6)	0.469
At risk for CV	16 (23.2)	23 (28.4)	
Body Mass Index categories			
Non-obese	32 (46.4)	37 (45.7)	0.932
Obease	37 (53.6)	44 (54.3)	

* value significant at $p<0.05$

Table 2. Food group-specific food items- eating patterns based on coffee consumption groups for different Body mass index groups.

Food groups	<once daily		p-value	Daily		p-value
	Non-obese	Obese		Non-obese	Obese	
Fruits group						
Orange						
Never	2 (6.3)	5 (13.5)		2 (5.4)	3 (6.8)	
Monthly	9 (28.1)	9 (24.3)	0.288	9 (24.3)	11 (0.0)	0.304
Weekly	16 (50.0)	12 (32.4)		17 (45.9)	26 (59.1)	
Daily	5 (15.6)	11 (29.7)		9 (24.3)	4 (9.1)	
Banana						
Never	1 (3.1)	2 (5.4)		0 (0.0)	1 (2.3)	
Monthly	8 (25.0)	5 (13.5)	0.646	6 (16.2)	7 (15.9)	0.386
Weekly	13 (40.6)	18 (48.6)		20 (54.1)	29 (65.9)	
Daily	10 (31.3)	12 (32.4)		11 (29.7)	7 (15.9)	
Strawberry						
Never	4 (12.5)	7 (187.9)		7 (18.9)	5 (11.4)	
Monthly	8 (25.0)	15 (40.5)	0.344	11 (29.7)	14 (31.8)	0.179
Weekly	13 (40.6)	10 (27.0)		13 (35.1)	23 (52.3)	
Daily	7 (21.9)	5 (13.5)		6 (16.2)	2 (4.5)	
Apple or pear						
Never	3 (9.4)	4 (10.8)		2 (5.4)	4 (9.1)	
Monthly	9 (28.1)	10 (27.0)	0.978	8 (21.6)	10 (22.7)	0.845
Weekly	15 (46.9)	16 (43.2)		20 (54.1)	20 (45.5)	
Daily	5 (15.6)	7 (18.9)		7 (18.9)	10 (22.7)	
Dates or figs						
Never	3 (9.4)	7 (18.9)		4 (10.8)	6 (13.6)	
Monthly	11 (34.4)	8 (21/.6)	0.523	6 (16.2)	11 (25.0)	0.660
Weekly	10 (31.3)	11 (29.7)		18 (48.6)	16 (36.4)	
Daily	8 (25.0)	11 (29.7)		9 (24.3)	11 (25.0)	
Raisins or grapes						
Never	6 (18.8)	4 (10.8)	0.374	6 (16.2)	4 (9.1)	0.597

Monthly	10 (31.3)	17 (45.9)		11 (29.7)	18 (40.9)	
Weekly	9 (28.1)	12 (32.4)		15 (40.5)	18 (40.9)	
Daily	7 (21.9)	4 (10.8)		5 (13.5)	4 (9.1)	
Fresh peach and apricot						
Never	6 (18.8)	8 (21.6)		4 (10.8)	5 (11.4)	
Monthly	13 (40.6)	11 (29.7)	0.805	11 (29.7)	15 (34.1)	0.314
Weekly	10 (31.3)	13 (35.1)		13 (35.1)	20 (45.5)	
Daily	3 (9.4)	5 (13.5)		9 (24.3)	4 (9.1)	
Dried peach or apricot						
Never	12 (37.5)	12 (32.4)		11 (29.7)	12 (27.3)	
Monthly	10 (31.3)	12 (32.4)	0.936	10 (27.0)	18 (40.9)	0.588
Weekly	6 (18.8)	9 (24.3)		12 (32.4)	11 (25.0)	
Daily	4 (12.5)	4 (10.8)		4 (10.8)	3 (6.8)	
Vegetables group						
Tomato						
Never	1 (3.1)	1 (2.7)		2 (5.4)	1 (2.3)	
Monthly	12 (32.4)	3 (8.1)	0.705	9 (24.3)	6 (13.6)	0.504
Weekly	12 (37.5)	19 (51.4)		11 (29.7)	17 (38.6)	
Daily	15 (46.9)	14 (37.8)		15 (40.5)	20 (45.5)	
Carrots						
Never	6 (18.8)	8 (21.6)		6 (16.2)	5 (11.4)	
Monthly	13 (40.6)	16 (43.2)	0.922	22 (59.5)	20 (45.5)	0.307
Weekly	11 (34.4)	10 (27.0)		9 (24.3)	18 (40.9)	
Daily	2 (6.3)	3 (8.1)		0 (0.0)	1 (2.3)	
Spinach						
Never	8 (25.0)	9 (24.3)		11 (29.7)	11 (25.0)	
Monthly	17 (53.1)	19 (51.4)	0.974	19 (51.4)	23 (52.3)	0.857
Weekly	6 (18.8)	7 (18.9)		7 (18.9)	10 (22.7)	
Daily	1 (3.1)	2 (5.4)		0 (0.0)	0 (0.0)	
Broccoli						
Never	23 (71.9)	23 (62.2)	0.819	23 (62.2)	28 (63.6)	0.239
Monthly	6 (18.8)	8 (21.6)		8 (21.6)	14 (31.8)	

Weekly	2 (6.3)	4 (10.8)		4 (10.8)	2 (4.5)	
Daily	1 (3.1)	2 (5.4)		2 (5.4)	0 (0.0)	
Green beans						
Never	7 (21.9)	8 (21.6)		7 (18.9)	13 (29.5)	
Monthly	17 (53.1)	21 (56.8)	0.280	14 (37.8)	18 (40.9)	0.431
Weekly	8 (25.0)	5 (13.5)		13 (35.1)	12 (27.3)	
Daily	0 (0.0)	3 (8.1)		3 (8.1)	1 (2.3)	
Cauliflower						
Never	11 (34.4)	13 (35.1)		14 (37.8)	19 (43.2)	
Monthly	8 (25.0)	11 (29.7)	0.913	13 (35.1)	18 (40.9)	0.472
Weekly	11 (34.4)	10 (27.0)		10 (27.0)	7 (15.9)	
Daily	2 (6.3)	3 (8.1)		0 (0.0)	0 (0.0)	
Green or red pepper						
Never	3 (9.4)	7 (18.9)		2 (5.4)	7 (15.9)	
Monthly	6 (18.8)	15 (40.5)	0.003	15 (40.5)	10 (22.7)	0.188
Weekly	21 (65.6)	8 (21.6)		12 (32.4)	19 (43.2)	
Daily	2 (6.3)	7 (18.9)		8 (21.6)	8 (18.2)	
Lettuce or parsley						
Never	5 (15.6)	6 (16.2)		5 (13.5)	2 (4.5)	
Monthly	7 (21.9)	7 (18.9)	0.901	9 (24.3)	15 (34.1)	0.471
Weekly	16 (50.0)	17 (45.9)		16 (43.2)	19 (43.2)	
Daily	4 (12.5)	7 (18.9)		7 (18.9)	8 (18.2)	
Zucchini or pumpkin						
Never	5 (15.6)	6 (16.2)		11 (29.7)	11 (25.0)	
Monthly	17 (53.1)	19 (51.4)	0.635	18 (48.6)	21 (47.7)	0.807
Weekly	9 (28.1)	8 (21.6)		8 (21.6)	12 (27.3)	
Daily	1 (3.1)	4 (10.8)		0 (0.0)	0 (0.0)	
Cucumber or eggplant						
Never	3 (9.4)	3 (8.1)		3 (8.1)	2 (4.5)	
Monthly	7 (21.9)	9 (24.3)	0.740	11 (29.7)	11 (25.0)	0.685
Weekly	18 (56.3)	17 (45.9)		13 (35.1)	21 (47.7)	

Daily	4 (12.5)	8 (21.6)		10 (27.0)	10 (22.7)	
Cabbage or coleslaw						
Never	9 (28.1)	8 (21.6)		7 (18.9)	13 (29.5)	
Monthly	15 (46.9)	13 (35.1)	0.472	17 (45.9)	23 (52.3)	0.203
Weekly	6 (18.8)	12 (32.4)		11 (29.7)	8 (18.2)	
Daily	2 (6.3)	4 (10.8)		2 (5.4)	0 (0.0)	
Brussels cabbage						
Never	17 (53.1)	21 (56.8)		14 (37.8)	19 (43.2)	
Monthly	5 (15.6)	12 (32.4)	0.134	15 (40.5)	19 (43.2)	0.634
Weekly	7 (21.9)	3 (8.1)		7 (18.9)	6 (13.6)	
Daily	3 (9.4)	1 (2.7)		1 (2.7)	0 (0.0)	
Carbohydrates group						
Corn						
Never	5 (15.6)	8 (21.6)		13 (35.1)	12 (27.3)	
Monthly	12 (37.5)	22 (59.5)	0.048	15 (40.5)	13 (29.5)	0.165
Weekly	14 (43.8)	5 (13.5)		8 (21.6)	19 (43.2)	
Daily	1 (3.1)	2 (5.4)		1 (2.7)	0 (0.0)	
Potato						
Never	1 (3.1)	5 (13.5)		7 (18.9)	3 (6.8)	
Monthly	8 (25.0)	8 (21.6)	0.239	5 (13.5)	4 (9.1)	0.150
Weekly	16 (50.0)	12 (32.4)		14 (37.8)	27 (61.4)	
Daily	7 (21.9)	12 (32.4)		11 (29.7)	10 (22.7)	
Sweet potato						
Never	8 (25.0)	15 (40.5)		9 (24.3)	17 (38.6)	
Monthly	11 (34.4)	11 (29.7)	0.484	15 (40.5)	18 (40.9)	0.337
Weekly	10 (31.3)	7 (18.9)		10 (27.0)	8 (18.2)	
Daily	3 (9.4)	4 (10.8)		3 (8.1)	1 (2.3)	
Popcorn						
Never	8 (25.0)	6 (16.2)		11 (29.7)	15 (34.1)	
Monthly	18 (56.3)	22 (59.5)	0.796	18 (48.6)	20 (45.5)	0.771
Weekly	5 (15.6)	8 (21.6)		8 (21.6)	8 (18.2)	

Daily	1 (3.1)	1 (2.7)		0 (0.0)	1 (2.3)	
Macaroni					
Never	7 (21.9)	10 (27.0)		11 (29.7)	10 (22.7)	
Monthly	5 (15.6)	13 (35.1)	0.082	13 (35.1)	17 (38.6)	0.910
Weekly	18 (56.3)	10 (27.0)		11 (29.7)	14 (31.8)	
Daily	2 (6.3)	4 (10.8)		2 (5.4)	3 (6.8)	
Corn bread					
Never	20 (62.5)	24 (64.9)		22 (59.5)	29 (65.9)	
Monthly	7 (21.9)	4 (10.8)	0.526	5 (13.5)	7 (15.9)	0.778
Weekly	1 (3.1)	3 (8.1)		2 (5.4)	1 (2.3)	
Daily	4 (12.5)	6 (16.2)		8 (21.6)	7 (15.9)	
White bread					
Never	1 (3.1)	2 (5.4)		6 (16.2)	1 (2.3)	
Monthly	1 (3.1)	2 (5.4)	0.769	4 (10.8)	1 (2.3)	**0.026**
Weekly	7 (21.9)	5 (13.5)		4 (10.8)	11 (25.0)	
Daily	23 (71.9)	28 (75.7)		23 (62.2)	31 (70.5)	
Cooked white rice					
Never	0 (0.0)	1 (2.7)		1 (2.7)	0 (0.0)	
Monthly	3 (9.4)	2 (5.4)	0.585	5 (13.5)	1 (2.3)	**0.069**
Weekly	14 (43.8)	20 (54.1)		15 (40.5)	28 (63.6)	
Daily	15 (46.9)	14 (37.8)		16 (43.2)	15 (34.1)	
Peas or white beans					
Never	3 (9.4)	6 (16.2)		10 (27.0)	8 (18.2)	
Monthly	14 (43.8)	17 (45.9)	0.729	18 (48.6)	24 (54.5)	0.812
Weekly	13 (40.6)	11 (29.7)		8 (21.6)	11 (25.0)	
Daily	2 (6.3)	3 (8.1)		1 (2.7)	1 (2.3)	
Lentils or chickpeas					
Never	3 (9.4)	5 (13.5)		4 (10.8)	1 (2.3)	
Monthly	11 (34.4)	9 (24.3)	0.805	11 (29.7)	18 (40.9)	0.361
Weekly	13 (40.6)	16 (43.2)		20 (54.1)	22 (50.0)	
Daily	5 (15.6)	7 (18.9)		2 (5.4)	3 (6.8)	

Whole Wheat bread						
Never	15 (46.9)	15 (40.5)		17 (45.9)	12 (27.3)	
Monthly	9 (28.1)	5 (13.5)	0.026	7 (18.9)	7 (15.9)	0.139
Weekly	6 (18.8)	4 (10.8)		4 (10.8)	13 (29.5)	
Daily	2 (6.3)	13 (35.1)		9 (24.3)	12 (27.3)	
Breakfast cereal flakes						
Never	24 (75.0)	27 (73.0)		26 (70.3)	35 (79.5)	
Monthly	5 (15.6)	2 (5.4)	0.310	6 (16.2)	4 (9.1)	0.674
Weekly	2 (6.3)	4 (10.8)		2 (5.4)	3 (6.8)	
Daily	1 (3.1)	4 (10.8)		3 (8.1)	2 (4.5)	
Milk group						
Milk						
Never	7 (21.9)	12 (32.4)		14 (37.8)	19 (43.2)	
Monthly	10 (31.3)	7 (18.9)	0.499	9 (24.3)	13 (29.5)	0.675
Weekly	8 (25.0)	12 (32.4)		10 (27.0)	7 (15.9)	
Daily	7 (21.9)	6 (16.2)		4 (10.8)	5 (11.4)	
Yogurt						
Never	10 (31.3)	9 (24.3)		15 (40.5)	9 (20.5)	
Monthly	6 (18.8)	6 (16.2)	0.838	3 (8.1)	6 (13.6)	0.106
Weekly	12 (37.5)	15 (40.5)		18 (48.6)	23 (52.3)	
Daily	4 (12.5)	7 (18.9)		1 (2.7)	6 (13.6)	
Meat group						
Egg						
Never	3 (9.4)	2 (5.4)		5 (13.5)	6 (13.6)	
Monthly	9 (28.1)	2 (5.4)	0.056	5 (13.5)	6 (13.6)	0.999
Weekly	11 (34.4)	17 (45.9)		17 (45.9)	20 (45.5)	
Daily	9 (28.1)	16 (43.2)		10 (27.0)	12 (27.3)	
Meat						
Never	2 (6.3)	1 (2.7)		4 (10.8)	2 (4.5)	
Monthly	7 (21.9)	8 (21.6)	0.871	8 (21.6)	7 (15.9)	0.329
Weekly	22 (68.8)	26 (70.3)		19 (51.4)	31 (70.5)	

Daily	1 (3.1)	2 (5.4)		6 (16.2)	4 (9.1)	
Poultry						
Never	1 (3.1)	1 (2.7)		1 (2.7)	2 (4.5)	
Monthly	1 (3.1)	2 (5.4)	0.973	2 (5.4)	4 (9.1)	0.233
Weekly	24 (75)	27 (73)		22 (59.5)	32 (72.7)	
Daily	6 (18.8)	7 (18.9)		12 (32.4)	6 (13.6)	
Labneh						
Never	1 (3.1)	1 (2.7)		4 (10.8)	2 (4.5)	
Monthly	1 (3.1)	4 (10.8)	0.679	6 (16.2)	3 (6.8)	0.253
Weekly	18 (56.3)	19 (51.4)		15 (40.5)	26 (59.1)	
Daily	12 (37.5)	13 (35.1)		12 (32.4)	13 (29.5)	
White cheese						
Never	5 (15.6)	8 (21.6)		12 (32.4)	6 (13.6)	
Monthly	14 (43.8)	10 (27.0)	0.137	11 (29.7)	17 (38.6)	0.250
Weekly	12 (37.5)	12 (32.4)		12 (32.4)	18 (40.9)	
Daily	1 (3.1)	7 (18.9)		2 (5.4)	3 (6.8)	
Fish and seafood						
Never	5 (15.6)	2 (5.4)		6 (16.2)	7 (15.9)	
Monthly	20 (62.5)	27 (73)	0.360	21 (56.8)	27 (61.4)	0.892
Weekly	7 (21.9)	8 (21.6)		8 (21.6)	9 (20.5)	
Daily	0 (0.0)	0 (0.0)		2 (5.4)	1 (2.3)	
Fat and oil group						
Nuts						
Never	1 (3.1)	3 (8.1)		4 (10.8)	1 (2.3)	
Monthly	11 (34.4)	9 (24.3)	0.581	11 (29.7)	8 (18.2)	**0.034**
Weekly	15 (46.9)	21 (56.8)		12 (32.4)	28 (63.6)	
Daily	5 (15.6)	4 (10.8)		10 (27.0)	7 (15.9)	
Sunflower seeds						
Never	8 (25.0)	15 (40.5)		13 (35.1)	13 (29.5)	
Monthly	12 (37.5)	9 (24.3)	0.102	12 (32.4)	11 (25.0)	0.548
Weekly	7 (21.9)	12 (32.4)		8 (21.6)	16 (36.4)	

Daily	5 (15.6)	1 (2.7)		4 (10.8)	4 (9.1)	
Ghee					
Never	11 (34.4)	17 (45.9)		17 (45.9)	16 (36.4)	
Monthly	7 (21.9)	8 (21.6)	0.632	10 (27.0)	14 (31.8)	0.729
Weekly	13 (40.6)	10 (27.0)		9 (24.3)	11 (25.0)	
Daily	1 (3.1)	2 (5.4)		1 (2.7)	3 (6.8)	
Butter					
Never	12 (37.5)	18 (48.6)		19 (51.4)	18 (40.9)	
Monthly	8 (25.0)	5 (13.5)	0.204	9 (24.3)	16 (36.4)	0.322
Weekly	12 (37.5)	11 (29.7)		8 (21.6)	6 (13.6)	
Daily	0 (0.0)	3 (8.1)		1 (2.7)	4 (9.1)	
Olive oil					
Never	2 (6.3)	2 (5.4)		5 (13.5)	2 (4.5)	
Monthly	3 (9.4)	3 (8.1)	0.787	4 (10.8)	3 (6.8)	0.266
Weekly	10 (31.3)	16 (43.2)		7 (18.9)	15 (34.1)	
Daily	17 (53.1)	16 (43.2)		21 (56.8)	24 (54.5)	
Mayonnaise					
Never	4 (12.5)	6 (16.2)		9 (24.3)	7 (15.9)	
Monthly	13 (40.6)	14 (37.8)	0.970	14 (37.8)	16 (36.4)	0.546
Weekly	11 (34.4)	13 (35.1)		12 (32.4)	20 (45.5)	
Daily	4 (12.5)	4 (10.8)		2 (5.4)	1 (2.3)	
Peanut butter					
Never	19 (59.4)	30 (81.1)		26 (70.3)	31 (70.5)	
Monthly	7 (21.9)	1 (2.7)	0.069	6 (16.2)	8 (18.2)	0.896
Weekly	4 (12.5)	5 (13.5)		3 (8.1)	4 (9.1)	
Daily	2 (6.3)	1 (2.7)		2 (5.4)	1 (2.3)	
Other carbohydrate group					
Jams					
Never	8 (25.0)	10 (27.0)		5 (13.5)	15 (34.1)	
Monthly	10 (31.3)	12 (32.4)	0.993	13 (35.1)	9 (20.5)	**0.002**
Weekly	10 (31.3)	11 (29.7)		10 (27.0)	19 (43.2)	

Daily	4 (12.5)	4 (10.8)		9 (24.3)	1 (2.3)	
Cake					
Never	3 (9.4)	5 (13.5)		5 (13.5)	4 (9.1)	
Monthly	10 (31.3)	18 (48.6)	0.328	12 (32.4)	13 (29.5)	0.876
Weekly	12 (37.5)	10 (27.0)		14 (37.8)	20 (45.5)	
Daily	7 (21.9)	4 (10.8)		6 (16.2)	7 (15.9)	
Donuts					
Never	11 (34.4)	13 (35.1)		12 (32.4)	17 (38.6)	
Monthly	7 (21.9)	16 (43.2)	0.169	15 (40.5)	10 (22.7)	0.374
Weekly	8 (25.0)	5 (13.5)		8 (21.6)	14 (31.8)	
Daily	6 (18.8)	3 (8.1)		2 (5.4)	3 (6.8)	
Ice cream					
Never	4 (12.5)	12 (32.4)		11 (29.7)	10 (22.7)	
Monthly	13 (40.6)	15 (40.5)	0.013	10 (27.0)	17 (38.6)	0.729
Weekly	14 (43.8)	5 (13.5)		15 (40.5)	16 (36.4)	
Daily	1 (3.1)	5 (13.5)		1 (2.7)	1 (2.3)	
Chocolate					
Never	5 (15.6)	4 (10.8)		6 (16.2)	4 (9.1)	
Monthly	7 (21.9)	9 (24.3)	0.942	5 (13.5)	4 (9.1)	0.146
Weekly	12 (37.5)	15 (40.5)		10 (27.0)	23 (52.3)	
Daily	8 (25.0)	9 (24.3)		16 (43.2)	13 (29.5)	
Cakes and maamoul					
Never	6 (18.8)	7 (18.9)		3 (8.1)	6 (13.6)	
Monthly	11 (34.4)	17 (45.9)	0.596	15 (40.5)	17 (38.6)	0.691
Weekly	8 (25.0)	9 (24.3)		13 (35.1)	17 (38.6)	
Daily	7 (21.9)	4 (10.8)		6 (16.2)	4 (9.1)	
Biscuits or cupcakes					
Never	5 (15.6)	7 (18.9)		7 (18.9)	6 (13.6)	
Monthly	5 (15.6)	8 (21.6)	0.852	4 (10.8)	9 (20.5)	0.664
Weekly	17 (53.1)	16 (43.2)		14 (37.8)	16 (36.4)	
Daily	5 (15.6)	6 (16.2)		12 (32.4)	13 (29.5)	

Potato or tortilla chips						
Never	4 (12.5)	5 (13.5)	0.942	6 (16.2)	8 (18.2)	0.459
Monthly	4 (12.5)	5 (13.5)		8 (21.6)	4 (9.1)	
Weekly	17 (53.1)	17 (45.9)		12 (32.4)	18 (40.9)	
Daily	7 (21.9)	10 (27.0)		11 (29.7)	14 (31.8)	
Candy without chocolate						
Never	11 (34.4)	6 (16.2)	0.333	10 (27.0)	14 (31.8)	0.886
Monthly	9 (28.1)	14 (37.8)		6 (16.2)	6 (13.6)	
Weekly	8 (25.0)	13 (35.1)		14 (37.8)	18 (40.9)	
Daily	4 (12.5)	4 (10.8)		7 (18.9)	6 (13.6)	

*value considered significant at $p<0.05$.

Discassion

The purpose of the current study was to evaluate dietary patterns among male university students categorized by habitual coffee consumption and body mass index (BMI). Participants' dietary intake frequencies for different food groups were evaluated using standardized food frequency questionnaires as part of a cross-sectional design to achieve this goal. Additionally, sociodemographic and health-related information was gathered to put dietary practices in context.

The present study revealed consistent food consumption patterns among university students, with notable associations between coffee consumption frequency and specific dietary choices, particularly among obese students. Our findings provide valuable insights into the complex relationship between beverage habits and food group consumption patterns in this population. Across both BMI categories and coffee consumption groups, university students demonstrated a predominantly weekly consumption pattern across most food groups, Daily consumption was strikingly limited, primarily confined to essential staple foods such as white bread, rice, tomatoes, carrots, and eggs. This finding aligns with the growing body of research suggesting that university students often adopt irregular eating patterns characterized by meal skipping, snacking, and limited dietary diversity (Abraham et al., 2018; Deliens et al., 2016).

Refined carbohydrates, particularly white bread and rice, emerged as the most frequently consumed food group on a daily basis. This reliance on refined carbohydrates, coupled with the relatively low consumption of whole grains, aligns with previous studies indicating that university students often favor energy-dense, nutrient-poor food choices (Papadaki et al., 2007; Sprake et al., 2018). The present results revealed inadequate fruit and vegetable consumption across all participant groups, with most students reporting only weekly intake of fruits such as oranges, bananas, and apples, falling well below recommended daily intake guidelines. One of the notable findings of this study was the statistically association between coffee consumption frequency and smoking behavior, This strong association supports the previous findings of Riera-Sampol and colleagues (2022), which documented a similar association between caffeine

intake, especially coffee, and increased smoking rates. Several mechanisms have been proposed for explaining the association between smoking and caffeine intake. One possible explanation the Metabolic Effects of Smoking induces the enzyme cytochrome P450 1A2 (CYP1A2), which is responsible for metabolism of caffeine. This induction leads to faster caffeine metabolism in smokers, potentially causing them to consume more caffeine to achieve the desired effects (Lagreula et al., 2023).

These findings support the conclusions of Mendelian randomization analyses, which show that smoking increases coffee consumption causally. This is most likely because smokers have higher metabolisms of caffeine (Bjørngaard et al., 2017). Other behavioral studies have shown that caffeine consumption increases the subjective reinforcement of smoking, increases the urge to smoke and the perceived pleasure of smoking, suggesting that caffeine consumption may enhance the pleasurable effects of smoking and thus increase the co-administration of both substances (Treloar et al., 2014).

Interestingly, no significant differences were observed between daily and less frequent coffee consumers regarding anthropometric measurements (weight, height, waist circumference, and BMI), aligning with Nemati et al.'s (2024) meta-analysis showing no significant association between coffee intake and general obesity (OR: 1.11; 95% CI: 0.92, 1.33) or abdominal obesity (OR: 1.03; 95% CI: 0.92, 1.15) (Nemati et al., 2024). However, our results contrast with Henn et al. (2023), who observed that moderate coffee consumption was associated with reduced body fat in participants with metabolic syndrome (Henn et al., 2023), and Silva da Costa et al. (2023), who reported increased central adiposity with coffee consumption in kidney transplant recipients (Silva da Costa et al., 2023). These contradictions likely stem from population differences, as the metabolic effects of coffee may vary based on underlying health conditions. The study identified several significant differences in food consumption patterns between daily and less frequent coffee consumers. For instance, Regarding carbohydrate consumption, interesting differences emerged between BMI groups. students with obesity consuming coffee daily reported significantly higher white bread consumption compared to non-obese students, with higher rates of both daily and weekly intake likely reflects a complex interplay of metabolic, neurobiological, and behavioral mechanisms. This aligns with studies linking refined carbohydrate consumption with higher BMI (Rouhani et al., 2014; Vitaglione et al., 2020). The crucial question this pose is why, particularly in obese people, consuming more white bread is associated with higher coffee intake?

Changes in glucose metabolism appear to be the main mechanism underlying this relationship. Reis et al. (2019) demonstrated that caffeine temporarily decreases insulin sensitivity, with more pronounced effects in individuals with higher BMI, potentially triggering compensatory cravings for quick-absorbing carbohydrates. These observations align with Beaudoin & Graham (2015) findings that caffeine acts as an adenosine receptor antagonist, reducing glucose uptake in skeletal muscle and leading to insulin resistance, which may induce compensatory behavior seeking fast-acting carbohydrates after coffee consumption (Beaudoin & Graham, 2015).. The current investigation found that among infrequent coffee consumers, non-obese individuals report significantly lower whole wheat bread consumption compared to individuals with obesity. This aligns with Gramling et al.'s (2018) findings that caffeine affects dopaminergic signaling in reward pathways that also respond to high-glycemic carbohydrates. Their neuroimaging study revealed altered reward center activation patterns in habitual low-caffeine consumers when exposed to refined sugar-based stimulants, suggesting caffeine may modify the hedonic response to refined carbohydrates, potentially reducing their appeal in caffeine's absence (Gramling et al., 2018).

Replacing white bread with whole-grain alternatives is associated with lower visceral adiposity and better glycaemic control (Aune et al., 2013). Yet, our non-obese occasional-coffee drinkers were the subgroup most likely to "never" consume white bread, hinting that bread choice, not coffee, discriminates weight status.

Our study population shows inadequate fruit and vegetable consumption, with most participants reporting only weekly intake rather than the WHO-recommended 400g daily (WHO, 2018). This pattern was consistent across all coffee consumption and BMI groups. Such nutritional vulnerability among university students reflects prioritization of convenience, affordability, and satiety over nutritional adequacy. Similar findings at Umm Al-Qura University showed 53% of students consumed fewer than two portions of fruits and vegetables daily, with 32% reporting no daily consumption (Althubaiti, 2022).

Regarding coffee intake, this study confirms previous findings that coffee consumption alone doesn't guarantee better dietary quality (Lopez-Garcia et al., 2006; van Dam & Hu, 2005). While moderate coffee intake may benefit metabolic health through thermogenesis and appetite regulation (Greenberg et al., 2005; Pan et al., 2023), these effects don't compensate for unhealthy eating patterns. Additionally, milk and yogurt were primarily consumed weekly or monthly across all BMI and coffee consumption groups, with daily intake uncommon. This aligns with previous studies showing low dairy preference among university students due to taste and price factors (Restrepo et al., 2015; Lee & Jung, 2002).

Some research suggests a link between central obesity and coffee consumption, potentially influenced by dietary choices like dairy intake (Wong et al., 2023). While Wee et al. (2022) found that regular coffee drinkers frequently consumed more dairy products, often adding milk to their coffee, our study showed no such association. This discrepancy suggests our student population may consume coffee differently, possibly using non-dairy alternatives. The relationship between dairy consumption and weight status remains inconsistent across populations, likely moderated by various dietary and lifestyle factors.

The data showed a significant relationship between coffee consumption and ice cream intake among obese participants, with daily coffee drinkers reporting higher weekly ice cream consumption (36.4% vs. 13.5%) and lower rates of "never" consuming ice cream (22.7% vs. 32.4%). This may result from caffeine's influence on reward pathways (Bauer et al., 2021), behavioral pairing of coffee with sweets (Jansen, 1998), or compensatory eating related to caffeine's thermogenic effects (Hursel & Westerterp-Plantenga, 2010). For protein and fat consumption, the study found predominantly weekly intake patterns across all demographic categories. This balanced approach aligns with Karam et al. (2021), who reported similar weekly intake of protein sources and healthy fats among Lebanese university students(Karam et al., 2021).

However, our findings contrast with Alsukait et al.'s (2022) reports of more polarized consumption patterns and Popkin's (2010) observations of increasing daily consumption of both protein and fat sources in transitional economies. These differences suggest our population may be less influenced by global dietary transition phenomena. The observed weekly consumption rhythm likely represents what Jayasinghe et al. (2025) described as "culturally-mediated dietary moderation," where traditional meal structures naturally regulate intake of protein and fat-rich foods. This balanced consumption pattern provides valuable insights for developing culturally appropriate nutritional guidance that recognizes the inherent wisdom in moderate, diversified intake of these essential macronutrients (Jayasinghe et al., 2025).

In the nuts and seeds category, students with obesity who consumed coffee daily reported significantly higher weekly consumption of nuts compared to non-obese participants.

Students with obesity daily coffee drinkers showed significantly higher weekly nut consumption compared to non-obese students, potentially reflecting complex interactions between coffee habits and snacking behaviors. This pattern may be explained by coffee creating additional eating occasions throughout the day, as Rodrigues et al. (2021) noted coffee serves both social and performance-enhancing functions, with breaks often incorporating complementary snacks (Rodrigues et al., 2021).. For students with obesity daily coffee drinkers, these extra consumption opportunities likely contribute to increased nut intake frequency. The health halo effect may also play a role, with these students potentially consuming nuts alongside coffee without recognizing their significant caloric contribution, viewing them as healthy accompaniments rather than substantial energy sources (Hamasaki & Hamasaki, 2017).

Ultra-processed foods like cakes, chips, and sweets were consumed weekly or monthly rather than daily, indicating their regular but not constant presence in students' diets. This pattern may reflect growing awareness about health implications of ultra-processed foods, with educational campaigns potentially influencing consumption behaviors toward treating these items as occasional indulgences rather than dietary staples (Baker et al., 2020).

One unanticipated result was that non-obese students reported significantly higher consumption of certain sweet foods compared to their obese counterparts, which presents an interesting contrast to conventional expectations. Among daily coffee consumers, non-obese students reported significantly higher jam intake, while in the less frequent coffee consumption group, non-obese students reported significantly higher weekly ice cream consumption.

Several factors may explain these seemingly contradictory findings. First, our measurement of frequency without precise portion sizes could mask significant differences in actual caloric intake, as non-obese individuals might consume smaller portions despite eating more frequently (Livingstone & Black, 2003). Second, reporting bias may play a role, with obese individuals potentially underreporting consumption of socially undesirable foods in dietary assessments, while non-obese participants might feel more comfortable accurately reporting sweet food intake (Connor, 2020).

Limitations

The current study was limited by the cross-sectional design, which disallowed a causality assumption. Another limitation was the single-collage data collection and small sample sizes, as well as considering only the male students. In addition, it should be noted that the data in this study lack information about the type of physical activity, sleeping hours and number of meals during the day, as well as income level, which may affect the food intake, and BMI.

Conclusion

The data demonstrate that weekly consumption was the predominant dietary pattern across nearly all food groups, including fruits, vegetables, grains, dairy products, meats, and snack items. Daily intake was generally restricted to staple foods—most notably white bread, poultry, and eggs—with white bread showing the highest daily intake, reaching up to 75% in some subgroups. In contrast, the consumption of ultra-processed and energy-dense foods, including sweets and high-fat items, was primarily weekly or monthly, with low levels of daily intake observed across all groups. Despite minor variations by BMI status and coffee consumption

frequency, overall dietary patterns remained broadly similar. Participants with elevated BMI tended to report higher daily consumption of white bread and poultry compared to their non-obese peers. Meanwhile, fruit and vegetable intake remained insufficient across all subgroups, characterized by weekly consumption and rare daily intake. Likewise, processed foods and fat-rich products were not incorporated into the daily diet for most individuals, regardless of BMI or coffee intake frequency. These findings highlight a general trend of low adherence to the recommended daily intake of nutrient-dense foods, especially fruits and vegetables, and a reliance on frequent but not daily intake of high-calorie processed items. The results suggest a need for targeted nutritional interventions to promote healthier eating habits, particularly among students with higher BMI and those with habitual coffee consumption.

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الملخص باللغة العربية

تناول الطعام بناءً على استهلاك القهوة ومؤشر كتلة الجسم بين طلاب الجامعات الذكور

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الملخص

القهوة من أكثر المشروبات استهلاكًا على مستوى العالم، حيث تحتوي على أكثر من 1000 مركب فعّال. وتُعدّ من بين أفضل المشروبات التي خضعت للدراسة، إلا أن هناك عددًا محدودًا من الدراسات التي تناولت تأثير استهلاك القهوة و/أو الكافيين على استهلاك الطاقة والتحكم في وزن الجسم.

هدفت هذه الدراسة إلى تقييم العادات الغذائية لدى مستهلكي القهوة في عينة الدراسة، بالإضافة إلى استكشاف العلاقة بين استهلاك القهوة وتناول بعض الأطعمة.

أُجريت دراسة مقطعية شملت 150 طالبًا من كلية الزراعة في جامعة جرش الخاصة، حيث أكملوا استبانات ذاتية التعبئة. وتضمنت الاستبيانات بيانات حول معلومات عامة عن المشاركين، واستهلاكهم للقهوة، وقياسات الجسم، بالإضافة إلى البيانات الغذائية.

أظهرت النتائج أن الطلاب غير البدناء الذين يشربون القهوة أقل من مرة واحدة يوميًا أفادوا بمعدل انتشار أسبوعي أعلى بشكل ملحوظ لاستهلاك الفلفل الأخضر أو الأحمر (65.6٪) من الطلاب البدناء (21.6٪،قيمة بي=٠,٠٠٣). استهلك أكثر من نصف الطلاب الخبز الأبيض يوميًا؛ ومع ذلك، لوحظ فرق كبير بين مستهلكي القهوة يوميًا، حيث كان الطلاب البدناء وأفادوا باستهلاك يومي أعلى (70.5٪ مقابل 62.2٪) وأسبوعيًا (25.0٪ مقابل 10.8٪) مقارنة بالطلاب غير البدناء. كما كشفت النتائج أن مستهلكي القهوة أقل من مرة واحدة يوميًا، والأفراد غير البدناء كانوا أكثر عرضة بشكل كبير للإبلاغ عن عدم استهلاكهم أبدًا (46.9٪) أو شهريًا (28.1٪) لخبز القمح الكامل مقارنة بنظرائهم البدناء (40.5٪ و13.5٪ على التوالي، قيمة بي= ٠,٠٢٦).

في الختام، أظهر طلاب الجامعات أنماطًا غذائية دون المستوى الأمثل، اتسمت بعدم كفاية تناول الفاكهة والخضراوات يوميًا، وكثرة تناول الأطعمة المكررة والمصنعة. وبينما كانت أنماط الاستهلاك العامة متسقة بين مجموعات مؤشر كتلة الجسم واستهلاك القهوة، تشير اختلافات محددة إلى أن كلا العاملين قد يؤثر على خيارات غذائية معينة. تسلط هذه الرؤى الضوء على الحاجة إلى تدخلات غذائية محددة لتحسين جودة النظام الغذائي لدى هذه الفئة.

الكلمات المفتاحية: القهوة، مؤشر كتلة الجسم، السلوك الغذائي، المجموعات الغذائية، طلاب الجامعات