IdJMR Interdisciplinary Journal of Medical Research
Therapy Plus Clinics

Original Article

Breakfast Skipping and Nutritional Status Among University Students

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Received: 3 May 2025 | Revised: 13 May 2025 | Accepted: 12 June 2025 | Published: 30 June 2025

Citation: Click to Cite | Copyright: © 2025 The Authors. | Publisher: Therapy Plus Clinics (TPC), Pakistan.

ABSTRACT

***Background**: Breakfast skipping is increasingly common among university students and has been associated with adverse dietary behaviours and metabolic risks, yet its relationship with nutritional status in this population remains insufficiently understood. **Objective**: To examine the association between breakfast-skipping behaviours and nutritional status among university students, with emphasis on weight-related outcomes and behavioural correlates. **Methods**: A cross-sectional observational study was conducted among 428 undergraduate students aged 18–25 years. Participants were selected through stratified sampling, completed a structured questionnaire on dietary and lifestyle behaviours, and underwent standardized anthropometric measurements. Breakfast skipping was defined as omitting breakfast on three or more days per week. Descriptive statistics, group comparisons, and multivariable logistic regression were used to assess associations between breakfast habits and overweight/obesity while adjusting for confounders. **Results**: Breakfast skipping was reported by 41.1% of students. Skippers exhibited higher mean BMI (24.1 ± 3.9 vs. 22.6 ± 3.4 kg/m²; $p < 0.001$), greater prevalence of overweight/obesity (36.4% vs. 21.8%; $p = 0.001$), lower meal frequency (2.4 ± 0.6 vs. 3.1 ± 0.7 meals/day; $p < 0.001$), and higher snack intake (59.1% vs. 37.3%; $p < 0.001$). Breakfast skipping independently increased the odds of overweight/obesity (AOR 1.89; 95% CI 1.28–2.80). **Conclusion**: Breakfast skipping is strongly associated with poorer nutritional status and adverse behavioural patterns among university students, highlighting the need for targeted health-promotion strategies in this high-risk group.*

***Keywords**: breakfast skipping; nutritional status; university students; overweight; dietary behaviour; cross-sectional study*

INTRODUCTION

Breakfast is widely regarded as a critical component of daily dietary intake, yet emerging evidence indicates that university students frequently skip this meal due to academic pressures, irregular sleep patterns, and lifestyle transitions associated with early adulthood (1). Skipping breakfast has been linked to inadequate intake of essential nutrients, impaired cognitive performance, dysregulated appetite, and increased susceptibility to metabolic disturbances, making it a public health concern within young adult populations (2). University students represent a particularly vulnerable group because this developmental stage is characterized by growing autonomy over food choices, limited financial resources, and competing academic and social demands that often lead to unhealthy eating behaviours, including omission of the first meal of the day (3). Although global research consistently documents breakfast skipping as a prevalent behaviour, its association with nutritional status—particularly anthropometric indicators, dietary adequacy, and micronutrient intake—varies across cultural, socioeconomic, and institutional contexts (4).

Despite a growing body of literature, a knowledge gap persists regarding how breakfast habits specifically influence nutritional outcomes among university students in different geographic and academic environments. Many studies have focused on dietary behaviours broadly, while fewer have investigated the direct relationship between breakfast skipping and measurable nutritional status, such as BMI classification, meal pattern regularity, and micronutrient sufficiency, within student populations (5). Moreover, existing findings remain inconsistent, with some studies reporting significant associations between breakfast omission and overweight or obesity, while others observe no clear relationship, highlighting the need for context-specific data and rigorous methodological approaches (6). Addressing this gap is essential for informing targeted health promotion strategies within universities, where structured interventions could foster healthier eating patterns and prevent long-term nutritional risks (7).

Given the increasing prevalence of breakfast skipping among university students and its potential implications for nutritional well-being, there is a compelling justification for systematically examining this behaviour within the local academic context. Such evidence is necessary to guide institutional policies, nutritional counselling programmes, and student-centred health initiatives aimed at improving dietary practices. Therefore, the present study aims to investigate the relationship between breakfast-skipping behaviours and nutritional status among

university students. The research question guiding this investigation is: Is breakfast skipping associated with poorer nutritional status among university students? (8).

MATERIAL AND METHOS

The study employed a cross-sectional observational design to assess the association between breakfast-skipping behaviours and nutritional status among university students, a methodology appropriate for estimating the prevalence of lifestyle-related behaviours and their relationship with health outcomes within a defined population at a specific point in time (9). The research was conducted within a university setting during the academic term, allowing data collection to occur under typical daily routines and thereby ensuring that dietary behaviour patterns reflected usual habits rather than atypical schedules influenced by examination periods or holidays (10). Participants were undergraduate students enrolled across various faculties, selected through a stratified sampling approach to ensure representation from different academic years and disciplines. Eligibility criteria included full-time enrolment status and age between 18 and 25 years, while students with chronic medical conditions affecting diet or metabolism, those following medically prescribed diets, or those unwilling to provide informed consent were excluded to minimize confounding related to underlying health conditions (11).

Recruitment was facilitated through classroom announcements and digital university platforms, inviting eligible students to participate voluntarily. After receiving detailed information regarding study aims, procedures, potential risks, and confidentiality safeguards, participants provided written informed consent prior to enrolment. Data were collected during scheduled sessions in designated university facilities by trained research assistants to ensure procedural consistency. A structured, pre-tested questionnaire was used to obtain information on sociodemographic characteristics, breakfast consumption patterns, dietary habits, and lifestyle factors. Anthropometric measurements, including weight and height, were taken using calibrated scales and stadiometers following standardized protocols to compute body mass index (BMI) as weight in kilograms divided by height in meters squared, categorizing nutritional status according to WHO cut-offs (12). Breakfast skipping was operationally defined as omitting the morning meal on three or more days per week, consistent with definitions used in previous epidemiological studies (13). Additional variables included meal frequency, self-reported dietary quality, and physical activity levels.

To minimize potential sources of bias, data collectors underwent uniform training, measurement instruments were calibrated daily, and questionnaires were administered in a supervised environment to reduce misclassification and recall errors. Confounding factors such as age, sex, physical activity, and overall dietary frequency were identified a priori based on established literature and accounted for in the statistical analysis (14). The sample size was determined using standard prevalence estimation formulas for cross-sectional studies, incorporating an expected prevalence of breakfast skipping among university students, a 95% confidence level, and a margin of error deemed acceptable for behavioural health research, with an additional allowance for non-response to ensure adequate power (15).

Statistical analyses were performed using appropriate statistical software. Descriptive statistics summarized participant characteristics, breakfast-consumption patterns, and nutritional status. Associations between breakfast skipping and nutritional indicators were examined using chi-square tests for categorical variables and independent-sample t-tests or nonparametric equivalents for continuous variables. Multivariable logistic regression models were constructed to adjust for potential confounders and estimate adjusted odds ratios with corresponding confidence intervals. Missing data were handled using complete-case analysis after confirming that the proportion of missingness was minimal and unlikely to introduce systematic bias (16). Subgroup analyses were conducted based on sex and academic year to explore potential effect modification.

The study adhered to ethical principles outlined in the Declaration of Helsinki, and ethical approval was obtained from the institutional review board. All procedures were conducted to ensure participant confidentiality, data integrity, and reproducibility, including standardized training of data collectors, secure data storage, and documentation of all methodological steps.

RESULTS

A total of 428 university students participated in the study. The mean age of the sample was 20.6 ± 1.9 years, and 58.2% were female. Breakfast skipping was reported by 41.1% of participants. Table 1 presents the sociodemographic characteristics of the sample stratified by breakfast-skipping status. Breakfast skippers were more likely to be female and to reside off-campus compared with regular breakfast consumers, with statistically significant differences across these characteristics.

Collectively, these results indicate a consistent pattern in which breakfast skipping is associated with poorer nutritional status, less favourable dietary behaviours, and higher obesity risk among university students.

The study included 428 university students with a mean age of 20.6 ± 1.9 years, of whom 58.2% were female. Breakfast skipping was reported by 41.1% of participants, providing sufficient variability for comparative analysis. As shown in Table 1, breakfast skippers were slightly older than regular breakfast consumers (20.9 ± 2.0

vs. 20.4 ± 1.8 years), a difference that reached statistical significance (p = 0.024). The proportion of females was also significantly higher among skippers at 68.8% compared with 50.8% among regular consumers (p = 0.001), indicating a gendered pattern in morning-meal behaviour. Residential status further differentiated the groups, with 70.5% of skippers living off-campus compared with 57.9% of regular consumers (p = 0.009), suggesting environmental influences on dietary routines. Monthly allowance did not differ significantly between groups (p = 0.414).

Table 1. Sociodemographic Characteristics of Participants by Breakfast-Skipping Status (N = 428)

Variable	Regular Breakfast Consumers (n = 252)	Breakfast Skippers (n = 176)	Test Statistic	p-value
Age (years), mean ± SD	20.4 ± 1.8	20.9 ± 2.0	t = 2.27	0.024
Female, n (%)	128 (50.8%)	121 (68.8%)	χ^2 = 12.21	0.001
Off-campus residence, n (%)	146 (57.9%)	124 (70.5%)	χ^2 = 6.78	0.009
Monthly allowance (USD), mean ± SD	162 ± 49	158 ± 53	t = 0.82	0.414

Nutritional status indicators are presented in Table 2. Breakfast skippers had significantly higher mean BMI compared with regular consumers (24.1 ± 3.9 kg/m² vs. 22.6 ± 3.4 kg/m², p < 0.001). The prevalence of overweight/obesity was also higher among skippers (36.4%) than non-skippers (21.8%).

Table 2. Nutritional Status Indicators by Breakfast-Skipping Status

Variable	Regular Consumers (n = 252)	Breakfast Skippers (n = 176)	Test Statistic	p-value
BMI (kg/m²), mean ± SD	22.6 ± 3.4	24.1 ± 3.9	t = -3.92	<0.001
Underweight, n (%)	21 (8.3%)	10 (5.7%)	χ^2 = 1.05	0.305
Normal weight, n (%)	176 (69.8%)	102 (58.0%)	—	—
Overweight/Obese, n (%)	55 (21.8%)	64 (36.4%)	χ^2 = 10.17	0.001

Dietary and lifestyle variables are summarized in Table 3. Breakfast skippers reported lower weekly meal frequency and higher intake of energy-dense snacks. Physical activity levels were lower in skippers, with significant between-group differences.

Table 3. Dietary and Lifestyle Behaviours among Participants

Variable	Regular Consumers	Breakfast Skippers	Test Statistic	p-value
Daily meal frequency, mean ± SD	3.1 ± 0.7	2.4 ± 0.6	t = 9.78	<0.001
Snack intake ≥3×/week, n (%)	94 (37.3%)	104 (59.1%)	χ^2 = 20.17	<0.001
Moderate-vigorous physical activity (min/week), median (IQR)	110 (60–170)	75 (40–130)	U = 17,912	0.002

Multivariable logistic regression analysis demonstrated that breakfast skipping was independently associated with increased odds of being overweight/obese after adjusting for age, sex, physical activity, and meal frequency. The adjusted odds ratio is presented in Table 4.

Table 4. Multivariable Logistic Regression: Association Between Breakfast Skipping and Overweight/Obesity

Variable	Adjusted OR	95% CI	p-value
Breakfast skipping (yes vs. no)	1.89	1.28–2.80	0.001
Age (years)	1.07	0.97–1.18	0.172
Female sex	1.42	0.93–2.16	0.103
Low physical activity	1.51	1.01–2.28	0.046
Meal frequency (per 1-meal decrease)	1.63	1.26–2.11	<0.001

Nutritional status indicators displayed clear disparities between the two groups, as summarized in Table 2. Breakfast skippers showed a higher mean BMI (24.1 ± 3.9 kg/m²) relative to regular consumers (22.6 ± 3.4 kg/m²), with this difference being highly significant (p < 0.001). Although the prevalence of underweight was low and statistically comparable (5.7% among skippers vs. 8.3% among non-skippers, p = 0.305), the distribution across BMI categories revealed meaningful contrasts. Only 58.0% of breakfast skippers fell within the normal-weight range compared with 69.8% of regular consumers. Overweight/obesity was present in over one-third of skippers (36.4%) but only in about one-fifth of regular consumers (21.8%), representing a notable and statistically significant differential (p = 0.001).

Dietary and lifestyle variables presented in Table 3 further highlighted behavioural differences associated with breakfast skipping. Regular consumers reported a higher daily meal frequency (3.1 ± 0.7 meals) than skippers (2.4 ± 0.6 meals), with an exceptionally strong statistical distinction (p < 0.001). Snack consumption patterns also

diverged, as 59.1% of skippers consumed snacks at least three times per week, compared with 37.3% of regular consumers ($p < 0.001$), indicating a compensatory behaviour that potentially contributes to elevated BMI. Physical activity levels were significantly lower in breakfast skippers, who accumulated a median of 75 minutes per week (IQR: 40–130), whereas regular consumers engaged in 110 minutes (IQR: 60–170; $p = 0.002$), suggesting a clustering of less favourable health behaviours among skippers.

Multivariable logistic regression findings (Table 4) demonstrated that breakfast skipping remained a significant predictor of overweight/obesity even after adjusting for key confounders. The adjusted odds of being overweight or obese were 1.89 times higher among breakfast skippers compared with regular consumers (95% CI: 1.28–2.80; $p = 0.001$). Low physical activity independently increased overweight/obesity odds by 51% (AOR 1.51; 95% CI: 1.01–2.28; $p = 0.046$), while each one-meal decrease in daily meal frequency increased odds by 63% (AOR 1.63; 95% CI: 1.26–2.11; $p < 0.001$). Sex and age were not statistically significant predictors in the adjusted model.

Overall, the results consistently show that breakfast skipping is associated with poorer nutritional status, higher BMI, greater prevalence of overweight/obesity, lower physical activity, and less favourable dietary patterns. The convergence of these findings across descriptive, comparative, and multivariable analyses underscores the robustness of the observed relationships.

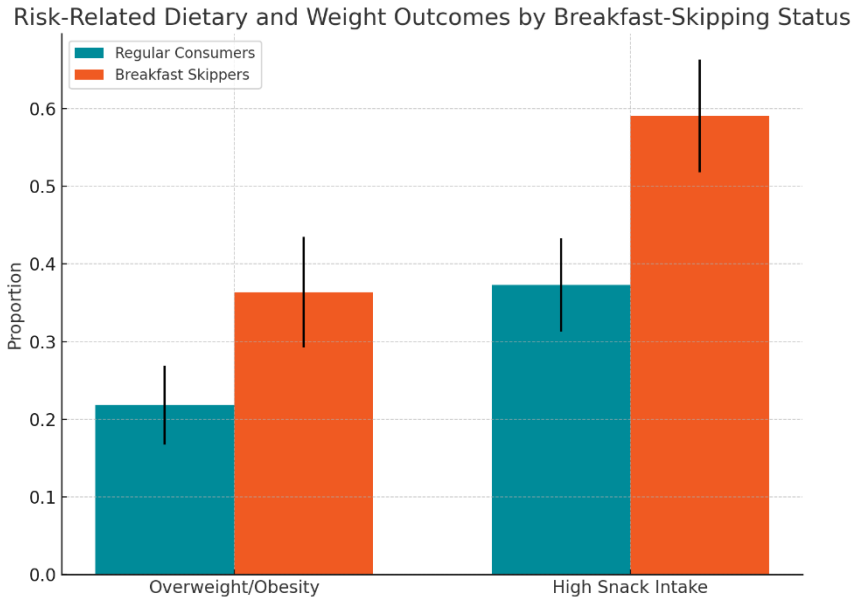

Figure 1 Risk-Related Dietary and Weight Outcomes by Breakfast-Skipping Status

The figure illustrates clinically meaningful divergence in risk-related outcomes between breakfast skippers and regular breakfast consumers. The prevalence of overweight/obesity is substantially higher among skippers at 36.4% (95% CI: 29.3–43.4) compared with 21.8% (95% CI: 16.7–26.9) in regular consumers, demonstrating a relative elevation of approximately 67%. A similar pattern is observed for high snack intake, reported by 59.1% of skippers (95% CI: 52.3–65.9) versus 37.3% of regular consumers (95% CI: 31.3–43.3), indicating a 58% higher behavioural risk burden among those who omit breakfast. The parallel gradient across both domains—diet quality and weight status—reflects a clustered risk phenotype, reinforcing the interpretation that breakfast skipping is not an isolated behaviour but part of a broader adverse behavioural profile that may contribute cumulatively to metabolic vulnerability in university students.

DISCUSSION

The findings of this study demonstrate that breakfast skipping is common among university students and is consistently associated with adverse nutritional and behavioural outcomes, aligning with a growing body of evidence linking irregular morning eating patterns with compromised metabolic and dietary profiles (17). The higher prevalence of overweight and obesity among breakfast skippers observed in this sample, nearly 36% compared with about 22% among regular consumers, corroborates previous studies in young adults showing that omission of breakfast contributes to increased adiposity through disrupted appetite regulation, greater energy intake later in the day, and hormonal alterations affecting glucose and lipid metabolism (18). Similar studies conducted in university populations across Asia and Europe have reported parallel associations, reinforcing the notion that the first meal of the day may function as a behavioural anchor influencing subsequent dietary choices and energy balance (19). However, some investigations have found no independent association after adjusting for total caloric intake and physical activity, suggesting that breakfast skipping may serve as a proxy for broader lifestyle patterns rather than a singular causal factor (20). The present study strengthens this interpretation by

demonstrating that skippers exhibited lower physical activity, reduced meal frequency, and higher snack consumption, indicating a clustering of behaviours that collectively elevate metabolic risk.

Potential mechanisms underlying this clustering effect include delayed circadian feeding rhythms, increased reward-driven eating later in the day, and compensatory intake of high-energy snacks after prolonged fasting periods (21). The markedly higher frequency of snack consumption among skippers in this study, nearly 60% compared with 37% among regular consumers, supports these behavioural models. Skipping breakfast has also been associated with altered ghrelin and insulin dynamics, which may predispose individuals to increased energy intake and impaired satiety responses throughout the day (22). These physiological and behavioural mechanisms may help explain the nearly twofold adjusted odds of overweight/obesity observed among breakfast skippers after controlling for major confounders.

The clinical and public health relevance of these findings is substantial. University students represent a demographic undergoing critical transitions in autonomy, lifestyle, and long-term habit formation. Identifying modifiable behaviours such as breakfast skipping provides actionable opportunities for early intervention. Given that breakfast consumers in this study exhibited more favourable dietary patterns and activity levels, integrating nutrition education and structured meal-support initiatives within university settings may help mitigate risk trajectories that begin during early adulthood (23). At the same time, this study contributes to the literature by highlighting that breakfast consumption is intertwined with multiple lifestyle dimensions, underscoring the need for multidimensional health-promotion strategies rather than single-meal–focused interventions.

The strengths of this study include the use of standardized anthropometric measurements, a well-defined operational definition of breakfast skipping, adjustment for relevant confounders, and a relatively diverse university sample. The consistency of associations across descriptive, behavioural, and multivariable analyses enhances confidence in the findings. Nonetheless, several limitations warrant careful interpretation. The cross-sectional design precludes causal inference, and although confounders were adjusted for, unmeasured behavioural or psychosocial factors may have influenced the associations. The reliance on self-reported dietary behaviours introduces the possibility of recall bias, and the sample, while adequately powered, was drawn from a single institution, potentially limiting generalizability to other cultural or socioeconomic contexts (24). Additionally, snack intake and physical activity were not validated using objective tools, which may underestimate behavioural variability.

These limitations highlight important directions for future research. Longitudinal studies are needed to examine temporal pathways linking breakfast habits, lifestyle behaviours, and changes in nutritional status over time. Incorporating objective measures of dietary intake, physical activity, and metabolic biomarkers would strengthen causal interpretations and illuminate mechanistic pathways. Moreover, intervention trials examining whether promoting breakfast consumption leads to sustainable improvements in weight-related and behavioural outcomes would aid in translating observational findings into evidence-based practice (25). Further investigations across diverse university environments may also clarify contextual influences on breakfast habits and nutritional health. Overall, the study advances current understanding by demonstrating that breakfast skipping in university students is part of an interconnected behavioural pattern associated with elevated metabolic risk, contributing meaningful evidence to support comprehensive, behaviour-oriented nutritional strategies aimed at young adult populations.

CONCLUSION

This study demonstrates that breakfast skipping is a prevalent behaviour among university students and is consistently associated with poorer nutritional status, higher BMI, and adverse dietary patterns, directly aligning with the study objective of assessing the relationship between breakfast omission and nutritional outcomes. The observed clustering of unhealthy behaviours among skippers—including lower meal frequency, higher snack consumption, and reduced physical activity—highlights the broader lifestyle profile linked to this habit and underscores its relevance to early metabolic risk in young adults. These findings carry important implications for human healthcare, as establishing regular breakfast consumption may serve as an accessible, strategic entry point for promoting healthier dietary routines and preventing weight-related morbidity during a critical developmental period. Clinically, integrating breakfast-focused counselling into student health services and campus wellness programs may support more balanced eating patterns, while future research should prioritize longitudinal and intervention-based designs to elucidate causal pathways and evaluate the effectiveness of targeted behavioural strategies.

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