JOURNAL OF BASHIR INSTITUTE OF HEALTH SCIENCES

RESEARCH ARTICLE

OPEN ACCESS

ARTICLE INFO
Received: 06 May 2026
Revised: 01 June 2026
Published online: 30 June 2026

Comparison of Frequency of GIT-Related Health Issues Between Day Scholar and Hostelite Undergraduate Students in Relation to Diet, Exercise and Smoking

[a]Noor ul Ain, [b]Fatima Balquis*, [a]Iqra sharif, [a]Manahil Fayaz, [a]Ayesha Ayub, [a]Spogmai Sajjad

[a]Peshawar Medical College, Peshawar, Pakistan
[b]Department of Clinical Pharmacy Practice, Shifa Tameer e Millat University Islamabad, Pakistan

*CORRESPONDENCE
Dr. Fatima Balquis
Department of Clinical Pharmacy Practice, Faculty of Pharmaceutical Sciences, Shifa Tameer e Millat University, Islamabad, Pakistan
fatima.scps@stmu.edu.pk

ABSTRACT

Background: Gastrointestinal (GIT) health is an important marker of individual well-being and may be impacted by diet, exercise, smoking, and living conditions. Undergraduate students represent a population particularly vulnerable to lifestyle-related GIT disorders, yet limited comparative data exist between hostelites and day scholars in Pakistan. To assess the difference in frequency of GIT health issues between hostelite and day scholar undergraduate students in relation to their dietary habits, exercise patterns, and smoking status. **Methodology:** We conducted a comparative descriptive cross-sectional study among 385 undergraduate students from institutions in Peshawar between 20th November 2023 and 12th January 2024. Convenience sampling was used for participant recruitment. Dietary intake and GIT symptoms were assessed using the Short-Form Food Frequency Questionnaire (SFFFQ) and the Gastrointestinal Symptom Rating Scale (GSRS), respectively. Statistical analyses including independent samples t-tests, Spearman's rank correlation for categorical variables, and Pearson's product-moment correlation for continuous variables were performed using SPSS version 25. **Results:** Of 385 participants, 210 were day scholars and 175 were hostelites. Approximately 42–45% in each group reported none to minimal GIT complaints, and total GIT symptom scores did not differ significantly between groups ($t = 0.109$, $p = 0.913$). Day scholars had a higher mean Dietary Quality Score (DQS) than hostelites (9.62 ± 1.49 vs. 9.29 ± 1.60; $p = 0.038$). Current smoking was somewhat more common among day scholars (6.7% vs. 3.4%). Correlation analysis identified significant associations between GIT symptoms and both dietary quality ($r = 0.177$, $p = 0.019$) and smoking status ($\rho = 0.179$, $p = 0.018$) in hostelites only. Hunger pains were the only individual GSRS symptom significantly elevated in hostelites ($p = 0.019$). **Conclusion:** Overall GIT symptom burden was similar between day scholars and hostelites, though day scholars had significantly better dietary quality. Associations between diet, smoking, and GIT symptoms were observed only in hostelites, suggesting that residential living may heighten susceptibility to lifestyle-related GIT risk factors though causal conclusions cannot be drawn from this cross-sectional study.

Keywords: *gastrointestinal health, diet, exercise, smoking, undergraduate students, hostelites, day scholars, Peshawar, GSRS, DQS*

INTRODUCTION

Gastrointestinal health is widely recognised as a sensitive indicator of overall well-being, and undergraduate students represent a population in which it merits particular attention. The university years bring substantial lifestyle transitions disrupted meal

routines, academic stress, reduced physical activity, and, for many students, the first sustained period away from home all of which may place the gut under stress. In Pakistan, close to 1.96 million students are currently enrolled in tertiary education, making this a meaningful public health concern. Within this population, the distinction between hostelites and day scholars is clinically relevant for several reasons. Hostelites relinquish control over their food environment: they depend on institutional canteens or street vendors, have no parental supervision of meal timing or food quality, and are more exposed to irregular sleep and eating schedules driven by communal living. Day scholars, by contrast, typically return home for meals and retain access to home-cooked food. These structural differences make the two groups a natural comparison for studying how residential environment shapes health behaviours and their downstream consequences. Functional GIT disorders including dyspepsia, IBS, and gastro-oesophageal reflux are common in young adults and substantially affect academic performance and quality of life [1,2]. If hostel living is associated with greater GIT symptom burden or different lifestyle risk profiles, there is a clear case for targeted institutional health interventions. Yet this comparison has received relatively little systematic attention in the Pakistani context.

Diet is one of the most reliably identified influences on GIT function. Low-fibre, high-processed food intake and irregular meal timing are associated with acid reflux, dyspepsia, IBS, and functional constipation [3,4]. Among college students specifically, a 2025 study in India found that those eating low-fibre, high-sodium ultra-processed foods reported more constipation and poorer bowel habits [5], while a 2024 narrative review highlighted how economic constraints, academic stress, and limited nutritional knowledge compound the risk of diet-related health problems in university populations [6]. Functional GIT disorders appear to be common in this age group: a 2024 cross-sectional study in Bangladesh identified irregular meals, meal source, insufficient physical activity, and psychological stress as significant predictors of GIT disorder burden in students [7], and a study of Yemeni medical students similarly pointed to dietary habits as a key driver of IBS prevalence [8].

GERD prevalence tends to be lower in Asian than Western populations, a difference often attributed to the protective influence of traditional dietary patterns [9]. In Pakistani urban settings, however, the rapid spread of processed and fast food culture may be eroding this advantage, and it cannot be taken for granted in the current student generation. Smoking is a separate and well-established risk factor for GIT disease. It is causally linked to GERD, peptic ulcer disease, and inflammatory bowel conditions through impaired mucosal defence, increased gastric acid secretion, and delayed ulcer healing [10]. A 2023 Mendelian randomisation study provided genetic-level evidence for the causal relationship between smoking and both gastric and duodenal ulcer risk [11], while a global burden of disease analysis identified smoking as a continuing contributor to peptic ulcer mortality, particularly among young adult males [12].

Regular physical activity is broadly beneficial for gut health. Moderate exercise improves intestinal motility, reduces systemic inflammation, and strengthens gut barrier function, with evidence of benefit across GERD, IBS, and functional constipation [13]. A 2025 systematic review found that walking, cycling, and yoga were each associated with improved GIT outcomes, though very high-intensity prolonged exercise could paradoxically worsen symptoms in some individuals [14]. Physical activity also appears to influence the gut microbiome, promoting microbial diversity and short-chain fatty acid production, which may provide additional GIT benefits independent of motility effects [15].

Some relevant prior work exists from Pakistan and the region. Hassan et al. [16] found that hostel students commonly adopted sedentary habits, with around 70% reporting regular junk food consumption, while Zaheer et al. [17] observed poorer dietary and lifestyle behaviours among hostelites compared to day scholars, though their outcome focus was on psychological rather than GIT health. Safdar et al. [18] validated the use of food frequency questionnaires in Pakistani adults and identified associations between dietary patterns, tobacco use, and physical activity. Li et al. [19] reported higher dyspepsia prevalence in female and senior-year Chinese undergraduates without examining lifestyle predictors, a gap the present study set out to address. To our knowledge, no study in Peshawar has simultaneously examined diet, smoking, exercise, and GIT symptom burden in hostelites and day scholars using validated measurement tools.

Research Objectives

1. To investigate the dietary patterns and exercise behaviours of day scholar and hostelite students in relation to their gastrointestinal health.

2. To assess the frequency of gastrointestinal symptoms and examine associations with diet, exercise, and smoking in both groups.

3. To identify differences in frequency of GIT symptoms between day scholar and hostelite students.

Volume 7, Issue 1, 2026 | https://doi.org/10.53576/bashir.007.01.0311

Hypotheses

H_0: There is no difference in frequency of GIT-related diseases between hostelites and day scholars.

H_1: There is a greater frequency of GIT-related diseases in hostelites than in day scholars.

METHODOLOGY

Study Design

This was a comparative descriptive cross-sectional study comparing GIT symptom frequency and its associations with lifestyle factors between hostelite and day scholar undergraduates across multiple institutions in Peshawar, Pakistan.

Study Setting and Duration

Participants were recruited from nine educational institutions in Peshawar: Peshawar Medical College, Kabir Medical College, Sardar Begum Dental College, Rufaidah Nursing College, Peshawar Dental College, and the English, Pharmacy, and Microbiology departments of the University of Peshawar, as well as Federal Government College for Boys Peshawar. Data collection took place between 20th November 2023 and 12th January 2024.

Sample Size and Sampling

The required sample size was calculated using Raosoft software. In the absence of a published prevalence estimate for GIT symptom burden specifically in this student population, a conservative proportion of 50% was used, which maximises the required sample size and thus errs on the side of adequacy. Based on an estimated total enrolled undergraduate population of approximately 10,000 across the nine institutions, a 50% response distribution, 5% margin of error, and 95% confidence level, the minimum required sample was calculated as 370; a target of 385 was set to account for potential incomplete responses. Participants were recruited through convenience sampling: members of the research team approached students directly in classrooms, common areas, and library spaces during the data collection period, and those who met the inclusion criteria and provided written consent were enrolled. Enrolment was conducted across all nine institutions, though allocation was not formally stratified by institution; as a result, institutional representation was not equal and this should be considered a limitation when generalising findings. Students with a confirmed diagnosis of diabetes mellitus or hypertension were excluded to minimise the confounding effect of established medical conditions on GIT symptom reporting. Additional exclusion criteria included: current use of medications known to affect GIT function (e.g. NSAIDs, proton pump inhibitors, antibiotics within the previous four weeks), and unwillingness to provide informed consent.

Research Instruments

Short-Form Food Frequency Questionnaire (SFFFQ): A validated short-form food frequency questionnaire was used to assess dietary intake. Prior to administration, the questionnaire was reviewed by two nutritionists with expertise in Pakistani dietary practices. Items that were culturally irrelevant or rarely consumed in the local context (e.g., certain Western processed foods) were replaced with locally consumed equivalents of comparable nutritional category (e.g., local fried snacks, traditional bread types). The adapted instrument was piloted on a small group of 20 students before the main data collection to confirm item comprehensibility; minor wording adjustments were made based on this feedback. Internal consistency of the adapted SFFFQ in the current sample was acceptable (Cronbach's $\alpha = 0.71$). The questionnaire yielded a Dietary Quality Score (DQS); a score of ≥ 9 was classified as meeting the healthy dietary threshold [20].

Gastrointestinal Symptom Rating Scale (GSRS): A validated 15-item instrument assessing the frequency and severity of GIT symptoms over the preceding seven days. Each item is rated on a seven-point scale (0 = absent, 6 = very severe). Total scores were classified as follows: none to minimal (0–7), mild (8–14), moderate (15–21), moderate-to-severe (22–28), and severe (>28). The GSRS has established reliability and validity across multiple populations and has been used extensively in student health research [21].

Statistical Analysis

Data were analysed using SPSS version 25. Prior to parametric testing, normality of continuous outcome variables was assessed using the Shapiro-Wilk test and inspection of Q-Q plots; total GIT symptom scores were approximately normally distributed in both groups, supporting the use of independent samples t-tests. Descriptive statistics were generated for all variables.

Volume 7, Issue 1, 2026 | https://doi.org/10.53576/bashir.007.01.0311

Independent samples t-tests were used to compare continuous outcomes between groups, with effect sizes reported as Cohen's d (small: 0.2, medium: 0.5, large: 0.8) and 95% confidence intervals provided for key mean differences. Pearson's product-moment correlation (r) was applied to assess associations between dietary quality score, exercise frequency, and total GIT symptom burden. Smoking status was coded as an ordinal variable with three levels (1 = never smoked, 2 = ex-smoker, 3 = current smoker) and its association with GIT symptoms was examined using Spearman's rank correlation (ρ), which is appropriate for ordinal exposures. Statistical significance was set at $p < 0.05$. Given the exploratory nature of this study, formal Bonferroni correction for the 15 individual symptom comparisons was not applied; however, p-values are reported as observed and readers should note that one or more false positives among 15 comparisons would be expected by chance at $\alpha = 0.05$ alone.

Ethical Considerations

This study was granted ethical approval by the Ethical Review Committee (Undergraduate) of Prime Foundation Pakistan, based at Peshawar Medical College, Warsak Road, Peshawar (Approval No.: Prime/ERC/2024-67; approved 27th September 2023).

RESULTS

Demographic Characteristics

A total of 385 students were enrolled: 210 day scholars (54.5%) and 175 hostelites (45.5%). Day scholars were on average slightly younger (20.78 ± 1.49 vs. 21.34 ± 1.44 years). Both groups were predominantly male (54.8% and 57.1%, respectively), and most students in each group rated their overall health as either good or excellent/very good. All students with diabetes or hypertension were excluded before analysis. Demographic details are presented in Table 1.

Table 1: Demographic Characteristics of Study Participants

Characteristic	Day Scholars (n=210)	Hostelites (n=175)	Total (N=385)
Age (years), Mean ± SD	20.78 ± 1.49	21.34 ± 1.44	21.03 ± 1.49
Male, n (%)	115 (54.8%)	100 (57.1%)	215 (55.8%)
Female, n (%)	95 (45.2%)	75 (42.9%)	170 (44.2%)
Overall Health – Excellent/Very Good, n (%)	92 (43.8%)	70 (40.0%)	162 (42.1%)
Overall Health – Good, n (%)	83 (39.5%)	74 (42.3%)	157 (40.8%)
Overall Health – Fair/Poor, n (%)	35 (16.7%)	31 (17.7%)	66 (17.1%)

SD = Standard Deviation. Diabetic and hypertensive participants were excluded.

GIT Symptom Severity

GIT symptom profiles were broadly comparable between groups. Around 42–45% of students in each group fell into the none-to-minimal symptom category, and severe symptoms were reported by 11.0% of day scholars and 9.7% of hostelites. Mean total GIT sum scores were nearly identical: 17.16 ± 15.75 for day scholars and 17.33 ± 15.35 for hostelites. The independent samples t-test found no statistically significant difference between groups ($t = 0.109$, $p = 0.913$; Cohen's $d = 0.01$, 95% CI for mean difference: 3.23 to 2.89), confirming a negligible effect size. These data are summarised in Table 2.

Table 2: Distribution of GIT Symptom Severity Between Groups

GIT Severity Category	Day Scholars n (%)	Hostelites n (%)	Total n (%)	p-value
None to Minimal	89 (42.4%)	78 (44.6%)	167 (43.4%)	
Minimal	51 (24.3%)	32 (18.3%)	83 (21.6%)	
Moderate	27 (12.9%)	29 (16.6%)	56 (14.5%)	
Moderate to Severe	20 (9.5%)	19 (10.9%)	39 (10.1%)	
Severe	23 (11.0%)	17 (9.7%)	40 (10.4%)	
Total GIT Sum Score, Mean ± SD	17.16 ± 15.75	17.33 ± 15.35	17.24 ± 15.54	0.913

Independent samples t-test used for Total GIT Sum Score.

Dietary Quality, Smoking, and Exercise

Volume 7, Issue 1, 2026 | https://doi.org/10.53576/bashir.007.01.0311

Day scholars had a significantly higher mean DQS (9.62 ± 1.49) compared to hostelites (9.29 ± 1.60; mean difference = 0.33, 95% CI: 0.02 to 0.64; p = 0.038; Cohen's d = 0.21, a small effect). Smoking rates were low in both groups; current smokers were more frequent among day scholars (6.7% vs. 3.4%), with the majority of participants in both groups never having smoked. Exercise participation was similar across groups, with 61.9% of day scholars and 64.0% of hostelites reporting some physical activity. These findings are presented in Table 3.

Table 3: Dietary Quality, Smoking Status, and Exercise Participation by Group

Variable	Day Scholars	Hostelites	p-value
Dietary Quality Score (DQS)			
Mean ± SD	9.62 ± 1.49	9.29 ± 1.60	p = 0.038
DQS ≥ 9 (Healthy), n (%)	173 (82.4%)	130 (74.3%)	—
DQS < 9 (Suboptimal), n (%)	37 (17.6%)	45 (25.7%)	—
Smoking Status			
Current Smoker, n (%)	14 (6.7%)	6 (3.4%)	—
Ex-Smoker, n (%)	16 (7.6%)	16 (9.1%)	—
Never Smoked, n (%)	179 (85.2%)	152 (86.9%)	—
Exercise Participation			
Any Exercise, n (%)	130 (61.9%)	112 (64.0%)	—
Light Exercise, n (%)	62 (29.5%)	61 (34.9%)	—
No Exercise, n (%)	80 (38.1%)	63 (36.0%)	—

** p < 0.05. DQS cut-off = 9 (healthy ≥ 9).*

Individual GIT Symptom Analysis

Of the 15 individual GSRS symptoms examined, hunger pains were the only item that differed significantly between groups, with hostelites scoring notably higher (1.937 ± 1.778 vs. 1.543 ± 1.519; mean difference = 0.39, 95% CI: 0.07 to 0.72; p = 0.019; Cohen's d = 0.24, a small effect). All other symptoms — including heartburn, acid reflux, bloating, constipation, diarrhoea, and incomplete emptying — showed no statistically significant between-group differences. Given that 15 comparisons were conducted, the probability of at least one false positive at α = 0.05 by chance alone is substantial; results should therefore be interpreted with appropriate caution, and the hunger pains finding in particular should be replicated before being treated as definitive. Full data are presented in Table 4.

Table 4: Comparison of Individual GIT Symptom Scores (Mean ± SD)

GIT Symptom	Day Scholars (Mean ± SD)	Hostelites (Mean ± SD)	p-value
Abdominal Pain	1.090 ± 1.440	1.074 ± 1.528	0.915
Heartburn	1.205 ± 1.387	1.371 ± 1.655	0.283
Acid Reflux	1.067 ± 1.368	1.276 ± 1.432	0.145
Hunger Pains	1.543 ± 1.519	1.937 ± 1.778	p = 0.019
Nausea	0.986 ± 1.392	1.097 ± 1.674	0.476
Rumbling	1.338 ± 1.570	1.223 ± 1.505	0.465
Bloating	1.290 ± 1.606	1.200 ± 1.365	0.556
Burping	1.057 ± 1.440	1.194 ± 1.596	0.376
Gas / Flatus	1.248 ± 1.682	1.063 ± 1.407	0.249
Constipation	1.157 ± 1.537	1.091 ± 1.529	0.676
Diarrhea	0.876 ± 1.523	0.663 ± 1.192	0.132
Loose Stools	0.857 ± 1.362	0.777 ± 1.180	0.543
Hard Stools	1.052 ± 1.538	1.131 ± 1.497	0.612
Urgency of Stools	1.062 ± 1.516	1.057 ± 1.401	0.975
Incomplete Emptying	1.329 ± 1.815	1.183 ± 1.594	0.408

** p < 0.05. Scale: 0 = no discomfort, 6 = very severe discomfort. Independent samples t-test.*

Pearson's Correlation Analysis

Volume 7, Issue 1, 2026 | https://doi.org/10.53576/bashir.007.01.0311

Correlation analysis showed a notable contrast between the two groups. Among day scholars, none of the lifestyle variables were significantly associated with total GIT symptom score: dietary quality (r = 0.120, p = 0.082), smoking status (ρ = 0.103, p = 0.138), or exercise frequency (r = 0.023, p = 0.740). Among hostelites, however, both dietary quality (r = 0.177, p = 0.019) and smoking status (ρ = 0.179, p = 0.018) were significantly associated with GIT symptom burden, though the effect sizes were modest. It should be noted that the number of current smokers in the hostelite group was small (n = 6), which limits the statistical power of the smoking correlation; this finding should therefore be interpreted cautiously. Exercise frequency showed no significant association in either group. These relationships are illustrated in Figure 1.

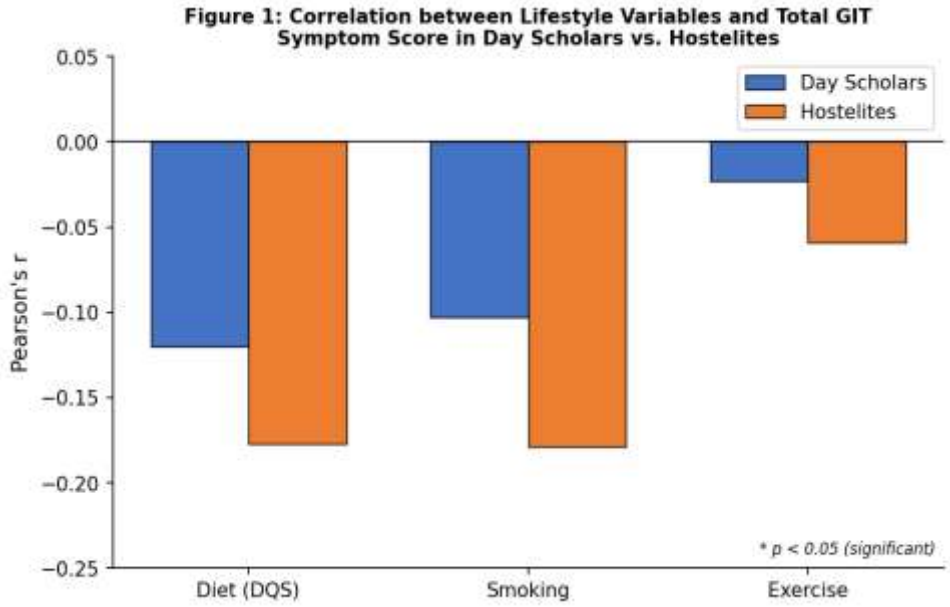

Figure 1: Pearson's Correlation Coefficients between Lifestyle Variables and Total GIT Symptom Score in Day Scholars vs. Hostelites. * p < 0.05 in hostelites.

DISCUSSION

To our knowledge, this is one of the first studies to directly compare GIT symptom profiles between hostelite and day scholar undergraduates in Peshawar using both a validated symptom scale and an objective dietary quality score. The finding that overall GIT symptom burden did not differ significantly between groups echoes similar null results in comparable settings: a cross-sectional study of Bangladeshi students found no significant difference in GIT symptom scores between subgroups with differing living arrangements [7], and Hassan et al. [16], working specifically in Pakistani hostel students, found that despite poorer dietary habits, hostelites did not report markedly greater GIT complaints than commuters. At face value, these convergent findings suggest that living arrangement alone does not reliably determine gut health, at least in populations where overall dietary quality remains within a broadly acceptable range.

That said, the picture is more nuanced than a single p-value suggests. Among hostelites, both dietary quality and smoking status were associated with GIT symptom burden (diet: r = 0.177, p = 0.019; smoking: ρ = 0.179, p = 0.018), while neither association was observed in day scholars. This pattern is consistent with the idea that students living in hostels — where food choice is more constrained and home support is absent — may be more vulnerable to the gut-related consequences of poor diet or tobacco use, though the cross-sectional design of this study does not permit causal conclusions. This is broadly in line with Almoraie et al.'s [6] observation that compounding lifestyle pressures in university settings heighten diet-related health risks, and with evidence that dietary quality has a more pronounced relationship with GIT health when individual food control is reduced [3,4].

The modestly but significantly higher DQS among day scholars (9.62 vs. 9.29, p = 0.038; Cohen's d = 0.21) is consistent with the expectation that access to home-cooked meals confers a nutritional advantage over reliance on canteen or street food. Hassan et al. [16] and Zaheer et al. [17] both documented widespread consumption of fried, processed, and nutritionally poor foods among hostel students in Pakistani university settings. Safdar et al. [18], in a dietary patterns study of Pakistani adults, found that irregular eating and dependence on vendor-prepared food were associated with lower dietary quality. The present data align with this work. Importantly, both group means still exceeded the healthy DQS threshold of 9, which likely explains why the dietary

Volume 7, Issue 1, 2026 | https://doi.org/10.53576/bashir.007.01.0311

difference did not produce a corresponding difference in total GIT symptoms neither group was in nutritionally deficient territory by this instrument's criteria. Studies with greater dietary divergence between living groups would be needed to determine whether larger DQS differences translate into detectable differences in GIT symptom burden.

Current smoking was somewhat more common among day scholars (6.7% vs. 3.4%), which may seem surprising at first glance, but likely reflects the greater autonomy, disposable income, and exposure to peer smoking in public spaces that comes with living off-campus. Similar patterns have been reported in other student cohorts [17]. Despite this higher prevalence, smoking showed no significant association with GIT symptoms in day scholars, possibly because the absolute number of smokers in both groups was small only 14 in the day scholar group and 6 among hostelites. The latter figure, in particular, raises real concerns about statistical power, and the observed correlation in hostelites (ρ = 0.179, p = 0.018) should be interpreted with caution given that the sample of smokers is very limited. That said, the biological plausibility of a smoking–GIT link is well-established: smoking impairs mucosal defence, increases gastric acid output, promotes duodenogastric reflux, and delays ulcer healing [10,11,12]. The fact that this association was detectable only among hostelites may reflect the cumulative effect of an already compromised dietary environment, in which individual risk factors become more consequential.

Hunger pains were the only individual GSRS item to reach significance, and they were meaningfully higher in hostelites (1.937 vs. 1.543, p = 0.019). This makes practical sense: hostel dining operates on fixed schedules that may not align well with individual hunger patterns or the late-night study habits common in this age group, making meal skipping fairly routine. Even in the absence of underlying pathology, irregular eating is known to generate hunger-associated dyspepsia and gastric acid dysregulation [7], and this finding is perhaps the most direct and interpretable effect of the hostel food environment visible in the current data.

The lack of a significant exercise–GIT association in either group is not unexpected, and is consistent with much of the cross-sectional student health literature [8,14]. Exercise is well-established as beneficial for gut motility, inflammation, and microbiome diversity in longitudinal and mechanistic studies [13,14,15], but cross-sectional surveys of student populations who tend toward light activity and have short symptom recall windows frequently fail to capture these effects. Sustained moderate-to-vigorous exercise is probably needed before population-level GIT benefits become detectable, and the exercise profiles in this sample may not have reached that threshold.

This study has several strengths worth noting: it drew on a multi-institutional sample, used validated and locally adapted instruments, and examined three lifestyle domains simultaneously in a population that has received limited attention in GIT research. That said, its limitations should be acknowledged. The cross-sectional design means that no causal conclusions can be drawn from the observed associations. The GSRS relies on a seven-day recall window, which introduces the possibility of recall bias, while self-report of dietary intake and smoking may be subject to social desirability bias. Convenience sampling restricts generalisability to the broader student population. Additionally, the small number of current smokers in both groups particularly hostelites (n = 6) limits the reliability of any smoking-related correlations, and these should not be over-interpreted. Future studies would benefit from longitudinal designs, objective dietary and physical activity monitoring, and sampling strategies that allow broader representativeness across Pakistani university settings.

CONCLUSION

Overall GIT symptom burden did not differ significantly between day scholar and hostelite undergraduates in Peshawar, and the majority of students in both groups reported no more than minimal gastrointestinal complaints. Day scholars had a modestly but significantly better dietary quality score, reflecting the nutritional advantage of home-cooked meals. The most notable finding was that dietary quality and smoking status were each associated with higher GIT symptom burden in hostelites, but not in day scholars a pattern that suggests the residential environment may make students more susceptible to the effects of lifestyle-related risk factors, though causal conclusions cannot be drawn from this cross-sectional data. Hunger pains were significantly more common in hostelites, likely reflecting the constraints of fixed institutional meal schedules. Taken together, these findings point to the potential value of targeted nutritional support, structured meal planning, and smoking cessation resources within university residential settings, and underscore the need for longitudinal research to better understand how student living arrangements shape gut health over time.

Acknowledgements

The authors express their sincere gratitude to Director UMR, Hala Rajab, for her foundational mentorship and facilitation throughout this research. The authors also wish to thank Supervisor Dr. Zia Ul Ain Sabiha and Dr. Hafsa Habib for their invaluable guidance and support.

Author's Contribution

All authors reviewed and approved the version submitted for publication.

Conflicts of Interest

None declared.

Ethical Approval and Consent to Participate

The study was conducted in accordance with the principles of the Declaration of Helsinki. This study was granted ethical approval by the Ethical Review Committee (Undergraduate) of Prime Foundation Pakistan, based at Peshawar Medical College, Warsak Road, Peshawar (Approval No.: Prime/ERC/2024-67; approved 27th September 2023).

Use of Artificial Intelligence

AI-based writing assistance was used during preparation of this manuscript, limited to language editing and restructuring of sentences. All data, analysis, interpretation, and scientific conclusions are entirely the work of the named authors, who take full responsibility for the accuracy and integrity of this submission. AI tools played no part in data generation, reference creation, or the formulation of scientific conclusions.

Funding

No funding was received from any public, commercial, or charitable source for this research.

Data Availability Statement

The datasets generated and analysed in this study are available from the corresponding author on reasonable request.

REFERENCES

1. Steptoe A, Wardle J. Health behaviour, risk awareness and emotional well-being in students from Eastern Europe and Western Europe. Soc Sci Med. 2001;53(12):1621–1630.

2. Esmaillzadeh A, Azadbakht L. Food intake patterns may explain the high prevalence of cardiovascular risk factors among Iranian women. J Nutr. 2008;138:1469–1475.

3. Taraszewska A. Risk factors for gastroesophageal reflux disease symptoms related to lifestyle and diet. Rocz Panstw Zakl Hig. 2021;72(1):21–28. doi:10.32394/rpzh.2021.0145.

4. Ohlsson B, Manjer J. Physical inactivity during leisure time and irregular meals are associated with functional gastrointestinal complaints in middle-aged and elder subjects. Scandinavian journal of gastroenterology. 2016 Nov 1;51(11):1299-307.

5. Ghosh A, Muley A. Ultra-Processed Food Consumption Among College Students and Their Association with Body Composition, Bowel Movements and Menstrual Cycle. International Journal of Public Health. 2025 Apr 8;70:1607712.

6. Almoraie NM, Alothmani NM, Alomari WD, Al-Amoudi AH. Addressing nutritional issues and eating behaviours among university students: a narrative review. Nutr Res Rev. 2025;38(1):53–68. doi:10.1017/S0954422424000088.

7. Roy S, Eva FN, Dev D, Roy S, Tipu SK, Chowdhury S, Medha MR, Poonya PT, Juthi IJ, Nowrin JH, JC E. Prevalence and predictors of functional gastrointestinal disorder among the undergraduate students of Bangladesh. Plos one. 2024 Dec 18;19(12):e0315687.

8. Mahyoub MA, Abbas O, Elhoumed M, et al. Dietary habits as associated factors with irritable bowel syndrome among medical students: a cross-sectional study. BMC Gastroenterol. 2024;24:268. doi:10.1186/s12876-024-03320-w.

9. Zöhrer PA, Unterberger S, Aschauer R, Draxler A, Somloi S, Kapeller M, Bauer T, Heinz C, Reichstam S, Franzke B, et al. The impact of a high-protein diet with strength training on the gastrointestinal microbiota in community-dwelling older adults: subanalysis of a randomized controlled trial. Front Nutr. 2026;12:1712451. doi:10.3389/fnut.2025.1712451.

10. Li L, Chan R, Lu L, et al. Cigarette smoking and gastrointestinal diseases: the causal relationship and underlying molecular mechanisms. Int J Mol Med. 2014;34:372–380.

11. Liu Y, Xiao Z, Ye K, Xu L, Zhang Y. Smoking, alcohol consumption, diabetes, body mass index, and peptic ulcer risk: A two-sample Mendelian randomization study. Frontiers in genetics. 2023 Jan 6;13:992080.

12. Li H, Shi Q, Chen C, Li J, Wang K. Smoking-attributable peptic ulcer disease mortality worldwide: trends from 1990 to 2021 and projections to 2046 based on the global burden of disease study. Frontiers in Public Health. 2024 Dec 17;12:1465452.

13. Al-Beltagi M, Saeed NK, Bediwy AS, El-Sawaf Y, Elbatarny A, Elbeltagi R. Exploring the gut-exercise link: a systematic review of gastrointestinal disorders in physical activity. World J Gastroenterol. 2025;31(22):106835. doi:10.3748/wjg.v31.i22.106835.

14. Katagiri K, Koyama S, Takeda K, Yamada K, Tan K, Kondo H, Otaka Y, Tanabe S. Immediate effect of physical activity on gut motility in healthy adults. Scientific reports. 2025 Sep 29;15(1):33423.

15. Varghese S, Rao S, Khattak A, Zamir F, Chaari A. Physical Exercise and the Gut Microbiome: A Bidirectional Relationship Influencing Health and Performance. Nutrients. 2024;16(21):3663. doi:10.3390/nu16213663.

16. Seven Avuk H, Aydin O, Kocatepe N, Sahin SM, Akdogan I, Cavus E. The investigation of fermented food consumption on gastrointestinal symptoms: a cross-sectional study in university students. PeerJ. 2025;13:e20479. doi:10.7717/peerj.20479.

17. Zaheer M, Kamran H, Hareem M, Babar N, Ijaz M, Abdul-Rauf M. Assessment of Lifestyle and Dietary Habits and its Effect on Psychological Health Among University Students: Effects of Lifestyle and Dietary Habits among University Students. Pakistan Biomedical Journal. 2023 Jan 31:02-8.

18. Safdar NF, Bertone-Johnson E, Cordeiro L, Jafar TH, Cohen NL. Dietary patterns of Pakistani adults and their associations with sociodemographic, anthropometric and life-style factors. J Nutr Sci. 2013;2:e42. doi:10.1017/jns.2013.37.

19. Li M, Lu B, Chu L, et al. Prevalence and characteristics of dyspepsia among college students in Zhejiang Province. World J Gastroenterol. 2014;20(13):3649–3654.

20. Cleghorn CL, Harrison RA, Ransley JK, Wilkinson S, Thomas J, Cade JE. Can a dietary quality score derived from a short-form FFQ assess dietary quality in UK adult population surveys?. Public health nutrition. 2016 Nov;19(16):2915-23.

21. Dimenäs E, Glise H, Hallerbäck B, Hernqvist H, Svedlund J, Wiklund I. Well-being and gastrointestinal symptoms among patients referred to endoscopy owing to suspected duodenal ulcer. Scandinavian journal of gastroenterology. 1995 Jan 1;30(11):1046-52.