

Nutrition Knowledge, Attitudes, and Practices among University Students
and Their Association with Dietary Habits: A Cross-Sectional Study at Iqra
National University, Swat Campus

Humaira Jamal

MS in Human Nutrition & Dietetics, Department of Human Nutrition, Faculty of
Nutritional Sciences The University of Agriculture Peshawar. Pakistan.
hurikhan862@gmail.com

Maisam Ali

Department of Human Nutrition, The University of Agriculture, Peshawar, Pakistan:
Clinical Dietitian, Combined Military Hospital (CMH) Jhelum, Pakistan.
maisamali528@gmail.com

Sawaira Shahid

Department of Human Nutrition, The University of Agriculture, Peshawar, Pakistan
sawairashahid17@gmail.com

Sharif Ullah

Student of BS Nursing, Hasnain college of Nursing & Allied Health Sciences Swat.
sharifand99@gmail.com

Inam Ullah*

Lecturer in Department of Allied Health Sciences, Surgical Technology at IQRA National
University Swat Campus. Corresponding Author Email: inamu536@gmail.com

Abstract

Author Details

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Corresponding E-mails & Authors*:

Inam Ullah

inamu536@gmail.com

Background and Objective: University life is a formative period during which independent food choices become established and may influence long-term health. Nutrition knowledge, attitudes, and practices (KAP) can shape eating behavior, yet evidence from university students in Khyber Pakhtunkhwa is limited. This study assessed nutrition KAP among undergraduate students at Iqra National University, Swat Campus, and examined their association with dietary habits. **Methods:** A descriptive cross-sectional study included 250 undergraduate students selected through stratified random sampling by academic department and year of study (between October 15, 2023, and February 28, 2024). Data were collected using a structured, self-administered questionnaire covering

sociodemographic characteristics, nutrition knowledge, attitudes, practices, and dietary habits. Height and weight were measured to calculate body mass index (BMI). Data were analyzed in SPSS version 27 using descriptive statistics, chi-square tests, and Pearson correlation, with statistical significance set at $p < 0.05$. Ethics approval was obtained from the IERB (Ref: INU/ETH/AHS/2023/042). **Results:** Among 250 participants, 138 (55.2%) were male and 112 (44.8%) were female; mean age was 21.3 ± 2.1 years; mean BMI was 22.4 ± 3.2 kg/m². Good nutrition knowledge was observed in 169 students (67.6%), positive nutrition attitudes in 181 (72.4%), and good nutrition practices in 123 (49.2%). Regular breakfast consumption was reported by 147 participants (58.8%), whereas 161 (64.4%) consumed fast food at least once weekly and 173 (69.2%) regularly consumed sugar-sweetened beverages. Nutrition knowledge and positive attitudes were associated with healthier dietary habits ($\chi^2 = 24.49$, $p < 0.001$ and $\chi^2 = 9.08$, $p = 0.003$, respectively). Nutrition-practice and dietary-habit scores showed a moderate positive correlation ($r = 0.48$, $p < 0.001$). **Conclusion:** Most students demonstrated adequate nutrition knowledge and favorable attitudes, but fewer than half reported good nutrition practices. The observed knowledge-practice gap supports university-based interventions that combine nutrition education with practical behavior-change strategies and healthier campus food environments. Because the study was cross-sectional and based largely on self-reported data, causal inference is not possible.

Keywords: Nutrition knowledge; nutrition attitudes; nutrition practices; dietary habits; university students; healthy eating; Pakistan.

Introduction

University life is a formative stage during which many young adults gain greater independence over food selection, meal timing, and food purchasing. Academic pressure, limited time, financial constraints, living away from family, and the campus food environment can encourage meal skipping and reliance on inexpensive, energy-dense foods. These patterns may persist beyond university and contribute to poor diet quality and future cardiometabolic risk [1,2].

Nutrition knowledge, attitudes, and practices (KAP) provide a useful framework for examining how individuals understand nutrition, perceive healthy eating, and apply this understanding in daily life. Knowledge may support informed choices, but it does not automatically translate into healthier behavior. Attitudes, food availability, cost, convenience, social influence, and practical food skills may strengthen or weaken the relationship between knowledge and actual dietary practice [2–5].

Studies among university populations have consistently identified a gap between nutrition awareness and everyday eating behavior. Research from China reported that

dietary attitude was more closely related to practice than knowledge alone and that the behavioral effect of a single nutrition lecture was short-lived [3]. A systematic review also found substantial variation in nutrition knowledge across university populations and highlighted inconsistent reporting of questionnaire validity and scoring methods [4]. Recent evidence further emphasizes that the university food environment, economic circumstances, and living arrangements influence students' eating patterns [1].

Evidence from Pakistan, particularly Khyber Pakhtunkhwa, remains limited. Local data are needed because dietary practices, food access, educational exposure, and campus environments vary across regions. This study therefore aimed to assess nutrition knowledge, attitudes, and practices among undergraduate students at Iqra National University, Swat Campus, and to examine their association with dietary habits. The findings may inform context-appropriate nutrition education and campus health-promotion strategies.

2. Materials and Methods

2.1 Study Design and Setting

A descriptive cross-sectional study was conducted among undergraduate students enrolled at Iqra National University, Swat Campus, Khyber Pakhtunkhwa, Pakistan, between October 15, 2023, and February 28, 2024. The total eligible undergraduate student population across all allied health science programs during the study term was approximately $N = 1,200$. The sampling frame comprised active undergraduate students across six departments (Radiology, Doctor of Physical Therapy, Medical Laboratory Technology, Dental Technology, Anesthesia Technology, and Surgical Technology) spanning academic years 1 through 4.

2.2 Participants, sample size, and sampling

A sample size of $n = 250$ was determined using Cochran's formula for finite populations [$n = (N \cdot z^2 \cdot p(1-p)) / (e^2(N-1) + z^2 \cdot p(1-p))$], assuming an expected prevalence (p) of 50% for good nutrition practices to yield maximum variance, a 95% confidence level ($z = 1.96$), and a 5% margin of error ($e = 0.05$). Accounting for an anticipated non-response rate of 10%, a total of 278 students were approached.

- **Eligibility Criteria:** Full-time undergraduate students aged ≥ 18 years who provided written informed consent.

- **Exclusion Criteria:** Students with prior formal tertiary qualifications in dietetics, those with diagnosed metabolic disorders requiring medical nutrition therapy, or incomplete questionnaires ($< 80\%$ completion).

Stratified random sampling was applied with proportional allocation based on departmental enrolment sizes. Within each department stratum, individual participants

were selected via simple computer-generated random number sampling from registrar class lists. Out of 278 approached, 250 completed the survey, yielding a response rate of 89.9%.

2.3 Data-collection instrument and measurements

Data were collected using a structured, self-administered questionnaire adapted from previously validated FAO Guidelines for Assessing Nutrition-Related Knowledge, Attitudes, and Practices (KAP) and published literature on university populations. The questionnaire comprised 4 primary domains (35 items total):

- **Knowledge:** 10 multiple-choice/true-false items (score range: 0–10).
- **Attitude:** 8 Likert-scale items (score range: 8–40).
- **Practice:** 10 frequency items (score range: 0–10).
- **Dietary Habits:** 7 items assessing meal timing and food group frequencies (score range: 0–14).

Good knowledge, positive attitude, good practice, and healthy dietary habits were operationalized as achieving scores $\geq 70\%$ of the domain's maximum score.

Operational definitions for 'regular breakfast' was defined as ≥ 5 days/week, and 'regular sugar-sweetened beverages' as ≥ 3 times/week. The instrument was pre-tested on 25 non-sample students to establish face validity and clarity; internal consistency was high (Cronbach's $\alpha = 0.81$ overall; Knowledge $\alpha = 0.78$, Attitude $\alpha = 0.82$, Practice $\alpha = 0.79$). Items in the practice and dietary-habit sections were cross-checked to eliminate redundant questions to avoid artificial inflation of bivariate correlations.

Height (cm) and weight (kg) were measured using a calibrated stadiometer and digital scale (Seca 874), and Body Mass Index (BMI) was categorized according to WHO Asian-specific thresholds ($< 18.5 \text{ kg/m}^2$ underweight, $18.5\text{--}22.9 \text{ kg/m}^2$ normal, $23.0\text{--}27.5 \text{ kg/m}^2$ overweight, $\geq 27.5 \text{ kg/m}^2$ obese).

2.4 Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics version 27. Frequencies and percentages summarized categorical variables, while means and standard deviations summarized continuous variables when distributional assumptions were appropriate. Chi-square tests assessed associations between categorical KAP variables and dietary-habit categories; Fisher's exact test was applied where expected cell counts were < 5 . Pearson's correlation assessed the linear relationship between nutrition-practice and dietary-habit scores. Statistical significance was set at $p < 0.05$, and exact p-values were reported except when $p < 0.001$.

2.5 Ethical Considerations

Ethical approval was granted by the Institutional Ethical Review Board (IERB) of Iqra National University, Swat Campus (Approval Ref No: INU/ETH/AHS/2023/042, approved on October 2, 2023). Participation was voluntary, responses were kept strictly confidential, and informed written consent was acquired from all participants prior to study involvement.

3. Results

3.1 Participant Characteristics

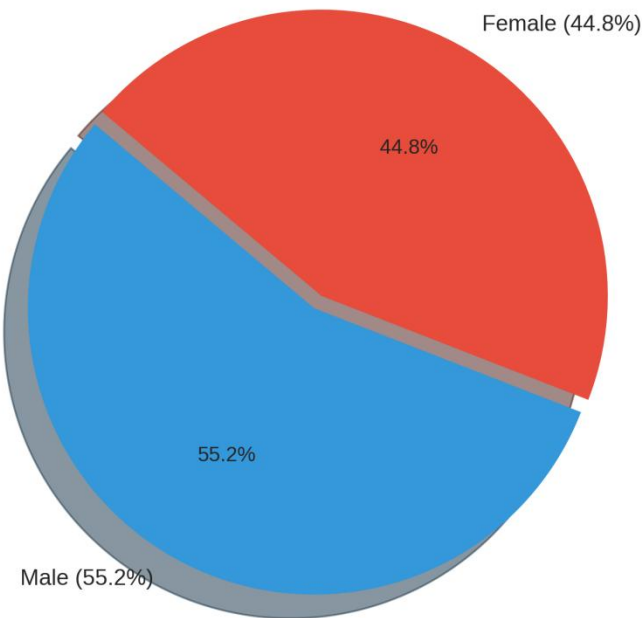
Among the 250 participants, 138 (55.2%) were male and 112 (44.8%) were female. Mean age was 21.3 ± 2.1 years (Table 1). Anthropometric evaluation revealed a mean BMI of 22.4 ± 3.2 kg/m². Overall, 152 (60.8%) had normal BMI, 31 (12.4%) were underweight, 45 (18.0%) were overweight, and 22 (8.8%) were classified as obese according to Asian-specific cutoff criteria (Table 1).

Table 1. Sociodemographic and anthropometric characteristics of study participants (N = 250)

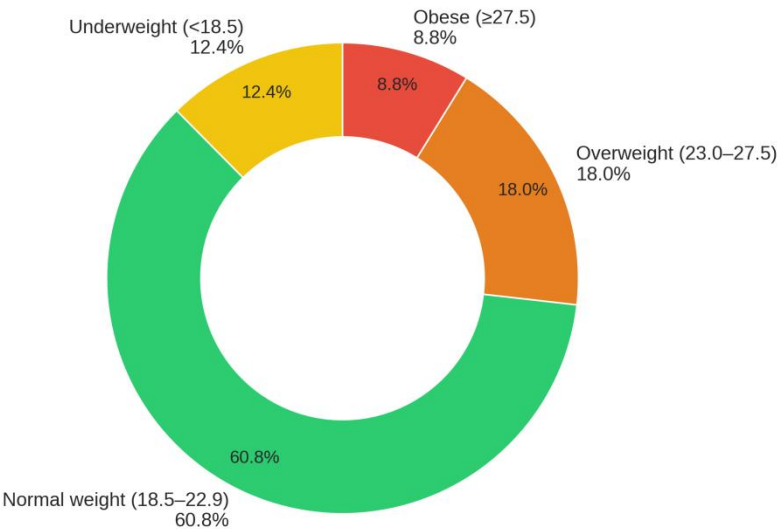
Table 1: Sociodemographic and anthropometric characteristics of study participants (N = 250)

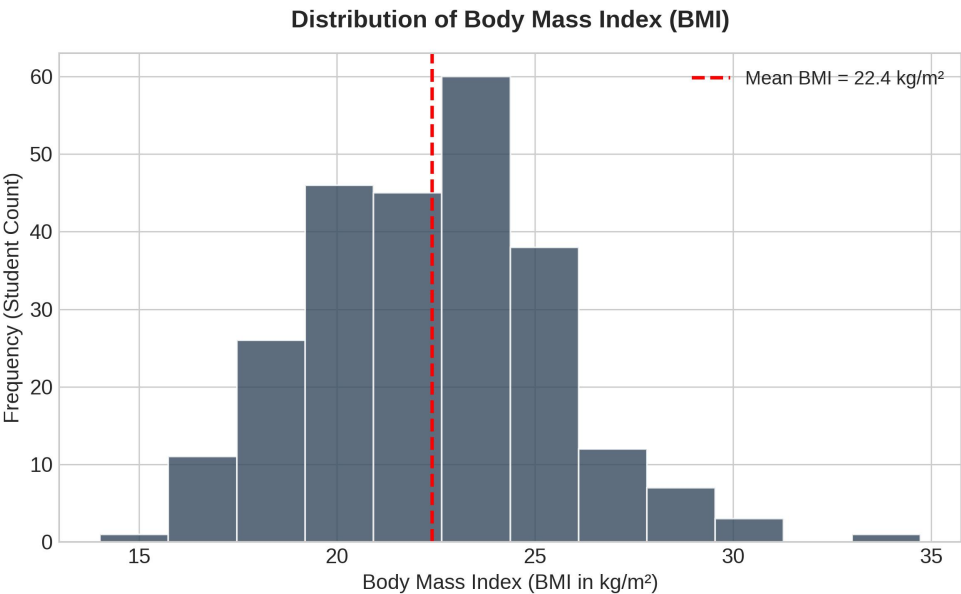
Characteristic	n	%
Gender		
Male	138	55.2
Female	112	44.8
Age (years), mean $\pm$ SD	21.3 $\pm$ 2.1	—
BMI (kg/m ²), mean $\pm$ SD	22.4 $\pm$ 3.2	—
BMI Category (WHO Asian Cutoffs)		
Underweight (< 18.5)	31	12.4
Normal weight (18.5–22.9)	152	60.8
Overweight (23.0–27.5)	45	18.0
Obese ($\geq$ 27.5)	22	8.8
Total Sample Size	250	100.0

Gender Distribution of Participants (N = 250)



BMI Category Distribution (WHO Asian Cutoffs)

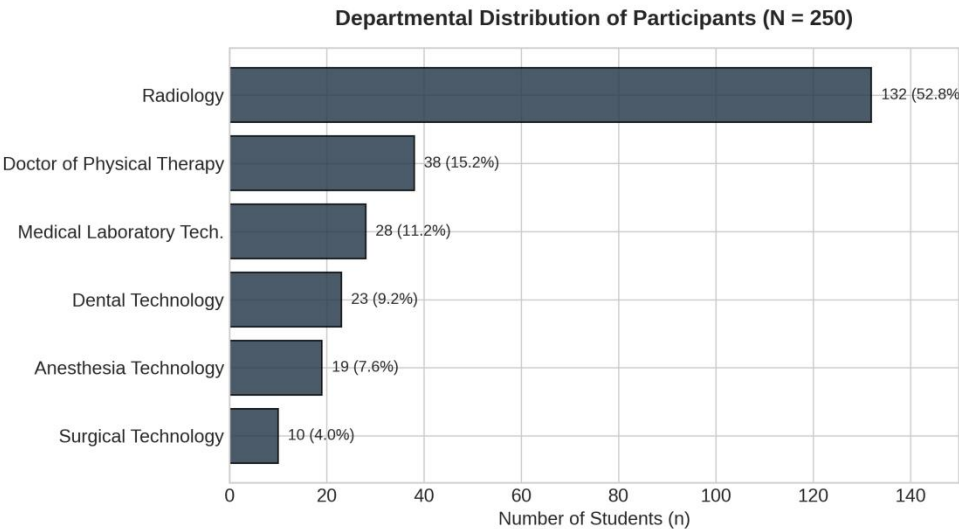




The largest proportion of participants was enrolled in Radiology (132, 52.8%), followed by Doctor of Physical Therapy (38, 15.2%), Medical Laboratory Technology (28, 11.2%), Dental Technology (23, 9.2%), Anesthesia Technology (19, 7.6%), and Surgical Technology (10, 4.0%) (Table 2). This distribution reflects proportional allocation from the underlying university population.

Table 2: *Departmental distribution of study participants (N = 250)*

Department	n	%
Radiology	132	52.8
Doctor of Physical Therapy	38	15.2
Medical Laboratory Technology	28	11.2
Dental Technology	23	9.2
Anesthesia Technology	19	7.6
Surgical Technology	10	4.0

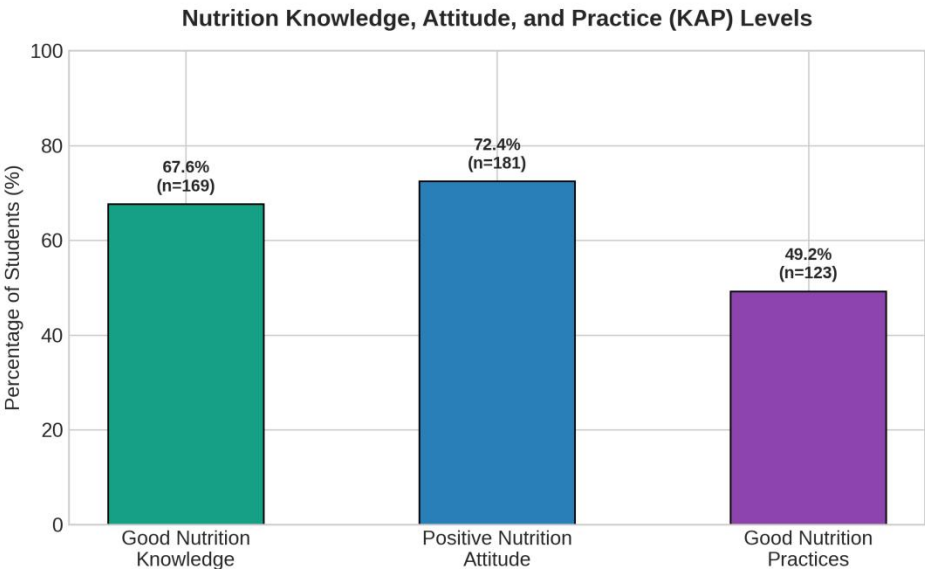


3.2 Nutrition knowledge, attitudes, and practices

Good nutrition knowledge was observed in 169 students (67.6%), and 181 (72.4%) had positive attitudes toward healthy eating. In contrast, 123 students (49.2%) were categorized as having good nutrition practices, indicating a clear gap between awareness and reported behavior (Table 3).

Table 3: *Nutrition knowledge, attitude, and practice categories among participants (N = 250)*

Domain	n	%
Good nutrition knowledge	169	67.6
Positive nutrition attitude	181	72.4
Good nutrition practices	123	49.2

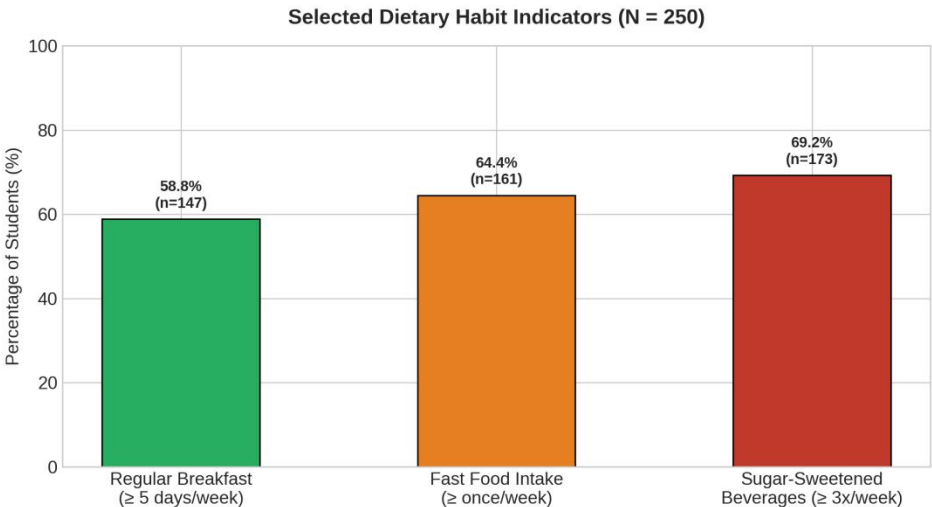


3.3 Dietary habits

Regular breakfast consumption was reported by 147 participants (58.8%). Fast-food consumption at least once weekly was reported by 161 participants (64.4%), and regular sugar-sweetened beverage intake by 173 participants (69.2%) (Table 4).

Table 4: *Selected dietary-habit indicators among study participants (N = 250)*

Dietary Habit Indicator	n	%
Regular breakfast consumption ($\geq$ 5 days/week)	147	58.8
Fast food consumption $\geq$ once/week	161	64.4
Regular sugar-sweetened beverage intake ($\geq$ 3 times/week)	173	69.2



3.4 Associations between nutrition KAP and dietary habits

Higher nutrition knowledge was associated with healthier dietary-habit categories ($\chi^2 = 24.49$, $df = 1$, $p < 0.001$). Positive nutrition attitude was also associated with healthier dietary habits ($\chi^2 = 9.08$, $df = 1$, $p = 0.003$). Nutrition-practice and dietary-habit scores showed a moderate positive correlation ($r = 0.48$, $p < 0.001$) (Table 5). Because the reported analyses are unadjusted, these findings should be interpreted as bivariate associations rather than independent effects.

Table 5: *Associations of nutrition knowledge, attitudes, and practices with dietary habits (*Statistically significant at $p < 0.05$)*

Variable Pair	Statistical Test	Test Statistic	p-value
Nutrition knowledge × Dietary habits	Chi-square	$\chi^2 = 24.49$, $df = 1$	$< 0.001^*$
Nutrition attitude × Dietary habits	Chi-square	$\chi^2 = 9.08$, $df = 1$	0.003^*
Nutrition practices × Dietary habits	Pearson's r	$r = 0.48$	$< 0.001^*$

4. Discussion

This study identified a clear gap between what students knew and believed about healthy eating and what they reported doing in daily life. Although approximately two-thirds had good nutrition knowledge and nearly three-quarters had positive attitudes, fewer than half met the study's criteria for good nutrition practices. Similar knowledge-practice gaps have been described in university populations elsewhere, suggesting that information alone is often insufficient to produce sustained dietary change [1,3–5].

Unhealthy dietary behaviors were common. Nearly two-thirds of participants consumed fast food at least weekly, more than two-thirds regularly consumed sugar-sweetened

beverages, and only 58.8% reported regular breakfast intake. University students often make food choices under constraints related to cost, time, academic workload, living arrangements, cooking facilities, and the availability of healthier foods on campus [1,6]. These contextual factors may help explain why favorable attitudes did not consistently translate into healthy practice.

Nutrition knowledge and positive attitudes were associated with healthier dietary habits in the bivariate analyses. However, the moderate correlation between practice and dietary-habit scores should be interpreted carefully. Items in both domains were reviewed to minimize redundant scoring. Recent research also suggests that attitude and practical capability may be more directly related to dietary practice than knowledge alone [3].

The findings support a multicomponent approach to student nutrition promotion. Brief lectures may improve knowledge but may not produce lasting behavioral change [3]. Universities may obtain greater benefit from combining repeated nutrition education with food-skills training, affordable healthy options in cafeterias, clear menu information, peer-supported activities, and attention to the needs of students living away from home.

This study has several limitations. Its cross-sectional design does not establish temporal or causal relationships. The single-campus setting and the high representation of Radiology students may limit generalizability. Most dietary variables were self-reported and may be affected by recall and social-desirability bias. Future multicampus longitudinal studies should use validated instruments and evaluate whether sustained, context-specific interventions improve dietary behavior.

5. Conclusion

Most students demonstrated adequate nutrition knowledge and favorable attitudes toward healthy eating, but fewer than half were classified as having good nutrition practices. Knowledge and attitudes were associated with healthier dietary habits in unadjusted analyses, and practice scores showed a moderate positive correlation with dietary-habit scores. The findings highlight the need for university initiatives that move beyond information provision and address practical skills and the campus food environment.

Administrative Statements

Conflict of Interest: The authors declare no conflicts of interest.

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Data Availability: The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request and ethical approval.

Authors' Contributions

Humaira Jamal (First Author): Conceived and designed the study, conducted the literature review, developed the research methodology, coordinated data collection, performed data interpretation, drafted the initial manuscript, and incorporated revisions throughout the writing process.

Maisam Ali: Contributed to the study design, assisted with questionnaire development, supervised aspects of data collection, contributed to data interpretation, and critically reviewed the manuscript for important intellectual content.

Sawaira Shahid: Assisted in data collection, data entry, data verification, and literature review, and contributed to manuscript editing and formatting.

Sharif Ullah: Participated in participant recruitment, data collection, data organization, and preliminary data management, and assisted in proofreading the manuscript.

Inam Ullah (Corresponding Author): Supervised the overall research project, refined the study methodology, performed statistical analysis and interpretation of results, critically revised the manuscript for scientific accuracy and intellectual content, coordinated communication with the journal throughout the submission and peer-review process, and approved the final version of the manuscript for publication.

All authors read and approved the final manuscript and agree to be accountable for all aspects of the work, ensuring the accuracy and integrity of the research.

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