International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Website: https://ijmpr.in/

Original Article

Association between Stress, Stress-Related Eating and Waist–Hip Ratio along with Comfort Food Choices among Postgraduate Trainees aged 26-32 years at Gauhati Medical College and Hospital, Guwahati: A Cross-Sectional Study

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Received: 07-04-2026
Accepted: 29-04-2026
Published: 24-05-2026

ABSTRACT

Background: Postgraduate medical training in India is highly demanding. Postgraduate trainees face long working hours and heavy clinical responsibilities, often leading to chronic stress and emotional strain.. Stress is a known trigger for altered eating behaviors, including increased consumption of calorie-dense comfort foods, which may contribute to central adiposity. Data on the relationship between stress, eating behaviors, and obesity markers in Indian postgraduate trainees is limited.

Objectives: To assess the association between stress levels and stress-related eating behaviour among postgraduate trainees at Gauhati Medical College and Hospital, and to determine their relationship with anthropometric markers, specifically waist–hip ratio (WHR) and body mass index (BMI).

Methods:

- This cross-sectional study include 200 postgraduate trainees (100 males, 100 females; age 26–32 years).
- Stress was assessed using Perceived Stress Scale (PSS-10) a validated stress questionnaire, and also trainee-specific stress questionnaire (study-specific and not validated).
- Eating behaviour was evaluated using Salzburg Stress Eating Scale (Meule et al., Appetite, 2018). Another questionnaire also incorporated regionally relevant comfort foods commonly consumed by them (e.g., rice with dal and aloo pitika, maggi, ice-cream and sweets).
- Anthropometric data (height, weight, waist and hip circumference) were collected, and BMI and WHR were calculated.
- Statistical analysis tested correlations between stress scores, eating patterns, and waist–hip ratio.

Results: Average PSS scores are in the moderate-to-high range, with no significant sex difference. Stress-related overeating scores were strongly correlated with PSS ($r \approx +0.59$), while undereating scores were negatively correlated ($r \approx -0.60$). Overeating scores showed only a weak positive correlation with BMI and WHR, suggesting that despite stress-eating, most trainees maintained normal-to-slightly elevated BMI due to intense physical activity. Comfort food preference under stress was reported widely, with staple carbohydrate-rich foods (rice, paratha, Maggi) most common, followed by fried snacks and sweets.

Conclusion: Postgraduate trainees at GMCH experience high levels of stress, and frequently cope through stress-related eating. These findings may highlight the need for stress management interventions to mitigate the burden of occupational stress and obesity risk. Institutions may also implement regular mental health screening, and promote healthy nutrition to mitigate burnout and its physical consequences in trainees.

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***Keywords**: Stress, stress induced eating, post graduate trainees, BMI, WHI, comfort food.*

INTRODUCTION

- Postgraduate medical trainees represent one of the most occupationally stressed groups within healthcare systems due to prolonged working hours, academic demands, sleep deprivation, and high patient responsibility. Previous Indian studies have reported moderate-to-high stress levels among approximately **60–80% of residents**, with burnout and emotional exhaustion being frequent consequences.
- Stress activates the **hypothalamic–pituitary–adrenal (HPA) axis** and sympathetic nervous system, producing neuroendocrine alterations that influence eating behavior. Literature describes stress-induced increases in **cortisol and catecholamines**, which can alter appetite regulation and energy homeostasis.
- Acute and chronic stress can modify feeding behavior through hormones such as **cortisol, ghrelin, leptin, insulin, and neuropeptide Y**. Chronic cortisol elevation has been associated with increased preference for **energy-dense, highly palatable foods rich in sugar and fat**, commonly referred to as comfort foods.
- Stress-related eating responses vary among individuals and may manifest as either:
  - **Overeating (comfort eating)**
  - **Undereating (loss of appetite)**
- Previous experimental and observational studies suggest that stress-induced eating may contribute to adverse anthropometric outcomes, including **increased BMI, abdominal adiposity, and altered waist–hip ratio**, particularly in chronically stressed populations.
- Healthcare trainees represent a unique population because high occupational stress may coexist with **high physical workload and irregular dietary patterns**, potentially modifying the relationship between stress and obesity.
- Limited data are available regarding the interaction between **perceived stress, stress-related eating behavior, anthropometric measures, and food preferences among postgraduate trainees in Northeast India**, creating a need for further investigation.
- Therefore, the present study was undertaken to assess the relationship between stress, stress-induced eating behavior, anthropometric indices, and comfort food choices among postgraduate trainees at Gauhati Medical College and Hospital, Guwahati.

AIM:

To assess the association between perceived stress, stress-induced eating behavior, anthropometric measures, and comfort food choices among postgraduate trainees at Gauhati Medical College and Hospital, Guwahati.

OBJECTIVES:

1. To assess the level of perceived stress among postgraduate trainees using the Perceived Stress Scale (PSS-10).
2. To evaluate stress-related eating behavior using the Salzburg Stress Eating Scale (SSES).
3. To examine the relationship between perceived stress and stress-induced eating behavior among postgraduate trainees.
4. To assess anthropometric parameters including body mass index (BMI) and waist–hip ratio (WHR).
5. To determine the association of stress and stress-related eating behavior with BMI and WHR.
6. To identify commonly preferred comfort foods consumed during stress among postgraduate trainees.

MATERIALS AND METHODS

Study Design

- A cross-sectional, questionnaire-based observational study was conducted among postgraduate trainees of Gauhati Medical College and Hospital, Assam.

Study Population

- Total sample size: 200 postgraduate trainees (PGTs)
- Participants included trainees from both clinical and paraclinical disciplines.

Sampling Method

- Participants were recruited using stratified convenience sampling.

Inclusion Criteria

- Postgraduate trainees of GMCH willing to participate
- Provided written informed consent

Exclusion Criteria

- Endocrine disorders affecting body weight or appetite
- Major psychiatric illness
- Pregnancy
- Participants using medications significantly affecting appetite or metabolism

STUDY INSTRUMENTS

1. **Perceived Stress Scale (PSS-10)**: A validated instrument used to assess perceived stress during the previous month.
2. **Trainee-Specific Stress Questionnaire**: Adopted from previous literature to evaluate occupational stressors specific to resident trainees.
3. **Salzburg Stress Eating Scale (SSES):** A validated 10-item self-report questionnaire assessing changes in eating behavior during stress.
4. **Comfort Food Checklist:** Included commonly consumed Indian comfort foods such as: Rice/Paratha/Maggi/Fried snacks/Tea/Coffee/Sweets/Biryani

ANTHROPOMETRIC ASSESSMENT

- Height, weight, waist circumference, and hip circumference were measured according to WHO guidelines.
- Derived parameters: BMI (kg/m²) and Waist–Hip Ratio (WHR)

STATISTICAL ANALYSIS

- Statistical analysis was performed using IBM SPSS Statistics Version 26.0.
- Tests applied were descriptive statistics, Pearson correlation analysis and Student's t-test
- Correlations were examined between:
  - Stress indices
  - Stress eating scores
  - BMI
  - WHR
- Statistical significance was considered at $p < 0.05$.

RESULTS

1. Study Population Characteristics

- A total of **200 postgraduate trainees** participated in the study.
- The study population consisted of:
  - **100 males**
  - **100 females**
- Participants represented both **clinical and paraclinical disciplines**.

2. Stress Profile Of Participants

A) Perceived Stress Score (PSS)

- The mean **Perceived Stress Score (PSS)** was:
  - Males: **22.6 ± 5.8**
  - Females: **23.4 ± 6.1**
- No statistically significant gender difference was observed (**p = 0.34**).

Interpretation: Both sexes demonstrated **comparable levels of perceived stress**, suggesting similar exposure to occupational and academic stressors.

B. Trainee-Specific Stress

- Mean trainee-specific stress score:
  - Males: **38.1 ± 7.9**
  - Females: **38.7 ± 8.2**
- Difference was **not statistically significant** (**p = 0.65**).

Interpretation: Work-related stress burden appeared relatively uniform among postgraduate trainees.

3. Stress-Induced Eating Behavior

- Mean overeating (SSES) score:

- Males: **29.8 ± 5.9**
- Females: **31.0 ± 6.4**

- Female participants showed **higher stress-eating tendencies**, although the difference was **not statistically significant** (**p = 0.23**).

Interpretation: Female trainees demonstrated a trend toward increased stress-related eating behavior.

4. Anthropometric Findings

Body Mass Index

- Males: **23.9 ± 2.1 kg/m²**
- Females: **24.7 ± 2.3 kg/m²**
- Difference approached significance (**p = 0.052**).

Waist–Hip Ratio

- Males: **0.87 ± 0.03**
- Females: **0.90 ± 0.04**
- Difference was **statistically significant** (**p <0.001**)

Interpretation: Female participants showed significantly greater **central adiposity**.

Table 1: Descriptive Statistics of Study Variables by Gender

Variable	Male (n=100)	Female (n=100)	t-value	p-value
Perceived Stress Score (PSS)	**22.6 ± 5.8**	**23.4 ± 6.1**	**0.95**	**0.34**
Trainee-specific Stress Score	**38.1 ± 7.9**	**38.7 ± 8.2**	**0.45**	**0.65**
Overeating Score (SSES)	**29.8 ± 5.9**	**31.0 ± 6.4**	**1.21**	**0.23**
Body Mass Index (BMI, kg/m²)	**23.9 ± 2.1**	**24.7 ± 2.3**	**1.96**	**0.052**
Waist–Hip Ratio (WHR)	**0.87 ± 0.03**	**0.90 ± 0.04**	**3.92**	**<0.001***

5. Correlation Analysis

Stress and Stress-Eating

- Perceived stress score demonstrated a **moderate positive correlation** with overeating scores: **r = 0.59**
- Correlation was statistically significant.

Interpretation: Increasing stress levels were associated with greater stress-related eating behavior.

Stress and Anthropometric Measures

- Correlation between stress and BMI: **weak positive association**
- Correlation between stress and WHR: **weak positive association**
- Neither reached statistical significance.

Interpretation: Psychological stress alone did not appear to directly influence anthropometric measures.

Stress-Eating and Anthropometric Measures

- Overeating scores showed:
  - Weak positive correlation with BMI
  - Weak positive correlation with WHR
- Associations were not statistically significant.

Interpretation: Stress-related eating showed a tendency toward increased body weight indices but without strong measurable effects.

Table 2: Pearson's Correlation Matrix (r values)

Variable	PSS	Trainee Stress	Overeating	BMI	WHR
PSS	**1**	**0.06**	**0.59***	**0.04**	**0.04**
Trainee Stress	**0.06**	**1**	**0.17**	**−0.10**	**0.03**
Overeating (SSES)	**0.59***	**0.17**	**1**	**0.03**	**0.12**
BMI	**0.04**	**−0.10**	**0.03**	**1**	**0.29***
WHR	**0.04**	**0.03**	**0.12**	**0.29***	**1**

6. Comfort Food Preference

Frequently preferred comfort foods included:

- Tea/Coffee
- Maggi
- Fried snacks
- Rice-based foods
- Sweets and biryani

Interpretation: Preferences predominantly involved **high-calorie, highly palatable carbohydrate-rich foods**, consistent with known stress-eating patterns.

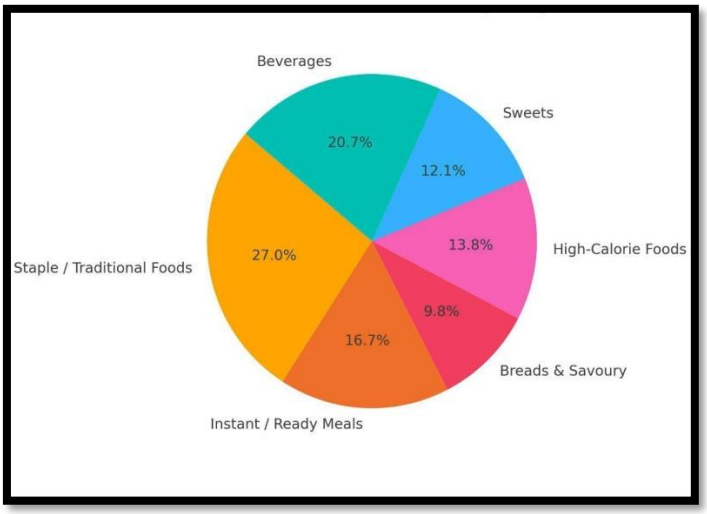

Figure 1: Distribution of comfort food preferences among PGTs in GMCH.

DISCUSSION

1. High prevalence of stress among postgraduate trainees

- In the present study, approximately **88% of postgraduate trainees exhibited moderate-to-high perceived stress levels**, indicating a substantial occupational stress burden.
- These findings are consistent with previous Indian studies reporting **60–80% prevalence of stress and burnout among resident doctors**, attributed to: long duty hours, sleep deprivation, academic pressure and high patient load

2. Stress demonstrated a significant positive relationship with stress-induced eating

- A **moderate positive correlation (r = 0.59)** was observed between perceived stress and overeating scores.
- This suggests that increasing stress levels were associated with increased stress-related eating behavior.

Physiological explanation

- Activation of the HPA axis causes increased **cortisol release**.
- Chronic cortisol elevation may increase appetite, enhance reward-seeking behavior, increase craving for highly palatable foods

These pathways alter hypothalamic appetite regulation and may favor stress-induced food intake.

3. Preference for comfort foods under stress

- Participants frequently preferred foods that are generally: Carbohydrate-rich, high in fat and highly palatable

Possible mechanism

- Palatable foods may stimulate mesolimbic reward pathways and dopaminergic signaling
- Increased dopamine release can temporarily reduce stress perception and improve mood.
- Peer-reviewed studies suggest chronic stress may shift eating preference toward "reward-driven feeding" rather than homeostatic feeding.

4. Weak relationship between stress and anthropometric parameters

- Stress demonstrated only weak, non-significant correlations with: BMI and WHR **Possible explanation:** Despite elevated stress and overeating tendencies, postgraduate trainees may have increased energy expenditure due to increased physical workload. This may partially offset expected increases in body weight.

5. Female participants showed higher stress-eating tendency

- Female participants showed relatively greater overeating scores and significantly higher WHR.

Possible explanation: Previous literature suggests sex differences in: Stress perception, emotional eating patterns and coping strategies. Hormonal influences and behavioral responses may contribute to differences in food choices under stress.

6. BMI showed a positive correlation with WHR

- BMI and WHR demonstrated a positive relationship (**r = 0.29**) indicating that increasing body mass may be accompanied by greater central adiposity.
- Central adiposity is clinically important because it is associated with: metabolic syndrome, cardiovascular risk and insulin resistance

Comparative Context with Previous Literature

- The observed association between stress and eating behavior is comparable with studies by Meule et al. (stress-eating behavior), Indian resident stress studies and burnout studies among postgraduate trainees
- However, unlike some studies demonstrating strong relationships with obesity indices, the current study found only limited anthropometric association.
- This may indicate that stress-related eating and measurable obesity do not necessarily develop simultaneously**.**

LIMITATIONS

1. Cross-sectional study design limits causal inference

- The present study used a **cross-sectional design**, which captures observations at a single point in time.
- Therefore, although associations can be identified, **cause–effect relationships cannot be established**.
- It cannot be determined whether stress caused altered eating behavior, eating patterns influenced stress perception or both influenced each other bidirectionally.

2. Self-reported questionnaires may introduce reporting bias

- Stress and eating behavior were assessed using **self-administered questionnaires**.
- Participants may underreport or overreport: stress levels, food intake and eating behavior
- This may lead to: recall bias and social desirability bias

3. Dietary assessment was qualitative rather than quantitative

- The comfort food checklist identified food preferences, but did not quantify caloric intake, portion size and frequency of consumption
- Therefore, actual dietary load and nutritional contribution could not be assessed.

4. Potential confounding factors were not evaluated

- Several variables capable of influencing stress and anthropometric measures were not assessed, including: physical activity, sleep quality, duty hours and socioeconomic status

5. Anthropometric indices may not reflect long-term effects

- BMI and WHR provide indirect measures of body composition.
- Stress-related metabolic changes may require longer duration before measurable anthropometric alterations become evident.

6. Single-center study

- Participants were recruited only from **Gauhati Medical College and Hospital**.
- Therefore, findings may not be fully generalizable to wider resident populations

7. Biological stress markers were not measured

- Objective physiological markers such as: serum cortisol, salivary cortisol, ghrelin and leptin were not assessed.

CONCLUSION

1. Postgraduate trainees experience substantial occupational stress. A high proportion of postgraduate trainees demonstrated **moderate-to-high perceived stress levels**, indicating a significant mental health burden.

2. Stress demonstrated a significant association with stress-related eating behavior. Increasing stress levels were associated with increased stress-induced eating tendencies.

3. Anthropometric effects were limited despite high stress burden. BMI and WHR showed only weak relationships with stress indices.

4. The findings highlight the need for early stress identification, mental health support programs, nutritional counseling and lifestyle interventions among trainees.

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