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# THE IMPACT OF PSYCHOLOGICAL STRESS ON GASTROINTESTINAL HEALTH: A FOCUS ON GASTRITIS

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## ABSTRACT

**Objectives:** This study aimed to investigate the relationship between psychological stress and symptoms of gastritis among university students in Peshawar.

**Methodology:** A descriptive cross-sectional study was conducted involving 300 undergraduate and postgraduate students aged 18–30 years. The Perceived Stress Scale (PSS) and a gastrointestinal symptom questionnaire were used to gather data via online surveys. Statistical analyses, including descriptive statistics and Pearson's correlation, were performed using SPSS v20.

**Results:** The findings revealed that 61.07% of participants experienced high psychological stress. GI symptoms such as stomach complaints exacerbated by stress (18.85%) and frequent upset stomach (13.52%) were prevalent. Pearson's r indicated moderate correlations between stress indicators especially feelings of nervousness and loss of control and gastric symptoms.

**Conclusion:** Psychological stress significantly correlates with gastritis symptoms among students. Interventions targeting stress management may reduce the incidence of gastritis and improve gastrointestinal and mental well-being.

**Keywords:** Psychological stress, Gut-Brain Axis, Gastritis, Perceived Stress, Gastrointestinal Health.

## INTRODUCTION

Gastrointestinal (GI) health is essential for overall well-being, immune function, and psychological balance. This includes effective nutrient breakdown, a healthy gut microbiota, and prevention of malnutrition and infections. GI disorders are common, with over 60 million people in the U.S. suffering from gastroesophageal reflux disease (GERD) monthly and 10–15% affected by irritable bowel syndrome (IBS).[1] In developing countries, these issues are exacerbated by poor sanitation, while in developed nations, unhealthy diets and sedentary lifestyles contribute to chronic GI disorders. Gastritis, characterised by inflammation of the gastric mucosa, is particularly affected by psychological stress, often triggered by infections such as Helicobacter pylori and prolonged use of NSAIDs.[2] Emerging research highlights the essential role of psychological stress in the initiation and progression of gastritis. Through the physiological mechanisms of the gut-brain axis, psychological stress can alter gastric function by disrupting mucosal defences, increasing acid secretion, and impairing the stomach's natural protective barriers, thereby increasing its susceptibility to inflammation and damage.[3]

The gut-brain axis a bidirectional communication network between the central nervous system (CNS) and the enteric nervous system (ENS) plays a central role in mediating the influence of psychological stress on gastrointestinal health.[4] This complex interaction is facilitated through neural pathways such

as the vagus nerve, neurotransmitters including serotonin and dopamine, and various hormonal and immunological response systems. During episodes of psychological distress, the body releases stress hormones such as cortisol and adrenaline, which in turn trigger physiological changes in the gastrointestinal tract. These include alterations in gastric acid secretion, a pro-inflammatory shift in immune responses, and a reduction in the protective mucus layer of the stomach.[5] Such alterations impair the stomach's defence mechanisms, making it more vulnerable to pathogens, irritants, and subsequent inflammatory responses.

Chronic stress is also associated with the adoption of unhealthy behaviours, such as increased tobacco use, poor dietary choices, alcohol consumption, and irregular eating patterns, all of which are known to exacerbate gastritis. These behaviours may independently irritate the stomach lining but, in conjunction with stress-induced physiological changes, significantly increase the risk of gastric mucosal inflammation.[6] This bidirectional cycle, wherein stress exacerbates gastritis and the resulting symptoms further amplify psychological distress, leads to a cumulative decline in GI and mental health. Given these findings, stress management has emerged as a critical strategy in both the primary prevention and secondary treatment of stress-related GI disorders, particularly gastritis.[7] Recent investigations have further established the involvement of the brain-gut axis, immune modulation, and psychiatric comorbidities, such as anxiety and depression, in linking psychological stress to gastritis. Stress activation of the hypothalamic-pituitary-adrenal (HPA) axis results in elevated levels of gastric acid, increased gut permeability, and a pro-inflammatory state, thereby exacerbating symptoms in individuals predisposed to gastrointestinal (GI) disorders. [8,9]

Furthermore, studies have demonstrated that chronic stress negatively affects gastrointestinal motility, promotes intestinal hyperpermeability, and activates inflammatory responses, all of which elevate the risk for gastritis and other GI inflammatory conditions.[9] This highlights a compelling connection between mental and digestive health that warrants integrated therapeutic approaches. The gender differences have also been identified in stress-related gastritis. Research suggests that men may be at a slightly higher risk for developing both gastritis and associated psychiatric symptoms such as anxiety and depression. This disparity may be attributable to differences in stress response mechanisms, hormonal factors, and sociocultural influences on coping strategies.[10] Another critical aspect linking stress to gastritis is the interaction with infectious agents, particularly *H. pylori*. Psychological stress has been shown to suppress immune function, thereby reducing the body's capacity to control bacterial infections. This immunosuppression may lead to chronic gastric inflammation, suggesting that stress management could enhance immune regulation and aid in preventing gastritis in susceptible individuals.[11]

Proactive interventions for stress-induced gastritis, such as mindfulness-based practices, physical activity, and dietary modifications, have demonstrated efficacy in reducing symptom severity. These lifestyle adjustments address both the psychological and biological underpinnings of the disease. Moreover, avoiding harmful habits like smoking and excessive alcohol consumption can mitigate the deleterious effects of stress on the gastric mucosa.[12] Psychiatric comorbidities further complicate the clinical picture. Patients with anxiety and depressive disorders exhibit a higher incidence of gastritis, indicating that therapeutic strategies should integrate both gastroenterological and psychiatric care. Such integrative models have been shown to reduce symptom burden and improve overall health outcomes.[13] Environmental stressors, such as workplace pressures and strained interpersonal relationships, also contribute to the development and persistence of gastritis. Studies indicate that individuals experiencing chronic life stress report more severe gastritis symptoms compared to those without such stressors. This reinforces the need for holistic treatment strategies that incorporate stress management as a central component of gastritis care.[14] These findings support the incorporation of psychological interventions alongside conventional pharmacological therapies. As understanding of the gut-brain axis deepens, the paradigm of digestive health continues to shift toward one that acknowledges the inseparable links between mental and physical health, particularly in the context of stress-related gastrointestinal disorders.

## METHODOLOGY

The study employed a descriptive cross-sectional design to investigate the correlation between psychological stress and symptoms of gastritis at a specific point in time. This design was chosen due to its cost-effectiveness and suitability for estimating the prevalence and associations between variables within a defined population. However, it is limited by its inability to establish causal relationships and its dependence on self-reported data, which may introduce response biases. The research was conducted between January and March 2025, targeting students enrolled in both public and private universities in Peshawar, Khyber Pakhtunkhwa, Pakistan. A total of 300 participants were recruited through convenience sampling. The inclusion criteria encompassed students aged 18 to 30 years who were currently pursuing undergraduate or postgraduate education and who provided informed consent to participate. Exclusion criteria included individuals with a diagnosed gastrointestinal disorder, those who had used gastrointestinal medications in the past month, and those with comorbid chronic medical or psychiatric conditions. Data collection was conducted using an online, self-administered questionnaire disseminated via university mailing lists and student forums. The questionnaire consisted of four sections: demographic information, the Perceived Stress Scale (PSS) to assess psychological stress levels, a gastrointestinal symptom checklist derived from validated tools to capture the presence and frequency of gastrointestinal symptoms, and a section on bowel habits, including frequency, consistency, and related disturbances. In this study, the independent variables included psychological stress indicators such as feelings of nervousness, perceived loss of control, and emotional strain. In contrast, the dependent variables consisted of symptoms of gastritis, including heartburn, stomach discomfort, vomiting, and indigestion. All responses were coded and analysed, with stress levels evaluated based on PSS scoring thresholds and gastrointestinal symptoms quantified in terms of their frequency and severity. Statistical analysis was conducted using SPSS version 20. Descriptive statistics, including means and percentages, were used to summarise the demographic and clinical characteristics of the participants. Pearson's correlation coefficient was used to assess the relationship between psychological stress variables and gastritis symptoms, with a statistical significance level set at $p < 0.05$.

## RESULTS

In a study of 300 participants, 61.07% reported feeling nervous and stressed, with 48.77% feeling unable to control important aspects of their lives. This lack of control contributed to feelings of anger (44.26%) and upset (43.03%). Many struggled with basic tasks, with 43.03% having difficulties and 36.48% unable to manage responsibilities. These findings highlight significant psychological stress impacting their mental and physical health. GI symptoms associated with stress were observed, including stomach complaints (18.85%), heartburn (11.47%), and upset stomach (13.52%). A small number experienced acute stomach pain (4.92%) and vomiting (4.92%), potentially linked to stress-induced changes in gut motility. The strongest correlation was found between nervousness and stress, as well as stomach complaints linked to worry ($r = 0.372$). Feelings of lacking control showed moderate correlations with several gastrointestinal (GI) symptoms, including frequent heartburn ($r = 0.262$), indigestion ($r = 0.266$), and stomach complaints due to worry ($r = 0.301$). Difficulties accumulating stress also correlated with gastrointestinal (GI) symptoms, notably indigestion ($r = 0.260$) and stomach complaints related to worry ($r = 0.293$). Additionally, the inability to cope correlated moderately with stomach complaints aggravated by worry ($r = 0.338$). Overall, there is a consistent moderate correlation between various stress factors and GI symptoms.

**Table 1: Prevalence of Stress and GI Symptoms**

| Symptom | Stress Prevalence (%) | GI Symptoms Prevalence (%) |
|---|---|---|
| I felt nervous and stressed | 61.07% | - |
| I felt unable to control important things | 48.77% | - |
| Angered due to uncontrollable events | 44.26% | - |
| Upset due to unexpected events | 43.03% | - |
| Difficulties piling up beyond control | 43.03% | - |
| Found unable to cope with responsibilities | 36.48% | - |
| Stomach complaints are often aggravated by worry and tension. | - | 18.85% |
| Frequent heartburn/burning sensation | - | 11.47% |
| Frequent upset stomach | - | 13.52% |
| Acute stomach pain after eating/lying down | - | 4.92% |
| Vomiting of undigested food | - | 4.92% |

**Table 2: Correlation between Stress and GI Symptoms**

| Stress Variable | Frequent Upset Stomach | Frequent Heartburn | Vomiting | Indigestion | Stomach Pain Before Meals | Stomach Complaints Aggravated by Worry |
|---|---|---|---|---|---|---|
| Upset by unexpected events | 0.198 | 0.156 | 0.084 | 0.235 | 0.078 | 0.263 |
| Unable to control important things | 0.247 | 0.262 | 0.117 | 0.266 | 0.146 | 0.301 |
| Nervous and stressed | 0.149 | 0.211 | 0.094 | 0.198 | 0.035 | 0.372 |
| Difficulties piling up | 0.217 | 0.229 | 0.174 | 0.260 | 0.207 | 0.293 |
| Found unable to cope | 0.229 | 0.196 | 0.121 | 0.245 | 0.248 | 0.338 |

## DISCUSSION

The findings of this study underscore a significant association between psychological stress and gastrointestinal disturbances, with a particular emphasis on gastritis-related symptoms among university students. A majority of participants (61.07%) reported experiencing considerable psychological stress, primarily characterised by feelings of nervousness, lack of control, and difficulty coping. These findings mirror global data that highlight academic pressures and transitional life phases as significant contributors to psychological distress among young adults.

This study revealed that psychological stress manifests in somatic symptoms, particularly through gastrointestinal pathways. A moderate to strong correlation was found between feeling nervous or stressed and stomach discomfort worsening with worry ($r = 0.372$), which aligns with previous research emphasising the role of the gut-brain axis in modulating stress-related gastrointestinal dysfunction.[15] This axis serves as a dynamic, bidirectional communication system linking the central nervous system and the enteric nervous system through neural, endocrine, and immune pathways.[4] The release of stress hormones such as cortisol and catecholamines initiates physiological changes that compromise gastric motility, reduce mucosal defences, and increase intestinal permeability, making the gastrointestinal tract more susceptible to inflammation and mucosal injury.[2,5]

Participants who reported a perceived loss of control over important matters also showed an increased prevalence of GI symptoms, including heartburn and indigestion. A notable correlation ($r = 0.301$) between perceived helplessness and worry-induced stomach complaints supports the hypothesis that psychological stress, particularly involving feelings of low autonomy, triggers physiological responses via dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis.[16] This dysregulation contributes to excessive gastric acid secretion and inflammation, thereby aggravating symptoms of gastritis.

Additionally, the study highlights the role of behavioural mediators in this psychosomatic relationship. Chronic stress often fosters maladaptive coping mechanisms such as unhealthy eating, excessive caffeine intake, smoking, and disrupted sleep—all of which independently and collectively deteriorate gastrointestinal health.[17] These lifestyle factors, when combined with stress-induced physiological alterations, synergistically increase the risk of gastritis and other GI pathologies.

This study's findings align with those of Rosenthal et al. (2022), who demonstrated that psychological stress increases intestinal permeability, commonly referred to as "leaky gut," thereby facilitating the translocation of inflammatory mediators and pathogens across the gut epithelium.[9] This breach in intestinal integrity has profound implications for individuals harbouring infections such as *Helicobacter pylori*, where immune suppression from chronic stress impairs pathogen clearance and fosters persistent inflammation.[10]

Furthermore, these results validate the importance of adopting an integrative approach to managing gastritis, one that addresses both the physical and psychological dimensions of health. Previous studies advocate for the incorporation of psychological therapies such as cognitive behavioural therapy (CBT) and mindfulness-based stress reduction (MBSR) as effective interventions for stress-induced gastrointestinal symptoms.[18] These therapeutic approaches have demonstrated dual benefits: reducing perceived stress and eliciting physiological improvements such as reduced inflammation, improved mucosal healing, and enhanced gut motility.

Gender differences also emerged as a relevant factor in this study. Consistent with findings by Abrahams and Zhao (2023), male participants exhibited a higher vulnerability to stress-related gastritis.[12] These differences may stem from varying coping strategies, hormonal profiles, and sociocultural expectations, suggesting the need for gender-sensitive approaches in both research and clinical interventions.[19] These insights contribute to an evolving paradigm that recognises digestive health as intricately linked to psychological well-being. Given that stress is not only a contributing factor but potentially a precipitating agent in the pathophysiology of gastritis, the integration of mental health assessments into gastroenterological care is warranted. This is especially crucial in academic settings, where student populations face unique psychosocial stressors that may predispose them to stress-related GI conditions.

## CONCLUSION

This study reinforces the emerging consensus that psychological stress has profound and measurable effects on gastrointestinal health, particularly in contributing to the onset and exacerbation of gastritis symptoms. It highlights the importance of multidimensional treatment strategies that address the psychological, behavioural, and biological aspects of the disorder. Future research should focus on longitudinal designs to assess causal relationships and evaluate the long-term efficacy of integrated stress reduction programs in reducing the risk of gastritis.

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