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PSYCHOEMOTIONAL AND AUTONOMIC ALTERATIONS IN HELICOBACTER PYLORI-POSITIVE AND HELICOBACTER PYLORI-NEGATIVE GASTRITIS: A COMPARATIVE REVIEW WITHIN THE GUT–BRAIN AXIS FRAMEWORK

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Abstract

Helicobacter pylori infection is a major etiological factor in chronic gastritis and is increasingly being investigated not only as a cause of local gastric inflammation but also as a potential contributor to systemic and neuropsychophysiological alterations. Within the contemporary gut–brain axis framework, chronic H. pylori infection may interact with the intestinal microbiota, inflammatory mediators, the hypothalamic–pituitary–adrenal axis, and autonomic nervous system regulation. **Objective.** The aim of this review was to compare psychoemotional status, sleep-related disturbances, and autonomic nervous system indicators in patients with H. pylori-positive and H. pylori-negative gastritis and to summarize the main mechanisms that may explain these differences. **Materials and Methods.** A narrative comparative review of contemporary publications, predominantly from 2021–2026, was performed. The analysis focused on studies evaluating anxiety and depressive symptoms, sleep quality, gastrointestinal symptom burden, heart rate variability, autonomic balance, H. pylori colonization characteristics, and potential gut–brain axis mechanisms. **Results.** The reviewed literature indicates that H. pylori-positive patients tend to demonstrate a higher prevalence or severity of anxiety, depressive symptoms, sleep disturbances, and alterations in autonomic regulation compared with H. pylori-negative individuals. Several studies describe associations between H. pylori infection and shifts in sympathetic–parasympathetic balance assessed by heart rate variability. Proposed mechanisms include chronic inflammatory signaling, microbiota-mediated changes in neurotransmitter metabolism, activation of the hypothalamic–pituitary–adrenal axis, neuroimmune interactions, and persistent gastrointestinal symptom burden. However, the available evidence does not establish a uniform causal direction. **Conclusion.** H. pylori-associated gastritis may involve clinically relevant psychoemotional and autonomic alterations in addition to gastric mucosal inflammation. Comprehensive assessment of patients with persistent symptoms may therefore benefit from inclusion of psychoemotional and autonomic screening, although further prospective studies are required to clarify causality and determine the effect of eradication therapy on these functional outcomes.

Keywords: Helicobacter pylori, chronic gastritis, psychoemotional status, autonomic dysfunction, heart rate variability, gut–brain axis, anxiety, depression, sleep disorders, hypothalamic–pituitary–adrenal axis.

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INTRODUCTION

Chronic gastritis remains one of the most common disorders encountered in gastroenterological practice, and Helicobacter pylori is recognized as one of its principal etiological factors. Current understanding of H. pylori-associated disease extends beyond local inflammatory injury of the gastric mucosa. Increasing attention is being directed toward the systemic effects of chronic infection and its potential interaction with neuroendocrine, immune, metabolic, and psychophysiological pathways. This broader perspective has been strengthened by the development of the gut–brain axis concept, which describes bidirectional communication between the gastrointestinal tract and the central nervous system through neural, endocrine, immune, and microbial mechanisms. Contemporary consensus documents emphasize that persistent H. pylori colonization leads to chronic gastritis, although a substantial proportion of infected individuals may remain clinically asymptomatic. This dissociation between morphological inflammation and symptom severity suggests that structural assessment alone may not fully characterize the clinical phenotype of H. pylori-associated disease. Psychoemotional status, sleep quality, visceral sensitivity, and autonomic nervous system regulation may influence symptom perception and disease burden, while chronic infection itself may contribute to these disturbances through inflammatory and neuroendocrine mechanisms. Recent studies have reported associations between H. pylori infection and anxiety, depressive symptoms, sleep disturbance, altered heart rate variability, and broader manifestations of gut–brain axis dysregulation. At the same time, it remains unclear whether psychoemotional and autonomic abnormalities are direct consequences of H. pylori infection, pre-existing modifiers of gastrointestinal symptoms, or components of a bidirectional interaction. This uncertainty is clinically important because patients with persistent dyspeptic symptoms may continue to experience reduced quality of life even after successful eradication of the microorganism. The aim of this review was to compare psychoemotional and autonomic indicators in patients with H. pylori-positive and H. pylori-negative gastritis and to analyze the main pathogenetic mechanisms potentially underlying these differences.

MATERIALS AND METHODS

The present study was designed as a narrative comparative review. Scientific publications and consensus materials addressing H. pylori infection, chronic gastritis, psychoemotional disturbances, sleep quality, autonomic nervous system function, heart rate variability, and gut–brain axis mechanisms were analyzed, with emphasis on literature published between 2021 and 2026 while retaining earlier studies of particular relevance to autonomic function. The comparative analysis focused on H. pylori-positive and H. pylori-negative patients and evaluated anxiety and depressive symptoms, affective disturbances, sleep disorders, gastrointestinal symptom burden, autonomic balance, and heart rate variability parameters. Particular attention was given to studies using validated psychometric instruments, including the PHQ-4 and related questionnaires, as well as objective physiological measures such as Holter-based heart rate variability analysis. Potential pathogenetic mechanisms were grouped into inflammatory-immune, microbiota-mediated, neuroendocrine, and autonomic pathways. Because the available studies differed in design, sample size, age distribution, diagnostic methods, assessment instruments, and

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clinical populations, the findings were synthesized qualitatively rather than by pooled statistical analysis.

RESULTS

The reviewed evidence supports a multidimensional relationship between H. pylori infection, psychoemotional status, and autonomic nervous system regulation. From the gastroenterological perspective, H. pylori colonization is associated with chronic mucosal inflammation, and higher colonization density has been related to more pronounced gastric atrophy and intestinal metaplasia in observational studies. These structural changes provide the background for persistent gastrointestinal symptoms and may contribute indirectly to psychophysiological disturbances through chronic symptom burden and inflammatory signaling. The relationship between H. pylori infection and psychoemotional status appears to involve several overlapping mechanisms. One proposed pathway is microbiota-related modulation of neurotransmitter metabolism. Changes in gastrointestinal microbial composition may influence the production or metabolism of signaling molecules associated with serotonin, gamma-aminobutyric acid, and dopamine pathways. A second mechanism involves activation of the hypothalamic–pituitary–adrenal axis, with increased cortisol-mediated stress responses potentially amplifying inflammatory signaling and affecting affective regulation. A third mechanism is chronic neuroimmune activation, in which inflammatory mediators generated during persistent infection may influence central nervous system function indirectly. Meta-analytic and observational evidence reviewed in the source material indicates a positive association between H. pylori infection and anxiety or depressive symptoms. A 2024 systematic review and meta-analysis reported a statistically significant association between H. pylori infection and the risk of anxiety and depression. Community-based data from patients with dyspepsia have also demonstrated a higher frequency of depressive symptoms in the presence of H. pylori infection. More recent cross-sectional evidence has extended this association to a combined phenotype involving gastrointestinal symptoms, sleep disturbance, and affective symptoms. In a study of 969 adults assessed using the 13C-urea breath test, gastrointestinal symptom scales, sleep assessment, and affective questionnaires, greater H. pylori infection burden was associated with increased odds of affective disturbances, sleep impairment, and co-occurrence of gastrointestinal, sleep, and emotional symptoms. These findings suggest that the clinical impact of H. pylori infection may extend beyond the stomach and involve several interacting functional systems. Sleep quality represents an additional dimension of this relationship. Patients with H. pylori-positive gastritis appear to experience sleep disturbances more frequently than H. pylori-negative individuals in several recent studies. The direction of this association remains uncertain, because sleep impairment may arise from nocturnal gastrointestinal symptoms, chronic inflammation, altered stress-axis activity, or affective disturbance, while poor sleep itself can exacerbate pain perception, stress reactivity, and autonomic imbalance. Autonomic nervous system dysfunction has been investigated most objectively through heart rate variability analysis. HRV reflects beat-to-beat variation in cardiac rhythm and provides indirect information about sympathetic and parasympathetic regulation. Systematic review data from functional gastrointestinal disorders indicate that gut–brain axis dysregulation is frequently accompanied by altered HRV patterns. Earlier comparative studies involving H. pylori-

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positive and H. pylori-negative patients reported significant differences in both low-frequency and selected vagal-related HRV parameters. These findings suggest that chronic H. pylori infection may be associated with altered autonomic regulation, although the exact pattern is not uniform across studies. Importantly, autonomic abnormalities do not always normalize immediately following eradication therapy. In patients with chronic duodenal ulcer, persistent autonomic changes have been described after eradication, suggesting that functional dysregulation may outlast microbiological clearance. Conversely, long-term improvements in anxiety and neuroticism after successful treatment have also been reported, supporting the possibility that at least part of the psychoemotional disturbance is secondary to chronic gastrointestinal disease. Comparative interpretation of the available data therefore suggests several recurring differences between H. pylori-positive and H. pylori-negative groups. First, anxiety and depressive symptoms are reported more frequently or more severely in H. pylori-positive patients in many studies, although not all investigations demonstrate uniform differences across all psychometric domains. Second, sleep impairment appears more common in H. pylori-positive patients and often coexists with gastrointestinal and affective symptoms. Third, abnormalities in sympathetic–parasympathetic regulation assessed by HRV may be more pronounced in H. pylori-positive disease. Fourth, similar psycho-autonomic relationships are being considered in children and adolescents, where lifestyle factors and emotional status may influence gastroduodenal symptom burden. Overall, however, the available evidence indicates association rather than definitive causation.

DISCUSSION

The findings of this review support the concept that H. pylori-associated gastritis should be considered not only as a localized inflammatory disorder of the gastric mucosa but also as a condition potentially involving systemic neuroimmune and psychophysiological interactions. The gut–brain axis provides a useful framework for interpreting these observations because it integrates neural, endocrine, immune, and microbial communication between the gastrointestinal tract and the central nervous system. Chronic H. pylori infection may influence emotional status through persistent inflammatory signaling, altered microbial ecology, activation of the hypothalamic–pituitary–adrenal axis, and sustained gastrointestinal symptom burden. At the same time, pre-existing anxiety, depression, chronic stress, or sleep disturbance may intensify dyspeptic symptoms through altered visceral sensitivity, autonomic regulation, and central processing of gastrointestinal signals. The relationship is therefore likely to be bidirectional rather than linear. This distinction is important when interpreting comparative data. A higher prevalence of anxiety or depressive symptoms in H. pylori-positive patients does not establish that the microorganism directly causes psychiatric symptoms. Confounding factors such as age, socioeconomic status, smoking, diet, chronic pain, medication use, symptom severity, and comorbid functional gastrointestinal disorders may contribute to the observed associations. Similarly, HRV abnormalities may reflect chronic inflammation, pain, psychological stress, or other systemic conditions rather than a specific effect of H. pylori alone. Nevertheless, the consistency of several independent lines of evidence supports further investigation of autonomic and psychoemotional dimensions of H. pylori-associated disease. The association between infection severity and co-occurring

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gastrointestinal, sleep, and affective symptoms is particularly relevant because it suggests that the disease burden may be multidimensional. A patient with persistent gastritis symptoms may therefore require evaluation beyond endoscopic or microbiological parameters alone. The role of heart rate variability is also noteworthy. HRV provides a noninvasive and relatively objective approach to evaluating autonomic regulation and may complement psychometric assessment. However, HRV is influenced by numerous factors including age, cardiovascular fitness, medications, respiration, sleep, and metabolic status. Standardized measurement protocols are therefore necessary before HRV can be incorporated routinely into gastroenterological practice. Eradication therapy introduces an additional layer of complexity. Microbiological eradication is essential for management of H. pylori infection, yet resolution of infection does not necessarily imply immediate normalization of functional symptoms, autonomic tone, or psychoemotional state. Persistent symptoms may reflect residual inflammation, established autonomic dysregulation, altered microbiota, visceral hypersensitivity, or comorbid functional disorders. Consequently, persistent complaints after successful eradication should not automatically be interpreted as treatment failure. From a clinical perspective, patients with marked anxiety, depressive symptoms, sleep disturbance, or persistent dyspepsia may benefit from a broader diagnostic approach. Brief validated questionnaires such as GAD-7 or PHQ-4 can identify clinically relevant affective symptoms, while HRV assessment may be considered in research settings or selected patients where autonomic dysfunction is suspected. However, psychoemotional screening should complement rather than replace established diagnostic and eradication strategies. The review also highlights methodological limitations of the current evidence base. Many studies are cross-sectional and cannot establish temporal relationships. Sample sizes and patient populations vary considerably, and some investigations include functional dyspepsia or peptic ulcer rather than isolated chronic gastritis. H. pylori diagnostic methods, psychometric tools, and HRV protocols are heterogeneous, limiting direct comparison. Furthermore, some of the most frequently cited autonomic studies are older and require confirmation using contemporary methodology. Future studies should therefore prioritize prospective longitudinal designs comparing psychoemotional, sleep, inflammatory, and autonomic parameters before and after eradication. Simultaneous assessment of H. pylori status, histological severity, microbiome composition, inflammatory markers, cortisol dynamics, validated psychometric scales, and standardized HRV indices could help determine whether observed changes are causal, secondary, or bidirectionally maintained. Such studies may also identify subgroups most likely to benefit from integrated gastroenterological and psychophysiological management.

CONCLUSION

Current evidence indicates that H. pylori-positive gastritis is associated with a greater burden of psychoemotional disturbances, sleep impairment, and autonomic dysregulation compared with H. pylori-negative gastritis in a substantial proportion of published studies. Potential mechanisms include chronic inflammatory activation, microbiota-mediated alterations in neuroactive signaling, stimulation of the hypothalamic–pituitary–adrenal axis, autonomic imbalance, and the persistent symptom burden of chronic gastrointestinal disease. However, the available literature does not establish a definitive

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causal direction, and the interaction between infection, psychological state, and autonomic regulation is likely to be bidirectional. Comprehensive management of H. pylori-associated gastritis may therefore benefit from consideration of psychoemotional and autonomic factors, particularly in patients with severe, persistent, or recurrent symptoms. Screening with validated questionnaires and, where appropriate, assessment of autonomic function may complement conventional gastroenterological evaluation. Further prospective studies are required to determine whether eradication of H. pylori leads to reproducible improvement in psychoemotional and autonomic parameters and to establish whether such changes have independent clinical significance.

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