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Review Article

Neurological manifestations and disorders in h.pylori infection: a mini review

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A R T I C L E I N F O

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A B S T R A C T

Helicobacter pylori (H. pylori) infection, affects approximately half of the world's population. As its infection leads to a number of gastric as well as extra-gastric pathologies, including inflammation, gastroduodenal ulcers, and malignancies early detection and treatment are crucial to prevent its spread. Based on the microbiological test and laboratory results available as well as patient clinical characteristics, its treatment is must for preventing neurological and other consequences. Systematic reviews showed that Helicobacter pylori (HP) infection is a major risk for developing gastric cancer and gastric ulcer. Also it causes inflammatory bowel diseases, functional gastrointestinal disorders, and neurological diseases like Alzheimer disease. However, the robustness of the evidence is still not explored well. Invasive methods (such as quick urease testing, biopsy, or culture) or non-invasive methods (such as breath tests, stool investigations, or serological tests) can be used. In addition to the current antibiotic regimens, alternative therapies may also be considered. It is imperative to eradicate the infections caused by H. pylori as soon as possible to prevent problems and the development of stomach cancer. The long-term effects of H. pylori eradication therapy on the course of these disorders still need to be explored and warrant further studies. .

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Introduction

This bacteria was first observed in the late nineteenth century. Helicobacter pylori (H. pylori), distinctively twisted bacterium, a highly mobile gram-negative, found in the gastrointestinal system [1]. Its typical presentation is chronic active gastroenteritis, where this bacteria lives in the glands beneath the mucosal surface [2].H. pylori is more commonly found in Asia, Latin America, and Africa than in North America and Oceania[3, 4].Among H. pylori-infected individuals, 34.7% live in industrialized nations, while 50.8% live in resource-poor nations [5]. This bacteria is found to spread through several ways including person-to-person, oral-oral, faecal-oral, waterborne or iatrogenic routes [6]. It usually colonize and dwells on the human gastric mucosa during early childhood and exist theirfor lifetime. It generally causes asymptomatic infection in most cases which leads to its misdiagnosis or developing chronicity. It is well studied and published that infection with the bacterium increases the risk of gastric diseases including peptic ulcers and gastric cancer [7].

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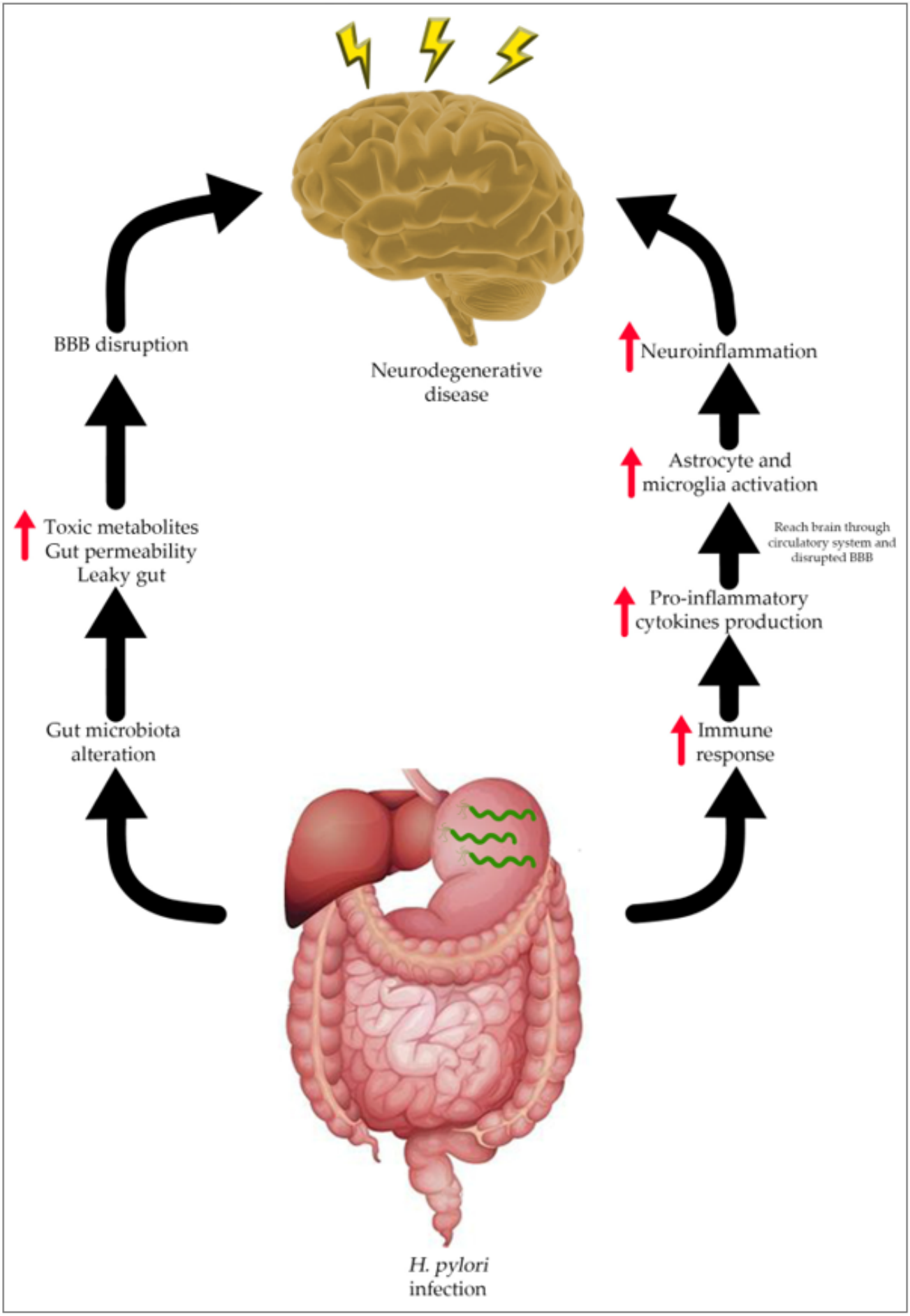
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A high H. pylori seroprevalence has been reported in different neurological and ophthalmological disorders including cerebrovascular diseases, mild cognitive impairment, Alzheimer's disease, Parkinson's disease, seizure disorders, migraine, multiple sclerosis, peripheral neuropathies, Guillain- Barre syndrome, and glaucoma. It is found that chronic H pylori infection is associated with elevated C-reactive protein, total cholesterol, plasma fibrinogen levels, and IL-8 levels . These elevate the risk of atherosclerosis, increase blood viscosity, promote blood clot formation and induce a systemic vasculopathy resulting in cerebrovascular accident [8,9]. In a comprehensive review of the scientific literature, it has been suggested that their is involvement of various pro-inflammatory cytokines in neuroinflammation. Another review suggest there is dysfunction of the gut-brain axis, alteration of the microbiota, modification of the production of intestinal neuropeptides in neurological manifestations with this bacterial infection[10]. H. pylori infection is generally associated with the development and progression of neurological diseases.Mainly its infection induces systemic inflammation, molecular mimicry, and interference with the absorption of drugs.

PARKINSON

This disease results in progressive neurodegeneration and is the second most common neuronal degeneration.The intracellular protein synuclein accumulation is an indicator of Parkinson's disease (PD). Due to this chemical there is death of dopaminergic neurons in the substantia nigra pars compacta [11].It has been reported that the gastrointestinal tracts of PD patients are more prone to develop peptic ulcer and similar syndromes with H. pylori infection. Its infection affect the absorption of levo-dopa in patients with PD by different direct and indirect mechanisms [12]. The prolonged high plasma levo- dopa concentration was found in eradicated patients as well as 1-methyl-4-

FIGURE 1: Gut-Brain Axis disorder with H.Pylori infection



phenyl-1,2,36-tetrahydropyridine is a well-known byproduct of H. pylori infection (MPTP) acts as marker in diagnosis. Substances like these ccausesdopamine depletion and injury to the substantia nigra, both of which can contribute to Parkinson's disease (PD) [13]. It is found in animal studies that the unpleasant chemical produced by its infection can also affect neurons in the brainstem by being transmitted through vagal afferent pathways [14].

MULTIPLE SCLEROSIS AND PERIPHERAL NEUROPATHIES

Multiple sclerosis (MS) is chronic inflammatory disease defined by lesions of the central nervous system (CNS), which can result in neurological defects as well as serious physical or mental impairment [15]. H. pylori infections trigger cellular and humoral immunity due to the sharing of similar epitopes present in nervous tissues, thereby results in neuronal degeneration [16, 17]. Other factors like platelet activation and aggregation; stimulation of mononuclear cells, different vasoactive and inflammatory substances; are produce by its infection.Tissue factor-like procoagulants; reactive oxygen species; and apoptotic processes are important factors which triggers MS and peripheral neuropathies like Guillain– Barre syndrome.Anti-aquaporin 4 (AQP4) antibody positivity is generally found in this bacterial infection [18]. Thus early diagnosis and adjuvant therapy is important for this infection treatment.

ALZEHMIER'S DISEASE:

Alzheimer's disease (AD) is a neurodegenerative disorder which is characterized by cognitive impairment and decline. Other agents to cause this infections are H. pylori, herpes simplex, picornavirus, Borna virus, Chlamydia pneumonia, and spirochete [19]. According to a study, people who have tested positive for the presence of this bacterium in their bodies are 1.6 times more likely to develop the disease. It is also demonstrated that those who have been infected for 20 years have the higher risk of acquiring dementia as those who have not been infected [20]. Deficiency of vitamin B-12 absorption is associated with this infection as it causes stomach abnormalities. Homocysteine levels raised causes dementia (major symptom of AD) and are generally these patients are tested positive. In the clinical practice domain, patients with various neuropsychiatric disorders have, risk of chronic H. pyloriinfection. According to the recommendations of the French Health Authority [21], patients with iron- deficiency anemia is searched for this infection and they were also associated with chronic dyspepsia and idiopathic vitamin B12 deficiency. Itsthe clinical situation which determines the, fundic and antral biopsies (immunohistochemical study) to be performed, or either by a carbon-13-labeled urea breath test (stable and non- radioactive isotope of carbon 12).

MICROBIOLOGICAL CRITERIA

Bacterial antigens in stools with a mixture of monoclonal antibodies, or by measuring specific Immunoglobulins (IgG) in the plasma is also another test performed in its infection. The treatment of gastric infection by H. pylori in psychiatric patients should be done orally [22].The eradication treatment of H. pylori, is guided by the antibiogram, and it involves triple or quadruple therapy.Effectiveness of therapy depends on the quality of the patient's therapeutic adherence. It is also necessary to consider the possible interactions between these treatments and prescribed psychotropes. especially when treated with clarithromycin [23]. Eradication of the bacterial infection should be checked at least four weeks after the end of the treatment using a carbon-13- labeled urea breath test or gastric biopsies. The verification of this eradication is even more necessary when psychiatric disorders are likely to compromise the good adherence to the antibacterial treatment in question [24], [25].

CONCLUSION

H. pylori plays a major role in the pathophysiology of many neurological and extragastric manifestations. The current research is very limited and need more exshaustive data to establish any causal relationship between this bacterial infection and mental disorders. The long-term effects of H. pylori eradication therapy on the course of disorders are still not clear. There is still need for further research to establish this association.

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CONFLICT OF INTEREST

Authors have no conflict of interest.

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