

# Vegetable Extracts for Helicobacter pylori

Subjects: **Nutrition & Dietetics**

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Vegetable extracts (Broccoli sprouts, curcumin, Burdock complex, and Nigella sativa) and micronutrients (vitamin C and E) were not found to be as effective as single agents in *H. pylori* eradication, rather their efficacy synergized with conventional pharmacological therapies. Conversely, GutGard was found to be significantly effective as a single agent when compared to placebo control.

Helicobacter pylori

alternative therapies

vegetable extracts

micronutrients

clinical trials

## 1. *Helicobacter pylori*

*Helicobacter pylori* is a Gram-negative, spiral shaped microaerophilic bacterium, infecting half of the world population. However, the incidence of infection has been gradually decreasing in developed countries due to reduced family sizes, decreased overcrowding, and improved sanitization. The prevalence in developing countries is around 90%, while in developed countries (except Japan), the prevalence of infection falls below 40% [1][2]. *H. pylori* is a nasty pathogen that can persist in the stomach of infected persons for a lifetime, if left untreated. It provokes a chronic gastric inflammatory response, resulting in the development of several gastric pathological conditions including superficial gastritis, chronic atrophic gastritis, peptic ulcers, gastric cancer, and mucosa-associated lymphoid tissue (MALT) lymphoma [3]. In 1994, it was regarded as a primary factor for the development of gastric cancer and was classified as a group-I carcinogen by The International Agency for Research on Cancer [4]. *H. pylori* bacteria have also been identified in extra-gastric tissues in the head and neck regions, with unknown origin and pathogenicity [5]. The possible mechanisms of diffusions are gastric reflux and nasal or oral routes, where laryngopharyngeal reflux may contribute to many sinonasal, laryngeal, pharyngeal, and middle ear disorders; however, there is no clear evidence of the active role of *H. pylori* in otorhinolaryngological diseases [5]. *H. pylori* infection has also been linked with some extra-digestive diseases i.e., iron deficiency anemia [6], idiopathic thrombocytopenic purpura [7][8], hepatobiliary diseases [9][10], nonalcoholic fatty liver disease [11], diabetes mellitus [12][13], cardiovascular disorders [14][15], neurodegeneration (Alzheimer's disease, Parkinson's disease, and glaucoma) [16][17][18], and osteoporosis [19][20][21]. Osteoporosis, with the burden of bone fragility and osteoporotic fractures it brings, is a common multifactorial disorder of increasing incidence. A large meta-analysis demonstrated that patients with *H. pylori* infection are at a high risk of developing osteoporosis [21]. Interestingly, recent data suggests that osteoporosis and many of the extra-digestive diseases associated with *H. pylori* infection share risk factors and pathogenetic pathways [19]. In this connection, it can be noted that diabetes mellitus, a prominent extra-digestive disease associated to *H. pylori* infection, adversely impacts on skeleton and bone health, and is associated with an increased risk of osteoporosis and fragility fractures [22]. Infection with the most virulent strains (in particular, *cagA*+) appears to be associated with higher inflammatory response and elevated risk of

gastroduodenal and extra-digestive diseases. Though details still remain unclear, person-to-person transmission and familial spread are the most common routes of the infection transmission [23][24].

## 2. Treatments

Eradication of *H. pylori* may provide significant benefits to the affected individual in term of the healing of a number of gastrointestinal complications and extra-gastrointestinal disorders [25]. The current pharmacological therapy is based on the combination of antimicrobial and antisecretory agents, as an increase in gastric pH by antisecretory agents is required for the bactericidal action of antibiotics. Many antibacterial entities are currently in practice for the treatment of *H. pylori* infections such as amoxicillin, tetracycline, clarithromycin, metronidazole, levofloxacin, bismuth subsalicylate, and rifabutin, while the only antisecretory class in use is proton pump inhibitors (PPIs) [26]. Different guidelines are available for treatments, where prescribers rely on triple therapy (amoxicillin, clarithromycin, and PPI) for 7–14 days as a first line therapy in most cases [27][28][29]. The eradication rate remains below 80% with this regimen, because of increased microbial resistance to clarithromycin, and switching to a quadruple therapy by the addition of bismuth-containing compounds has been suggested [30][31]. In addition to microbial resistance, lack of patient adherence to the therapy is an important factor responsible for treatment failure. The main cause of patient nonadherence is the complexity of the therapy involving at least three drugs, administered in frequent doses and for a long time. Other causes of nonadherence may include adverse drug reactions to the therapy with lack of immediate improvement, high cost of the medications, and recurrence of the infection after a successful eradication [3].

Considering these problems, novel therapeutic approaches, and the discovery of new molecules with antibacterial effects or adjuvants that may help patients to comply with the therapies have emerged. Natural extracts, especially those derived from botanical sources, have been used for their beneficial health effects and for the management of infectious disorders since ancient times [32]. A number of scientific studies have been reported the anti-*H. pylori* effects of natural products using in vitro and in vivo experimental models, either in the form of botanical extracts or pure compounds [33].

## 3. Conclusions

Vegetable extracts and micronutrients are not effective as single agents in eradication of *H. pylori* infections, but they may synergize with conventional pharmacological therapies for improved efficacy when used in combination. Broccoli sprouts, curcumin, Burdock complex, and vitamins (C and E) were found to be effective when used in combination with standard triple therapies for *H. pylori*. *Nigella sativa* L. in combination with omeprazole showed similar results to standard triple therapy consisting of antibiotics and omeprazole. Conversely GutGard was found significantly effective as a single agent when compared to placebo control in both clinical trials. Polaprezinc showed good efficacy in combination with standard therapy, but zinc showed no synergistic benefits.

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