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## Application of therapeutic diet for controlling peptic ulcer: A review

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**Abstract**

Peptic ulcers, characterized by open sores that develop on the inner lining of the stomach or the upper part of the small intestine, pose a significant health concern worldwide. The interplay of various factors, including *Helicobacter pylori* infection, non-steroidal anti-inflammatory drugs (NSAIDs), and lifestyle choices, contributes to the development and exacerbation of peptic ulcers. In recent years, therapeutic diets have gained prominence as a non-invasive and complementary approach to manage and control peptic ulcers. This review explores the application of therapeutic diets in the prevention and treatment of peptic ulcers, emphasizing their impact on symptom relief, healing, and long-term management.

**Keywords:** peptic ulcer, gastrointestinal disorders, *H. pylori*, physiological states, chronic stress

**Introduction**

Peptic ulcers, characterized by painful sores on the lining of the stomach or upper part of the small intestine, have long been associated with physical factors such as *Helicobacter pylori* infection and the use of non-steroidal anti-inflammatory drugs (NSAIDs) (Malfertheiner *et al.*, 2009) [7]. However, an emerging body of research is shedding light on the intricate relationship between psychological factors and the development, exacerbation, and management of peptic ulcers. This article explores the psychophysiology of peptic ulcers, delving into the complex interplay between mental and physiological states and their impact on gastrointestinal health. Peptic ulcers are prevalent gastrointestinal disorders, affecting millions of individuals globally. Traditional treatment approaches involve the use of medications, such as proton pump inhibitors (PPIs) and histamine-2 receptor blockers, alongside antibiotics for *H. pylori* eradication. However, emerging evidence suggests that dietary interventions play a crucial role in the prevention and management of peptic ulcers (Vomero and Colpo, 2014) [16].

Accordingly, diet therapy has played a key role in the prevention and treatment of Peptic ulcer, with the main purpose of recovering and protecting the gastrointestinal lining, improving digestion, relieving pain, and contributing to a satisfactory nutritional status. The objective of peptic ulcer diet therapy is to prevent hyper secretion of peptic chloride in order to reduce the sore and pain in the gastric and duodenal mucosa. In addition, nutritional therapy aims to promote healing, based on a complex sequence of events going from the initial trauma to the repair of the damaged tissue (Vomero and Colpo, 2014) [16].

**Pathophysiology of peptic ulcer**

Traditionally viewed as a primarily physiological condition, peptic ulcers are now being recognized as having strong ties to psychological factors. Stress, anxiety, and depression have been identified as significant contributors to the development and exacerbation of peptic ulcers. This section provides an overview of the evolving understanding of the psychophysiological aspects of peptic ulcers (Shell, 2021) [12].

**Stress and the Gut: The Mind-Gut Connection**

The intricate communication network between the brain and the gut, known as the "mind-gut connection," plays a pivotal role in the psychophysiology of peptic ulcers. Chronic stress can activate the sympathetic nervous system, leading to increased gastric acid production and decreased blood flow to the gastrointestinal tract, creating an environment conducive to ulcer formation (Kulshreshtha *et al.*, 2017) [5].

### Neurotransmitters and peptic ulcers

Neurotransmitters, the chemical messengers that facilitate communication between nerve cells, also play a crucial role in the psychophysiology of peptic ulcers. Imbalances in neurotransmitters, such as serotonin and dopamine, have been linked to alterations in gastric motility, acid secretion, and mucosal integrity, contributing to the development of ulcers (Lechin *et al.*, 1990)<sup>[6]</sup>.

### Emotional factors and ulcer exacerbation

Psychological factors not only contribute to the initiation of peptic ulcers but can also influence the course of the disease. Emotional stressors and negative affective states have been associated with increased ulcer symptoms, delayed healing, and higher rates of ulcer recurrence. Understanding these dynamics is essential for developing comprehensive treatment strategies (Sadikova, 2023)<sup>[11]</sup>.

### Coping mechanisms and ulcer management

Effective coping mechanisms and stress management strategies are integral to the holistic treatment of peptic ulcers. Mindfulness-based interventions, cognitive-behavioral therapy, and relaxation techniques have shown promise in reducing stress and improving clinical outcomes in individuals with peptic ulcers.

The psychophysiology of peptic ulcers reveals a dynamic interplay between the mind and the gastrointestinal system. Acknowledging the role of psychological factors in the development and course of peptic ulcers opens avenues for integrated, patient-centered approaches to prevention and treatment. Clinicians and researchers alike are increasingly recognizing the importance of addressing both the physical and emotional dimensions of peptic ulcer management.

### The role of diet in peptic ulcer development

A patient receiving a therapeutic diet is one who is afflicted with any kind of illness (Tewari, 2019)<sup>[14]</sup> Several dietary factors have been implicated in the development and exacerbation of peptic ulcers. High intake of spicy foods, caffeine, and alcohol, along with a diet low in fiber, can contribute to increased gastric acidity and mucosal irritation. This section reviews the scientific evidence supporting the association between dietary patterns and peptic ulcer development (Pramanik *et al.*, 2023)<sup>[10]</sup>.

### Therapeutic diets for peptic ulcer management

The objective of peptic ulcer diet therapy is to prevent hyper-secretion of peptic chloride to reduce the soreness and pain in the gastric and duodenal ulcer (Yaghoobi and Armstrong, 2022)<sup>[17]</sup>. The aim of nutritional therapy is to promote healing, based on a complex sequence of events going from the initial trauma to the repair of the damaged tissues. Previously diet was based on milk and milk cream combined with antacid for treatment of gastrointestinal ulcer based on the principle that milk would provide gastric alkalization and relieve pain. Nowadays milk is not recommended due to the buffering effect and significant gastric and secretion effect of milk.

The calories distribution for patients with peptic ulcer should be normal, carbohydrates should be 50-60%, 10-15% of proteins and 25-30% of lipids, with total energy value sufficient to maintain or recover the nutritional status (Sheneni *et al.*, 2023)<sup>[13]</sup>.

The calories distribution should be adjusted according to patient's need to normalize the nutritional status having as recommended macronutrients a protein intake of up to 1.2g/kg body weight/day in the acute stage (5<sup>th</sup> to 8<sup>th</sup> week) and up to 1.5g/kg body weight/day in the recovery stage (Pol *et al.*, 2024)<sup>[9]</sup>.

Carbohydrates should be adjusted to the patient's needs, without disaccharides concentration, to avoid fermentation, and lipids without concentration of saturated fats.

To accelerate the healing process, in addition to protein, there are specific micronutrients such as zinc, which is essential to maintain the immune system function, as a response to oxidative stress and to heal wounds. Selenium may reduce infection complications and improve healing. In addition, vitamin A may be used as a supplement, but the research that supports this practice is of limited effectiveness, because very high dosage does not promote cure and excessive intake may be toxic (Khalua *et al.*, 2019)<sup>[4]</sup>.

The physiochemical properties of fibre fractions produce different physiological effects in the organism. Soluble fiber found in the apple, oatmeal, and pear are responsible for instance for an increased viscosity in the intestinal content. Insoluble fibers like grains, granola, flax seeds increase stool bulk, reduce transit time in the large intestine and make fecal elimination easier and quicker. Fiber regulates the bowel function, which makes it vital for the wellbeing of healthy people and in the dietary treatment of many pathologies. A diet rich in fibers for individuals with peptic ulcer is advisable 20-30g/day by WHO because fiber act as buffers, reducing concentrations of bile acids in the stomach and the intestinal transit time, resulting in less abdominal bloating, thus decreasing discomfort and pain in the gastrointestinal tract (Manthei *et al.*, 2023)<sup>[8]</sup>.

There is special interest in probiotics for treating infection by *Helicobacter pylori* which can be shown by clinical data that prove the efficacy of some probiotics in diverse gastrointestinal diseases and also due to the increasing resistance of pathogenic bacteria to antibiotics (Ji and Yang, 2020)<sup>[3]</sup>.

- a. **Low-acidity diets:** Low-acidity diets focus on reducing the intake of acidic foods, such as citrus fruits, tomatoes, and certain dairy products. Studies have demonstrated that these diets can help alleviate symptoms in individuals with peptic ulcers by minimizing gastric irritation and promoting healing (Pol *et al.*, 2024)<sup>[9]</sup>.
- b. **High-fiber diets:** High-fiber diets have been associated with a lower risk of peptic ulcer development. Fiber-rich foods, including fruits, vegetables, and whole grains, contribute to enhanced gastrointestinal motility and the maintenance of a healthy gut microbiota, potentially preventing the formation of ulcers (Croagh *et al.*, 2023)<sup>[2]</sup>.
- c. **Probiotic and Prebiotic Diets:** Probiotics and prebiotics have gained attention for their potential role in promoting gut health (Tewari *et al.*, 2023)<sup>[15]</sup>. Probiotic-rich foods, such as yogurt and fermented products, can aid in maintaining a balanced gut microbiota, while prebiotics, found in certain fruits and vegetables, provide the necessary substrates for beneficial bacteria (Abdul-Malik *et al.*, 2023)<sup>[1]</sup>.

**Table 1:** Allowed foods, foods that should be consumed with caution, and foods that must be avoided during peptic ulcer

Food groups	Allowed	Use with caution	Prohibited
Dairy	Milk, low-fat cheeses, yogurt, fermented milk	Fatty cheeses (mascarpone, cream cheese, gorgonzola)	-
Oilseeds	Flaxseed, Brazilian nut, walnuts	-	-
Oils and olive oils	Vegetable oils, olive oil	-	Fried foods
Fruits	Apple, papaya, melon, banana	Orange, pineapple, acerola, passion fruit	Lemon
Vegetables	Leafy dark green vegetables, carrot, beet, green bean, spinach, kale, radish, zucchini, leek	Broccoli, cauliflower, cabbage, cucumber, onion, red pepper	Spicy peppers (black pepper, chilies)
Legumes	Bean soup, lentils, chickpeas, soybean	Beans	-
Meats	Lean meat (beef, pork, chicken, fish)	Fatty meats, organ meats and sausages	-
Sweets	-	Concentrated sweets	Chocolate
Beverages	Natural juices	Citrus/acidic fruit juices	Coffee, black tea, fizzy/cola drinks
Other foods	-	Industrialized seasonings, spices and condiments	Mustard grain

**Source:** Vomero & Colpo (2014)<sup>[16]</sup>.

## Conclusion

In conclusion, the application of therapeutic diets represents a promising avenue for controlling peptic ulcers. By addressing dietary factors that contribute to ulcer development and exacerbation, individuals can complement traditional medical treatments and enhance their overall well-being. However, it is essential to consult healthcare professionals for personalized dietary recommendations, considering individual differences and coexisting medical conditions.

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