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Review Article

# Ethnobotanical Insights into Ulcer Management

**Firoj A Tamboli[1]*, Archana P Agale[2], Tanzila R Bhagwan[2], Suhani S Gonugade[2], Aditya B Ambi[2], Anjali R Jadhav[2], Ravina M Choudhary[2], Meghana S Chavan[2] and Nikita V Khatal[2]**

*[1]Department of Pharmacognosy, Bharati Vidyapeeth College of Pharmacy, Near Chitranagari, Kolhapur – 416013, Maharashtra, India*

*[2]UG Students, Bharati Vidyapeeth College of Pharmacy, Near Chitranagari, Kolhapur – 416013, Maharashtra, India*

***Corresponding Author:** Firoj A Tamboli, Department of Pharmacognosy, Bharati Vidyapeeth College of Pharmacy, Near Chitranagari, Kolhapur – 416013, Maharashtra, India.

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## Abstract

Ulcers are a frequent gastrointestinal condition which is experienced by many people. It is essentially an inflamed lesion on the skin or the mucus membrane of the alimentary tract. Ulceration can occur when the established balance (homeostasis) is disrupted either by excessive aggression or reduced mucosal resistance. This may be owing to factors such as the repeated use of drugs, unordered diets, or stress, and many factors. Of these conditions, peptic ulcers are some of the most common gastrointestinal conditions in the world. The underlying cause of peptic ulceration, or the aetiology, involves multiple factors acting together including: an infection from *H. pylori* organism; prolonged use of non-steroidal anti-inflammatory drugs (NSAIDs); stress; alcohol; smoking; and others. The ulceration will occur due to the presence of acid and peptic activity present in gastric juice plus an impairment in the defence mechanisms of the mucosa. There are number of synthetic medications available for the treatment of ulcers; however these s medications can be expensive and can have more side-effects compared to herbal medications .The review of the literature shows that numerous medicinal plants and polyherbal formulations are utilized by various ayurvedic doctors and traditional practitioner for the management of ulcer. The optimal therapeutic goals for treating peptic ulcer disease are relieving pain, healing the ulcer, and delaying the recurrence of the ulcer. In this review, efforts have been made to learn about some of the several medicinal plants that may be utilized in ayurvedic or modern scientific treatment or prevention of peptic ulcer disease. The review covers pathophysiology, types, causes, symptoms, diagnosis, prevention and management strategies, and dietary plants for ulcers, including discussion of significant advances and future prospects.

**Keywords:** Ulcer; *H. Pylori*; NSAIDs; PPIs; Peptic Ulcer; Gastric Defense Factors

## Introduction

Ulcers are among the most common gastrointestinal diseases, which is the mucosal damage of the stomach or duodenum associated with the disproportionate number of protective and aggressive factors, i.e. acidic gastric acid, pepsin, Helicobacter pylori infection, and nonsteroidal anti-inflammatory drugs (NSAIDs) [1-

4]. Despite the prevalence of the conventional treatment such as proton pump inhibitors, H 2-receptor antagonists, and antibiotics, they have been linked to adverse effects, recurrence, and high [3].

Traditional medicine Traditional medicine practiced by people has a long history of using medicinal plants to treat ulcers, including Ayurveda, Unani and Traditional Chinese Medicine. Phytoconstituents, flavonoids, tannins, terpenoids, alkaloids and Saponin, have been reported to have gastroprotective and antioxidant, anti-inflammatory and antimicrobial properties, which help in healing ulcers and protecting the mucosa [2]. The growing popularity of plant-based remedies is preconditioned by their availability and affordability as well as relatively reduced side effects.

The number of chemical agents that can be used in treating peptic ulcers is enormous but many of them have serious side effects. An example is the impotence, headache, skin rash, and arrhythmias caused by the H2 antagonists and the unpredictable hypergastrinemia and atrophic gastritis caused by proton pump inhibitors [5]. Such events as stomach bloat, belching and constipation, as well as the possibility of ulcer perforation can be caused by antacids. Anticholinergic drugs in the meantime may cause constipation, dry mouth, urinary retention, blurred vision, xerostomia and provoke glaucoma. Protective ulcer drugs can result into constipation, diarrhea, dizziness, edema and hypophosphatemia, and on the contrary, prostaglandin analogues can cause abdominal cramps, uterine bleeding and even abortion [3]. It is also true that herbal medicines have been overly important due to their less-toxicity, cultural acceptance, suitability to the human body, fewer side effects, low cost, effective, and easy availability. The paper will outline the properties of some medicinal plants that have antiulcer properties [1]. The article sheds light on the possibilities of medicinal plants in treating ulcers based on their regulatory action and clinical implications in current healthcare.

## Causes of ulcer

Infection of Helicobacter pylori is the primary cause of peptic ulcer that destroys the gastric mucosa and hyper-secreting acid [6]. Long-term effects of NSAIDs including aspirin and ibuprofen suppress the production of prostaglandin, which alleviates the mucosal protection [7]. Other causes are hyper secretion of gastric acids (e.g. Zollinger annual syndrome), lifestyle choices such as smoking, alcohol, stress, and genetic predisposition, age and chronic systemic illnesses [8].

## Symptoms of ulcer

Epigastric pain is the most typical symptom of peptic ulcer, which is usually characterized as a burning or gnawing sensation which can be experienced in between meals or even during the night. These are other symptoms such as bloating, belching, nausea, vomiting, loss of appetite and weight loss. In more serious instances, patients can bring about hematemesis (vomiting of blood) or melena (black, tarry stools), which means gastrointestinal bleeding [8,9].

## Pathophysiology of ulcer

The pathophysiology of peptic ulcer is the disbalance between the aggressive factors (gastric acid, pepsin, Helicobacter pylori infection, and the use of the non-steroid anti-inflammatory drugs) and the defensive factors (mucus, bicarbonate secretion, prostaglandins, mucosal blood flow and the regeneration of the epithelial cells). *H. pylori* also plays part by making urease, cytotoxin and inflammatory mediator which destroy the epithelium of the gastrointestinal tract and induce acid secretion. The pathophysiology of NSAIDs damages due to inhibition of the enzyme cyclooxygenase (COX) to decrease the production of prostaglandins and impairs the mucosal defense. Mucosal injury is further aggravated by excess acid secretion in the gastric lining as observed in Zollinger-Ellison syndrome. Once the mechanisms of protection become compromised, the mucosal barrier is compromised and this leads to the erosion and development of ulcers [10,11].

## Diagnosis and Complications of ulcer

Peptic ulcer diagnosis is based mainly on endoscopy which enables the direct observation of peptic ulcer and biopsy to exclude malignancy, endoscopy and non-invasive methods such as urea breath test, stool antigen test, and serology test identify the presence of Helicobacter pylori infection. Barium meal radiology can also be applied in certain situations.Unattended peptic ulcers may cause severe complications such as gastrointestinal bleeding, perforation, gastrotomy, and likelihood of developing gastric cancer in ulcers associated with *H. pylori* [8,11].

## Some plants used for the management of ulcer

### *Adansonia digitata*

*Adansonia digitata*, also referred to as the baobab tree has significant antiulcer potential because of its containing a high level

of phytochemicals such as flavonoids, tannins, and other phenolic compounds. The reasons why these bioactive constituents play a role in its gastroprotective action include its ability to enhance the mucus lining, decrease the release of gastric acids and have antioxidant activity which alleviates oxidative stress-related damage to the mucosal lining. Its anti-inflammatory effect also helps in the gastric inflammation, and the healing of ulcers. Mechanistically, the flavonoids in *Adansonia digitata* suppress gastric acid formation, through the activity of histamine and proton pumps and tannins, increase the mucosal protection by depleting proteins in order to form a protective layer on the gastric mucosa. It also has an antioxidant effect that removes free radicals to inhibit lipid peroxidation and cell damage in the mucosa of the gastric mucosa. The presence of a therapeutic value as an antiulcer agent has been demonstrated in studies that show that it exhibits a pronounced ulcer inhibitory effect in experimental models [12,13].

### *Aegle marmelos*

The bael or *Aegle marmelos* is the crop that has been studied in the context of high antiulcer potential which mostly is due to its wide variety of phytochemicals including alkaloids, flavonoids, tannins and terpenoids. The compounds play a role in its gastroprotective properties through strengthening the mucosal protection, decreasing the release of gastric acid and having a high antioxidant and anti-inflammatory property. The action of the mechanism is inhibition of the activity of proton pumps and histamine release which reduce the secretion of gastric acid. Also, flavonoids and tannins stimulate the secretion of gastric secretions and strengthen the mucosal barrier, preventing the stomach lining against irritants and corrosive agents. Its anti-oxidant activity alleviates damage of mucosa due to oxidative stress scavenging free radicals, and the anti-inflammatory effect reduces inflammation of gastrointestinal tissues to promote the healing of ulcers. Experimental research has shown that Aegle marmelos extracts have a significant effect in reducing ulcer index and enhancing healing of the mucosa in different gastric ulceration models [14,15].

### *Allium sativum*

*Allium sativum* or garlic has a high antiulcer potential because of abundant sulfur-based compounds such as allicin, ajoene, and flavonoid compounds. These bioactive constituents play food protective roles in its gastroprotective properties in various ways such as antioxidant activity, which suppresses the effects of free radicals and mitigates oxidative stress of the gastric mucosa. Garlic also improves the production of gastric secretion which forms a form of protection against acid and pepsin. It also regulates the secretion of gastric acid by suppressing the release of histamine and proton pump, thereby preventing the mucosal damage by acid. Its anti-inflammatory effect aids in reducing inflammation of the gastric lining that encourages the healing of ulcers. Research has shown that extract of Allium sativum has a considerable effect of reducing ulcer indices in animal models through enhancing the defense of the mucosal lining and preventing oxidative stress [16,17].

### *Aloe vera*

The most common usage of *Aloe vera* has been its antiulcer properties which have been mainly attributed to the high concentration of bioactive compounds in *Aloe vera* which include polysaccharides (acemannan), vitamins, enzymes, and flavonoids. These components are associated with its gastroprotective properties which include promotion of healing of the mucosa, increase of the secretion of mucus, and strong antioxidant and anti-inflammatory properties. Mechanically, *Aloe vera* inhibits the secretion of gastrointestinal acid and neutralises the free radicals, which help protect the gastric mucosa against oxidative damage and erosion injury [18]. Its polysaccharides enhance the activity of fibroblasts and collagen synthesis that hasten the healing of the ulcer tissue. Also, *Aloe vera* prevents the production of pro-inflammatory mediators, which lowers inflammation of the gastric lining, and heals ulcers. The experimental studies have revealed that *Aloe vera* extract can greatly reduce the ulcer index and improve the mucosal regeneration of the gastric ulcer in different animal models [19].

### *Annona squamosa*

Sugar apple (*Annona squamosa*) has had potentials in using as antiulcer agent because of its rich phytochemical composition, flavonoids, alkaloids, and tannin which play a role in its gastroprotective. It is believed to act by stimulating mucosal defense through elevated mucus gastric secretion, antioxidant effects which dull free radicals and oxidative stress and gastric acid secretion. Also, the *Annona squamosa* could prevent inflammatory mediators such as prostaglandins and cytokines due to the presence of bioactive compounds to avoid mucosal damage. These findings are supported by a number of experimental studies in animal models which in-

dicate that gastric mucosal integrity and ulcer indices were significantly reduced following administration of the extracts of the plant [20,21]. All these mechanisms indicate that *Annona squamosa* has a potential of being a good source of natural products that can be harnessed to develop antiulcer treatments.

### *Azadirachta indica*

Neem is a common name of *Azadirachta indica* that has attracted attention in its potential to have antiulcer benefits. Studies note that neem has gastroprotective properties that are mainly attributed to its capacity to increase mucosal defense mechanisms, decrease gastric acidity and prevent the production of gastric acid. These effects are due to the active compounds in neem including nimbidin and azadirachtin which help promote the secretion of mucus and bicarbonate which help to protect the gastric lining and anti-inflammatory and antioxidant effects which help reduce oxidative stress in gastric tissues. Moreover, the antimicrobial effect of neem is useful in the treatment of gastric infections, which also confirms the use of neem in the prevention and treatment of ulcers. What is the pharmacological effect of neem extracts on the gastric ulcer on animal models [22,23].

### *Bauhinia variegate*

It has demonstrated high antiulcer properties mainly because of its high phytochemical content like flavonoid, tannin and phenolic compounds, which are some of the reasons why it has gastroprotective properties. The action of the mechanism is through its antioxidant effects, which counteract the effects of free radicals and lower the oxidative stress of the gastric mucosa, thus averting the destruction of cells. Moreover, *Bauhinia variegata* has anti-inflammatory properties including inhibiting pro-inflammatory mediators which aid in mucosal inflammation and ulcer genesis. It also increases the secretion of protective mucus and the gastric mucosal barrier, which encourages healing of ulcers. Extracts of *Bauhinia variegata* have been shown by experimental studies to decrease gastric acid secretion and prevent ulcerogenesis caused by several ulcerogens in animal models, which confirms its use as a natural antiulcer agent [25,26].

### *Beta vulgaris*

Antiulcer potential in *Beta vulgaris* (also known as beetroot) is also prominent due to an abundance of antioxidants, vitamins, and bioactivity agents, including betalains, flavonoid, and phenolic acids. The antioxidant property of Beta vulgaris is the main reason to promote gastroprotective effect of it on the gastric mucosal injury caused by oxidative stress and neutralizes reactive oxygen species (ROS). Also, *Beta vulgaris* increases secretion of gastric mucus, which fortifies the mucosal lining against irritants and acid secretion. Its anti-inflammatory effects are also added to the reduction of inflammation and the healing of the gastric lining. Beta vulgaris extracts have been shown through experimental studies to have a significant ability in reducing ulceration in animal models subjected to ulcerogenic agents such as ethanol and NSAIDs, which puts it in the line of possible applications as natural is a therapeutic agent against peptic ulcers [27-29].

### *Berberis aristata*

Commonly referred to as Indian barberry, *Berberis aristata* has shown great antiulcer potential most probably because of its active alkaloid, berberine. The gastroprotective effect is largely explained by the fact that it decreases the secretion of gastric acid and improves the mucosal defense mechanisms. Berberine has a very strong antioxidant effect, which means that it removes free radicals and lowers the harmful effects of oxidative stress on the gastrointestinal mucosa. It also regulates inflammatory responses by blocking pro-inflammatory cytokines and inhibiting NF-kB signaling pathways that would help to reduce mucosal inflammation and ulcer development. In addition, *Berberis aristata* stimulates the release of protective epithelial cell gastric mucus and helps repair injured cells. Animal experiments have established that *Berberis aristata* extracts have a significant impact on reducing ulcer index in models of ethanol, aspirin and pylorus-ligated models, which indicate potential promise of *Berberis aristata* as a natural antiulcer agent [30,31].

### *Withania somnifera* (Ashwagandha)

*Withania somnifera* roots have withanolides, which offer adaptogenic, anti-inflammatory, and antioxidant properties. They prevent the development of ulcers due to stress by reducing the level of acid secretion in the stomach and increasing the mucosal protection. Its gastroprotective effect on stress and drug-induced ulcers is proven by the experimental studies. Ashwagandha is also one that speeds up the healing of tissues, which helps in mucosal healing. It has been used centuries in Ayurveda and is particularly helpful in gastrointestinal disorders of stress. Its adaptogenic effect enhances host resistance to physiological and oxidative stress, which are

significant pathologic factors in ulcers, and is a useful option in the treatment of ulcers [33].

### *Centella asiatica* (Gotu kola)

Trierpenoids such as asiaticoside found in centella asiatica enhance tissue repair, angiogenesis, and collagen production and thus is useful in ulcer healing. It has been shown to increase the defense of the mucosal integrity, decrease the level of acid, and prevent oxidative stress, which explains its gastroprotective action. Its effectiveness is proven in animal studies that revealed the regeneration of the mucosal and strengthening in case of gastric ulcers caused by acetic acid. It is used as a traditional Ayurvedic and Traditional Chinese Medicine as it is believed to have wound-healing effects and adaptogenic effects. *Centella asiatica* could be a good candidate in ulcer treatment because it enhances the gastric mucosal strength, as well as the healing process with limited side effects [34].

### *Galega purpurea*

*Galega purpurea* is a plant with a family of Fabaceae that has demonstrated the capability of becoming an antiulcer agent; this has been mainly due to its bioactive compounds including flavonoids as well as saponins. It is believed that these compounds protect the gastric mucosa through increasing the mucosal defense mechanism, increasing mucus production and enhancing the regeneration of the epithelial cells. Also, *Galega purpurea* has antioxidant properties that assist in the alleviation of oxidative stress which is a predisposing factor to the development of ulcers. The mechanism of action could be by suppressing gastric secretion of acid and by regulating inflammatory events, which will decrease ulcerogenic damage. Experiments have shown that *Galega purpurea* extracts have the potential to reduce the index of ulcers by a considerable margin in experimental animals, and this implies that it can help in the treatment of ulcers [35,36].

### *Emblica officinalis* (Amla)

*Emblica officinalis* fruit (Amla) is a source of vitamin C, tannin, and polyphenols that have strong antioxidant and cytoprotective effects. It decreases gastric acid secretions, increases mucosal defense, and prevents stress and ulcers caused by NSAIDs. Experimental ulcer models have demonstrated a strong gastroprotective effect because of its free radical scavenging effect, which is important in preserving the integrity of the mucosa. Amla has a long history of application in Ayurveda in digestive preparations, especially in preparations such as Triphala. Its anti-secretory and antioxidant properties slow down the development of ulcers and their healing in combination, and its nutritional value additionally promotes the health of the stomach [37].

### *Ficus racemosa* (Cluster fig tree)

*Ficus racemosa* has a high level of tannins, flavonoids and triterpenoids that are very active in anti-ulcer activity. These phytochemicals lower the secretion of gastric acid, increase mucosal protection, and exhibit antioxidant properties, and hence prevent the onset of ulcers by ethanol and NSAIDs. A gastroprotective effect in rats has been experimentally demonstrated to be strong dose dependent, confirming its historical use in Ayurveda in the treatment of digestive diseases. Mucus secretion is also increased by the bark extract to prevent gastric lesions and heal ulcers. Its polyphenolic properties offer protection in disrupting the pathogenesis of ulcers through scavenging of free radicals, which are leading factors in the development of ulcers [38].

### *Hibiscus rosa-sinensis*

The antiulcer properties of *Hibiscus rosa-sinensis* have shown promising perspectives especially in its high amounts of bioactive compounds including flavonoids, sterols, and mucilage. Its antimalorative effects are explained by numerous factors among them the antioxidant activity that allows to alleviate oxidative stress of the gastric mucosa and anti-inflammatory effects that reduce mucosal inflammation. Moreover, a few studies indicate that modulation of GABA-A receptors could be involved in its gastroprotective activities by modulating the gastroduodenal axis (gastric secretions and gastrointestinal motility). In experimental trials especially with aqueous root extracts, the model has demonstrated a great potential of protection against experimental induced gastric ulcers in animals which is similar to other antiulcer drugs like lansoprazole which is a standard drug. Nevertheless, its mechanisms and clinical efficacy have not been completely explained but require additional studies [39].

### *Terminalia chebula* (Haritaki)

Tannins, flavonoids and phenolic compounds are some of the chemicals that give Terminalia chebula Retz., also known as Haritaki, a strong antiulcer activity. It has antioxidant, anti-secretory, and cytoprotective effects, which reduce gastric acidity, reduce

free radicals and improve mucus secretion, respectively. It also demonstrates anti-Helicobacter pylori properties, which minimize a significant source of ulcer development. The rats with ethanol-, aspirin-, and pylorus ligation-induced ulcers exhibited a considerable decrease in ulcer index when their extracts were given. These results confirm its traditional Ayurvedic action and its possible use as natural gastroprotective agent [40].

### *Moringa oleifera*

*Moringa oleifera* is an attractive nutritional and medicinal plant with a high antiulcer potential mainly because of high phytochemical content that consists of flavonoid, phenolic, and vitamin in nature. Its antioxidant properties are the primary source of its gastroprotective effect, which lessens the effects of oxidative stress and lipid peroxidation of the gastric mucosa by inhibiting the formation of ulcers. Moreover, under the influence of the *Moringa oleifera* plant, the secretion of gastric mucus increases and inflammatory cascades are modulated by suppressing pro-inflammatory cytokines, which contributes to the defense and healing of the mucosa. Animal model experimental studies have shown that *Moringa oleifera* extracts are useful in the reduction of gastric lesions caused by a number of ulcerogenic agents and can be as effective as the conventional antiulcer drugs [41].

### *Ocimum sanctum*

*Ocimum sanctum* (Holy Basil) has a high potential of antiulcer due to its high levels of bioactive compounds eugenol, flavonoids and phenolic acids. Its protective effects on the gastric mucosa are largely related to antioxidant effects which inhibit oxidative stress and lipid peroxidation in the gastric mucosa and prevent ulcer development. Moreover, *Ocimum sanctum* increases the formations of gastric mucus, which reinforces the mucosal barrier and has anti-inflammatory effects mediating through the regulation of pro-inflammatory cytokines. Animal experimental experiments have found that extracts of *Ocimum sanctum* have a major negative impact on gastric lesions induced by different ulcerogenic agents which in many cases are equivalent to the normal antiulcer drugs. All these effects help in mucosal protection and healing [42].

### *Plantago ispagula* (Psyllium husk)

*Plantago ispagula* (psyllium husk) has shown antiulcer effects principally due to the mucilage content that develops a protective gel on top of the gastric mucosa. This inhibitor decreases acid-pepsin assault and encourages recovery of the mucosa. Psyllium also enhances secretion of bicarbonate and reduces the diffusion of gastric acid, hence cytoprotecting. Its soluble fiber raises its levels so that it lowers intestinal irritation and oxidative stress, which aid in the healing of ulcers. In experimental research using rats, psyllium was found to significantly decrease ulcer index in rats with ethanol induced, indomethacin-induced, and ethanol induced ulcer models, which confirms its traditional usage as a gastrointestinal health agent. Therefore, psyllium is both preventive and curative of peptic ulceration [43].

### *Euphorbia neriifolia*

The antiulcer (gastroprotective) effect of *Euphorbia neriifolia* (Indian spurge tree) has been examined in experimental models. Hydro-alcoholic leaf extracts (100-400 mg/kg, p.o) have demonstrated considerable protection against gastric lesions as well as pyloric ligation and caused ulcers in rat. In pyloric ligation, the extract effect was increase in gastric pH, decrement in gastric juice volume, free and total acidity and significant decrease in ulcer index and ulcer grading, which followed the same trend as ranitidine. In ethanol models, pretreatment with the extract had a significant negative impact on mucosal damage, ulcer index and positive impact on protective biochemical indices of total hexoses, hexosamine, sialic acid, total carbohydrates, accompanied by a subsequent decrease in the leakage of proteins, which was an indicator of strengthening the mucus barrier. Gastroprotective activity is due to the presence of flavonoids, tannins, triterpenes (e.g., euphol), and saponins which possess antioxidant, anti-inflammatory, antisecretory, and cytoprotective actions. There are also reviews that mention that the plant was used traditionally in dyspepsia and abdominal conditions, thus indicating pharmacological value. Nevertheless, despite the relative safety of acute toxicity test on experimental doses, Euphorbia latex might be irritant; hence, clinical safety is not confirmed. In general, *E. neriifolia* demonstrates good prospects in its antiulcer activity, which is the combination of inhibition of aggressive gastric factors and stimulation of mucosal defense [44].

### *Oryza sativa*

One of the plant food sources with potential value in the prevention of ulcers is *Oryza sativa* (rice) that is known to have antiulcer effect, especially because of its bioactive properties due to phenolic acids, flavonoids, and γ-oryzanol, which are part of the antioxidants

and anti-inflammatory properties. The compounds are involved in preserving the gastric mucosa by neutralizing the free radicals as well as alleviating oxidative stress, which is a major contributor to ulcer development. Besides, *Oryza sativa* can also promote the secretion of protective mucus of the gastric walls and stop the secretion of mucus gastric acid, which improves the mucosal resistance to ulcerogenic factors. Animal model research has also shown that rice bran and husk extracts reduce gastrointestinal lesions caused by ethanol and stress all with similar effectiveness as the current antiulcerative drugs. Its anti-inflammatory properties also add to the healing process through the regulation of pro-inflammatory cytokines [45].

### *Barleria gibsoni*

It has also been reported that *Barleria gibsoni* (Acanthaceae) has a high potential of being used as an antiulcer agent since it has phytoconstituents such as flavonoids, iridoids, phenolic compounds and alkaloids that make it have antioxidant, cytoprotective, and antisecretory properties. The compounds are important to boost the defense of the gastric mucosal lining, promote the production of prostaglandins, the secretion of mucus and reduce the oxidative stress, thus preventing damage of the gastric lining caused by ethanol and pylorus ligation. Experimental data indicate that B. gibsoni extract significantly reduces ulcer index and gastrointestinal acidity and enhances mucosal healing, which suggests that *B. gibsoni* is a natural antiulcer agent. Therefore, the plant is promising to be developed as an herbal therapeutic agent in the management of ulcers [46].

## Side effects and contraindication of some antiulcer potential plants

Several medicinal plants with reported antiulcer potential also exhibit side effects and contraindications that warrant clinical caution. *Glycyrrhiza glabra* (Licorice) may cause sodium and water retention, hypertension, and hypokalemia at high doses, and is contraindicated in hypertensive, renal, or cardiac patients, especially those on corticosteroids or diuretics [47]. *Aloe vera* can lead to diarrhea, electrolyte imbalance, and abdominal cramping, particularly due to its laxative latex, and should be avoided during pregnancy, lactation, and in kidney disorders [48]. *Curcuma longa* (Turmeric) in high doses may induce gastric irritation, nausea, dizziness, and slow blood clotting, hence contraindicated in patients on anticoagulants or with gallbladder obstruction [49]. *Zingiber officinale* (Ginger) overdose may cause stomach upset, heartburn, and diarrhea, requiring caution in patients with bleeding risks or on anticoagulant/antiplatelet therapy [50]. *Camellia sinensis* (Green tea) can trigger insomnia, irritability, caffeine-induced tachycardia, and gastric acid increase in sensitive individuals, making it unsuitable for patients with anxiety, arrhythmias, or caffeine sensitivity [51]. *Mentha piperita* (Peppermint) may cause reflux, heartburn, and nausea, and is contraindicated in patients with GERD, hiatal hernia, or severe acid reflux [52]. *Capsicum frutescens* (Cayenne pepper) often produces gastric irritation, burning sensations, and diarrhea, thus unsuitable for patients with hemorrhoids, gastritis, or irritable bowel syndrome [53]. Finally, *Trigonella foenum-graecum* (Fenugreek) may lead to flatulence, diarrhea, and hypoglycemia, and should be avoided in pregnancy and in diabetic patients already receiving hypoglycemic therapy [54].

## Conclusion

Peptic ulcer is a major health issue in the world, and the ethnobotanical information can give good clues in the process of creating effective treatment plans, which are safer and affordable. *Berberis aristata, Withania somnifera* (Ashwagandha), *Centella asiatica* (Gotu kola), *Galega purpurea, Emblica officinalis (*Amla*) Ficus racemosa, Adansonia digitata, Aegle marmelos, Aloe vera, Allium sativum (*Garlic*), Annona squamosa, Azadirachta indica (*Neem*),* Bauhinia variegata, and beetroot demonstrate potent antiulcer properties as a result of a variety of pharmac These are gastric acid secretion, mucus and bicarbonate defense, free radical scavenging, anti-inflammatory, mucosal regeneration and Helicobacter pylori. These botanicals have been used in traditional forms of healing, e.g. Ayurveda, Siddha and Unani and have been proven effective by modern evidence. An example is that *Berberis aristata* has a pronounced antimicrobial activity against *H. pylori* whereas *Withania somnifera* prevents stress-related ulceration with its adaptogenic ability. *Centella asiatica* is better in increasing collagen synthesis and mucosal healing, and *Emblica officinalis* is better in antioxidant and cytoprotective effects. On the same note, *Ficus racemosa*, *Aegle marmelos*, and *Bauhinia variegata* exhibit anti-secretory and mucosal defense responses, and this presentation attests to the multifarious therapeutic capability of these medicinals. Therefore, ethnobotanical information does not only confirm the traditional practices, but also present promising options and adjuvant treat-

ment of the ulcer. Nevertheless, additional clinical trials, phytochemical standardization and mechanism research is necessary to determine their safety, effectiveness and place them in contemporary healthcare.

## Conflicts of Interest

The authors have declared that they have no potential conflicts of interest.

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