



## Common Medicinal Plants Effective in Peptic Ulcer Treatment: A Nutritional Review

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### ABSTRACT

Plants have long been used as drugs for treatment of diseases. With the decrease in the efficacy of synthetic drugs medicinal plants have gained importance. Peptic ulcer is the common gastrointestinal disorder that is associated with increase rate of morbidity and mortality. It is a break or lesion in the lining of the stomach and duodenum characterized by severe pain and bleeding. It is caused by increase in aggressive factors and decrease in defensive factors, genetics, stress, diet, alcohol, *Helicobacter pylori* and Non-steroidal anti-inflammatory drugs NSAIDS. Its medications such as Histamine, proton pump inhibitor and prostaglandins pose side effects such as arrhythmias, constipation, headache, blurred vision and bleeding. Plants containing flavonoids and terpenes protects the stomach lining and scavenge free radicals. This article reviews the medicinal plants having phytochemicals possessing gastroprotective and antiulcer activity.

**Key words:** Medicinal plants, peptic ulcer, diseases.

### INTRODUCTION

In the past, for the treatment of diseases the people search for the natural drugs present in nature. They used the plants as a source of drug but at that time there was no scientific evidence about the cause of illness and how the drug can be utilized for treatment. With the increase in knowledge, experiments and decrease in the efficacy of synthetic drugs, plants (natural agents) have gained importance and are again used for treating diseases and illness (Petrovska, 2012). Plants are the valuable source of natural compounds and an alternative source in search of new drugs. Many plants are used in traditional medicine that possesses antiulcer properties that can be modified to be utilized as antiulcer agents (Zakaria *et al.*, 2011).

Ulcers are an open sore or hole of the skin or the mucous membrane that is characterized by the shedding of inflamed dead tissues (Chan and Graham, 2004). Word "Peptic" is derived from the Greek word "peptikos" that means related to digestion. Peptic Ulcer is the most common ulcer and is the lesion of the lining of the stomach or the duodenum. There are two most common types of ulcer that are the gastric ulcer and the duodenal ulcer. A person may suffer from both ulcers at the same time. Gastric ulcer occurs in the stomach, more common in older

adults and is characterized by pain and eating increases the pain than relieve the pain. Duodenal ulcer occurs in the first part of the small intestine and is also characterized by severe pain along with burning sensation. The pain is intense that it may awaken the patient from sleep at night. The pain may relieve after eating and increases on empty stomach. It is more common in young individuals (Vyawahare *et al.*, 2009)

Peptic Ulcer (PUD) is a worldwide chronic disease that impairs the quality of life and is associated with the increase in morbidity and mortality rate. It is reported that about 10% population of adults affected with it in their life time and about 50% of the population complaints dyspepsia. It affects the population at 20 to 60 years of age with the males being affected more than females. The incidence of duodenal ulcer is more than the gastric ulcer. (Sai *et al.*, 2011).

Peptic ulcer is caused by imbalance between gastric offensive factors that are acid, bile salts, pepsin secretion, *H. Pylori*, ethanol, NSAIDS, nitric oxide and lipid peroxidation and protection factors cellular regeneration, blood flow, prostaglandins, glycoproteins, mucosal cells shedding, mucin secretion and antioxidant enzymes like superoxide dismutase, glutathione and catalase levels. Other factors that are involved in the pathogenesis of ulcer

are tumour necrosis factor- $\alpha$  (TNF  $\alpha$ ), histamine release, reactive oxygen species, bile acid secretion and apoptosis (Kaur *et al.*, 2012). It may pose threat to life with the appearance of the symptoms such as severe abdominal pain, bloody stool along with vomiting blood. Complications associated with peptic ulcer are pyloric stenosis, perforation, haemorrhage and malignant tumours development. Poor digestion and elimination of food, physical and mental stress, improper metabolism increases the risk of development of ulcer (Noor *et al.*, 2015).

Its prevalence is more in 3<sup>rd</sup> world countries with the 70% of population, while in developed countries it is estimated about 30%. An estimated 15000 deaths occur due to peptic ulcer and the annual incidence of haemorrhage due to peptic ulcer were 19.4-57 per 100,000 and perforation were 3.8 to 14 per 100,000 individuals (Najm, 2011).

The medications for treatment of peptic ulcer are reported to have some adverse effects such as H<sub>2</sub> antagonist causes skin rash, headache and arrhythmias. Proton pump inhibitor are reported to cause atrophic gastritis and hypergastrinemia whereas, use of antacids results in stomach distension, belching, ulcer perforation and constipation. Likewise, anticholinergics are known to cause dry mouth, blurred vision, urinary retention, xerostomia, constipation and glaucoma. Use of prostaglandins also leads to uterine bleeding, abdominal cramps and abortion (Reilly, 1999).

Studies revealed that the medicinal plants showed no acute toxicity and are more compatible to the human body and contain secondary metabolites like flavonoids and tannins that are reported to have the healing and antiulcer properties. These flavonoids, tannins and phenolic compounds protects the gastric mucosa by different mechanism such as free radicals scavenging ability, increasing mucous production, inhibit the growth of *H. Pylori*, vasoconstricting effect and by precipitating the micro proteins present at the ulcer site thereby forming a protective layer that hinders the ulcer induction (Sumbul *et al.*, 2011).

This paper highlights the plants that contain the phytochemicals that possess the antiulcer activity and are therefore, effective in treating and protecting gastrointestinal tract from offensive factors.

### **Matricaria chamomilla**

**Family:** Asteraceae

**Common name:** Chamomile, May weed, Wild chamomile, Hungarian chamomile and Sweet false chamomile

**Origin:** It is native to Western Asia and Europe. It is cultivated in countries like Hungary, Germany, Russia and other Southern and Eastern countries

**Part used:** Flowers

**Active constituents:** Flavonoids and phenolic compounds such as glucosides, patuletin, apigenin, luteolin and quercetin

**Traditional uses:** Infusion and essential oil possess flavouring, aromatic and colouring properties. It is used in perfumes, lotions, soaps, detergents, ointments, baked products, beverages, alcohol beverages and confectionary

**Roles in Human Body:** Used to treat gastrointestinal disturbances such as ulcers, indigestion, diarrhoea, flatulence, nausea, vomiting, anorexia and motion sickness,

possess antibacterial properties, anti oxidant capacity, anti platelet activity and have cardiac effects, anti-inflammatory effects, hypocholesterolaemia effects and central nervous system effects (McKay and Blumberg, 2006).

**Antiulcer activity:** Chamomile aqueous extract was administered to mice at 400mg/kg and ulcer was induced by 1.0ml of 0.3M solution of HCL 60% V/V ethanol and the results showed that 400mg/kg aqueous extract have gastroprotective effect an at 500mg/kg dose chamomile extract didn't show acute toxicity (Karbalay and Noorafshan, 2009). Chamomile and Omeprazole efficacy in treatment of aspirin induced ulcer in rats was compared. Omeprazole 2.3mg/kg body weight administered to group 2 and Chamomile 2.5ml/kg of bodyweight administered to group 3. Both groups showed no ulceration so it is proved that chamomile is inexpensive and alternative treatment for ulcer (Nomiri *et al.*, 2014).

### **Glycyrrhiza glabra**

**Family:** Fabaceae

**Common name:** Liquorice (English), Regalizia (Spanish), Mulathi (Punjab), Mithikathi (Sindhi), Khosha Walgi (Pushto), Rub-us-soos (Arabic)

**Origin:** Mediterranean region, Southern Russia and Asia. It is cultivated in Baluchistan in Pakistan and in subtropical climate

**Parts used:** Roots, rhizomes and stolon's

**Active constituents:** Flavonoids (glabrol, liquiritin), isoflavones (glabridin, glabrene), coumarines (liquocoumarin) and chalcones (isoliquiritin)

**Traditional uses:** It is used as a flavouring agent in confectionary, beverages and pharmaceutical, used in dyeing and Tobacco industry and also ideal herb for respiratory disorders

**Roles in Human body:** Diuretic, antioxidant activities, laxative, sedative, anxiolytic, antimicrobial, antiviral, anti-inflammatory, analgesic, antineoplastic, anticonvulsant action and antipyretic (Dastagir and Rizvi, 2016)

**Antiulcer activity:** *G. glabra* hydroalcoholic extract at 1600mg/kg didn't show toxicity. In ethanol induced ulcer 50-200mg/kg extract showed reduction in ulcer index. 50-150mg/kg showed antiulcer activity in indomethacin induced ulceration (Jalilzadehamin, *et al.*, 2015). Rats were divided into 6 groups and ulcer was induced by aspirin. Group 1 as control, Group 2 received only aspirin and Group 3 received Omeprazole + aspirin whereas group 4, 5, 6 received *G. glabra* at dose of 250mg, 500mg and 750 mg respectively along with aspirin for 7 days. The results showed *G. glabra* doses have gastroprotective effect and also antioxidant potential (Aslam *et al.*, 2015).

### **Cinnamomum zeylanicum**

**Family name:** Lauraceae

**Common name:** Cinnamon, Chinese cinnamon and Dar cheeni

**Origin:** South Asia and South America and now it is cultivated in different countries like China, Madagascar, Brazil and India (Amr and Maysa, 2010)

**Parts used:** Bark, leaves and Roots

**Active constituents:** Cinnamaldehyde, eugenol, mucilage, diterpenes, cinnamic acid, proanthocyanidins, camphor, linalool and trans-cinnamaldehyde (Jayaprakasha *et al.*, 2002)

**Traditional uses:** It is used as a condiment and flavouring agent in chewing gums, in preparation of chocolates and desserts also used in pickling, as a spice, used in tooth powders to treat toothaches, dental problem, bad breaths and as an insect repellent

**Roles in Human body:** Antimicrobial, anti parasitic, antifungal, antipyretic, anti carcinogenic, lipid lowering, anti tumour, sugar lowering, antiulcer and used to treat nausea, flatulence bloating, fever, amenorrhea, piles and heart diseases (Bandara *et al.*, 2012)

**Anti-ulcer activity:** Aqueous extract of cinnamon administered at dose of 250-500mg/kg in pylorus ligated, indomethacin and necrotizing induced ulceration in rats and it showed gastroprotective effect by increasing defensive factors and decreasing the aggressive factors (Alqasoumi, 2012). *Cinnamom zeylanicum* bark suspension at a dose of 100mg/kg body weight and 10mg/kg body weight was administered to rats to evaluate the antiulcer effect against acetic acid induced, pylorus ligated, ethanol induced, stress and indomethacin induced ulceration. The 100mg/kg body weight dose showed more antiulcer effect as compared to lower dose because of *C. zeylanicum* cytoprotective and gastroprotective potential (Saleh, 2012).

#### *Azadirachta indica*

**Family name:** *Maliaceae*

**Common names:** Neem, also commonly known as Divine tree, Heal All, Village Dispensary and Nature's Drug store

**Origin:** It is indigenous to India and Burma and also cultivated in tropical and subtropical regions.

**Parts used:** Seeds, leaves, flowers and stem bark

**Active constituents:** Isoprenoids such as protomeliacins, azadirone, limonoids, Flavonoids like tannins, quercetin, coumarin, glycosides and dihydrochalcone (Maithani *et al.*, 2011).

**Traditional uses:** Its twig is used for brushing teeth, used in preparing medical preparations, as a skin care treating acne

**Roles in Human body:** Anti-inflammatory, antiulcer, anti-fungal, anti-bacterial, anti-malarial, anti-hypertensive, anti-ulcerogenic, anti-hyperglycaemic, hepatoprotective, anti-fertility, anti-pyretic, analgesic, anti-cancer, anti-oxidant and immunostimulant activity also used for treating dental disorder, skin diseases and microbial infection (Subapriya and Nagini, 2005)

**Antiulcer activity:** Aqueous extract of *Azadirachta indica* (500mg/kg body weight) in pylorus ligated rats showed gastroprotective effect because of antisecretory activity and proton pump inhibiting activity rather than due to mucin secretion (Dorababu *et al.*, 2006).

#### *Curcuma longa*

**Family name:** *Zingiberaceae*

**Common name:** Turmeric, Haldi

**Origin:** It is cultivated in Asian countries. It is perennial plant

**Parts used:** Rhizome (brownish yellow in colour)

**Active constituent:** Flavonoids, curcumin, phenolic compounds, tannins, zingiberene, borneol, cineol and sabinene

**Traditional uses:** It is used as preservative, colouring agent, flavouring agent and as a food additive. Used as treating wounds

**Roles in Human body:** Anti-inflammatory, wound healing, anti-oxidant, anti-fungal, anti-bacterial, anti-venom, anti-protozoan, hypolipemic, hypoglycaemic, anti-coagulant, anti-carcinogenic and prevention of gastric ulcer (Chattopadhyay *et al.*, 2004)

**Antiulcer activity:** *Curcuma longa* at a dose of 50mg/kg protects the rats' gastric mucosa by increasing the gastric mucosal barriers and reducing acid secretory parameters in indomethacin induced ulceration (Morsy and El-Moselhy, 2013). *C. longa* extract was administered in pylorus ligated rats and it reduces gastric acid secretion and protects against gastric lesions by blocking H<sub>2</sub> Histamine receptor in competitive manner. Ethyl acetate extract of *C. longa* showed the most potent H<sub>2</sub>R antagonist effect (Kim *et al.*, 2005).

#### *Bauhinia purpurea*

**Family name:** *Leguminosae*

**Common name:** Orchid tree, Kachnar, Purple camel's foot

**Origin:** It is indigenous to South-Eastern Asia and South China

**Parts used:** Flower, root, bark

**Active constituents:** Saponins, oxepins, glucosides, leutin, beta sitosterol, flavonoids and polyphenols

**Traditional uses:** Traditionally used to treat ailments like ulcer, pain and wound healing also used for expelling gases and flatulence

**Roles in Human body:** Antiulcer, anti-bacterial, anti-fungal, anti-nociceptive, analgesic, anti-pyretic, anti-diabetic, anti-diarrheal, wound healing activity, nephroprotective and used in treating pain, fever, rheumatism and growth of cancer in stomach (Kumar and Chandrashekar, 2011).

**Antiulcer activity:** Methanolic extract of *Bauhinia purpurea* exhibit antiulcer activity by increasing mucus secretion in pylorus ligated and indomethacin induced ulceration in rats (Zainul *et al.*, 2012). Rats were pre-treated with Omeprazole 20mg/kg bodyweight and 200, 500mg/kg of ethanolic extract of *Bauhinia purpurea* leaves then ulcer was induced by ethanol. By investigating the stomach of rats, it showed that there is decrease in acidity and increase in gastric mucosal defensive factors in gastric area (Ismail IL, 2011).

#### *Nigella sativa*

**Family name:** *Ranunculaceae*

**Common name:** Black cumin, Kalonji, Habat-Ul-Sauda (Arabic)

**Origin:** Its origin is North Africa, Southern Europe and Southwest Asia. It is cultivated in regions such as Middle Eastern Mediterranean region, India, Turkey, Syria, Pakistan, South Europe and Saudi Arabia (Ahmad *et al.*, 2013).

**Parts used:** Seeds

**Active constituent:** Thymoquinone, tannins, saponins, triterpenes, sterols, glucosinolates, indazole alkaloid nigellimine, isoquinoline and nigellidine

**Traditional uses:** As a spice, condiment, carminative and aromatic. Increase milk production in nursing mothers. Used to relieve swelling of hands and feet, useful in treating obesity, hiccups, loss of appetite vomiting and dyspnea

**Roles in Human body:** Anti inflammatory, anti spasmotic, anti-amoebic, hypoglycaemic, bronchodilator,

anti-hypertensive, gastroprotective, spasmolytic, analgesic, renal protective, immunomodulator, antioxidant and anti tumor (Gilani *et al.*, 2004)

**Antiulcer activity:** The *Nigella sativa* ethanol ethyl acetate 51 fractions that is the most purified fraction showed antiulcer effect in indomethacin induced ulceration in rats (Zaman *et al.*, 2004). *Nigella sativa* oil was administered and rats were pre treated with it then ulceration ethanol was administered for ulcer induction. The results indicated that the oil imparts protective effect against ethanol induced ulcer (Dakhakhny *et al.*, 2000).

#### *Moringa olifera*

**Family name:** *Moringaceae*

**Common name:** Drum stick, Horseradish, Soanjana, Ben oil tree

**Origin:** It is native to Pakistan, North West India, Afghanistan and Bangladesh

**Parts used:** Flower, fruit, leaves, stem, roots

**Active constituent:** Vitamin C, Phenolic compounds as phytosterol, alkaloids, terpenoids, tannins proanthocyanidins, flavonoids, B-carotene

**Traditional uses:** Used in medicines, increasing milk production, in livestock feed, biogas production, bio pesticide, domestic cleaning agent and also used in water management and landscaping, used in skin remedies (Abdulkadir *et al.*, 2018)

**Roles in Human body:** Diuretic, antipyretic, anti-inflammatory, antitumor, anti-hypertensive, antidiabetic, analgesic, anti-spasmodic, antioxidant, anti-fungal, antibacterial, cytoprotective, antiulcer, hepatoprotective, antimalarial and cholesterol lowering

**Antiulcer activity:** Ethanolic root extract of *Moringa oleifera* at dosage of 300-500mg/kg reduces ulcer index in both pylorus ligated and ethanol induced ulcer in rats (Choudhary *et al.*, 2013). *Moringa oleifera* leaf extract pre treatment at a dosage of 200, 300, 400mg/kg bodyweight showed reduction in lesions induced by indomethacin in a dose dependent manner in comparison with untreated control group. This protection is because of presence of phytochemicals in *M. oleifera* (Dahiru *et al.*, 2006).

#### *Aloe vera*

**Family name:** *Liliaceae*

**Common name:** Aloe vera

**Origin:** It is perennial plant native to Mediterranean and African countries. It is cultivated in Cyprus, India, Malta and Sicily

**Parts used:** Leaf

**Active constituent:** Saponin, barbaloin, isobarbaloin

**Traditional uses:** Its gel is used in preparation of beverages, lotions and cosmetics such as shampoos, razors, moisturizers, soaps, sunscreens and makeup

**Roles in Human body:** Detoxification, laxative, wound healing, skin burns care, antiulcer, cytoprotective, anti-fungal, hepatoprotective, immunostimulator, mucus secreting and anti-diabetic (Rajeswari *et al.*, 2012)

**Antiulcer activity:** *Aloe vera* powder 200mg/kg significantly showed antiulcer activity as compared to standard reference drug omeprazole on indomethacin induced ulceration in rats (Sai *et al.*, 2011). *Aloe vera* gel extract 150mg/kg bodyweight was assessed in indomethacin and ethanol induced ulceration in rats. The gel extract showed significant reduction in ulcer index and

increased level of glycoproteins in gastric juice (Subramanian *et al.*, 2007).

#### *Ficus religiosa*

**Family name:** *Moraceae*

**Common name:** Peepal, Asvatthah (Sanskrit), Sacred fig (Bengali)

**Origin:** South East Asia especially India

**Parts used:** Bark, leaves, Fruit, Seeds

**Active constituent:** Saponins, tannins and flavonoids

**Traditional uses:** It is used as absorbent for inflammatory swelling, used in burns, strong laxative, memory enhancer, used to relieve toothache, earache, migraine also cures vomiting and anorexia

**Roles in Human body:** Anti diabetic, antiulcer, anti-amnesic, anti-microbial, anti-inflammatory, anti-convulsant, anti-asthmatic, anti-anxiety, anti-cancer and also used for menorrhagia, dysentery, diarrhoea, haemorrhoids, anti-lipid peroxidation and gastrohelcosis (Kaur *et al.*, 2011)

**Antiulcer activity:** Ethanolic extract significantly reduces the ulcer index and also reduces the gastric juices volume and increased the pH of gastric acid (Khan *et al.*, 2011). Antiulcer effect was assessed in ulceration induced by pylorus ligation and ethanol, rats were pre-treated with ethanolic extract of *Ficus religiosa* bark and root at 200mg and 400mg/kg bodyweight. The findings showed significant reduction in lesions and the extract showed antiulcer activity (Thorat *et al.*, 2013).

#### Conclusion

From this study, it is concluded that the medicinal plants play a fundamental role in preventing and treating illness and diseases. Various herbal plants and their extracts exhibited antiulcer effect in vivo trials in animal models because of their mucoprotective activity and gastric anti-secretory properties in comparison with that of reference drugs in treating ulcer. The plant extract also showed no-toxicity even at higher concentrations. Our review results showed that the medicinal plants mentioned provides protection in dose dependent manner. It is suggested that active constituents that are the flavonoids and tannins possess antiulcer activity therefore medicinal plants containing these compounds are important in providing gastroprotection and peptic ulcer treatment.

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