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Anti-ulcer activity of Medicinal Herbs - A Review

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Abstract

Peptic ulcer is a common disease of the Gastro Intestinal tract. Contrary to popular belief, ulcer is not caused by spicy food but instead is most commonly due to either an infection or long term use of medications. Standard treatment is a combination of drugs including antibiotics and a proton pump inhibitors. However, many studies revealed that herbal medicines can effectively treat Peptic ulcer in humans and various animal models. In this review, attempts have been made to know about some plants which may be used in treatment or prevention of peptic ulcers. Utilising herbal medicines could be a valuable alternative to treat Peptic ulcer with fewer adverse effects.

Keywords: Herbal medicine, Peptic ulcer.

Introduction

An ulcer is the inflamed break in the skin or mucus membrane lines the stomach or duodenum. Peptic ulcer is the most common disease of the Upper GI Tract. Ulceration occurs when there is a disturbance in the normal equilibrium due to either enhanced aggression or diminished mucosal resistance.^[1] The regurgitation of bile acid injures the gastric mucosa and weakens the gastric mucosal barrier, acid peptic disease include hyperacidity, gastro-esophageal reflux, stress induced mucosal erosions peptic ulcers, a localized loss of gastric as well as duodenal mucosa leads to the formation of peptic ulcer.^[2] The prevalence of Peptic ulcer is now a days increasing among the population due to the unhealthy food habits of the people. Incidence is high among people who takes NSAIDS, also high among smokers and alcoholic.^[3 - 6] The recurrence rate is also high as 60%.^[7] Although western drugs are effective, they produce adverse effects like H₂ blockers causes diarrhoea, dizziness, muscle pain and headache, which limits their usage. Both clinical and experimental studies have demonstrated that herbal

medicines exhibit better results in the treatment of Peptic ulcer.

Aloe vera

It is commonly known as Aloe vera. It belongs to family Liliaceae. *Aloe vera* gel possess gastroprotective properties. The existing mucilage tissue at the centre of leaves in this plant called aloe gel is used for various medicinal purposes. Its healing property is due to a compound called glucomannan, which is enriched with polysaccharides like mannose. The glucomannan affects fibroblast growth factor and stimulates the activity and proliferation of these cells. The mucilage of aloe vera not only increases amount of collagen on wound site, but also increases transversal connections among these bands rather than changing collagen structure fastening wound healing^[8,9]. *Aloe vera* gel inhibits the cyclooxygenase pathway and reduces prostaglandin E₂ production from arachidonic acid. Recently, the novel anti-inflammatory compound called C-glucosylchromone

was isolated from *Aloe vera* gel extracts. This may be the possible explanation for ulcer curative property of *Aloe vera* juice^[10]. The anti-ulcer activity of *A. vera* is due to its anti-inflammatory^[11], cytoprotective^[12], wound healing^[13], antioxidant and mucus stimulatory effects. *Aloe vera* juice, *Aloe vera* juice + banana stem juice and *Aloe vera* juice + banana flower juice exhibited significant gastro protection in alcohol induced ulcerated rats. The treatment with plant juices significantly ($P < 0.05$) reduced the lipid peroxidase activity when compared to untreated alcohol administration control^[14].

Annona squamosa

The plant *Annona squamosa* (Annonaceae) is commonly called as custard apple in English sharifa in Hindi. Traditionally the leaves were applied to ulcer and wounds. The gastro protective activity was evaluated by ethanol induced and pylorus ligated rats in experimental animal. The effect of extract was compared with ranitidine (20 mg/kg) as the reference drug. The aqueous extract of leaves of *A. squamosa* found to be safe up to 3000mg/kg. The extent of gastro protective effect of the test extract were 5.27% and 72.00% at 250 mg/kg and 500 mg/kg doses respectively which is comparable to ranitidine. Similar results were obtained with pylorus ligated ulcer model also. The test extract were showed gastro protection in a dose dependent manner i.e. 44.27% and 67.43% protection at 250 and 500 mg/kg doses respectively.^[15]

Azima tetracantha

Azima tetracantha (Salvadoraceae) is a well known medicinal plant whose root has been advocated for various ailments such as drowsy and rheumatism. *A. tetracantha* leaves possess analgesic effect^[16] and anti-inflammatory effect^[17]. The ethanolic extract of *A. tetracantha* leaves were investigated for its ulcer protective activity on aspirin plus pylorus ligation and cold restraint stress induced ulcer models. Various biochemical parameters such as gastric volume, pH of gastric content, free acidity and total acidity, dissolved mucous substances such as total protein, hexoses, hexosamine, fucose and sialic acid were estimated in 90% alcoholic precipitate of gastric juice and histopathological sections were examined on the test and control group animals. The extract at a concentration of 200 and 400 mg/kg exhibited a protective effect on ulcer induced models in a dose dependent manner and was comparable with the standard drugs ranitidine and omeprazole. The present study revealed that the extract of *A. tetracantha* had ulcer protective activity comparable with standard drugs ranitidine (50mg/kg) and omeprazole (10mg/kg), which may be mediated by its antioxidant effects.^[18]

Cissus quadrangularis

Cissus quadrangularis L. is a succulent plant of family Vitaceae. *Cissus quadrangularis* is an indigenous plant commonly mentioned in Siddha system of medicine for treatment of gastric ulcers. The methanolic extracts of the plant are proved to possess pharmacological activities such as antioxidant, antiulcer, analgesic, anti-inflammatory^[19].

The main components of *C. quadrangularis*, such as triterpenoids, vitamin C,^[20] b-sitosterol, glycosides and polyphenols, offer antiulcer and ulcer healing properties.^[21]

The ulcer-protective effect of a methanolic extract of *Cissus quadrangularis* was comparable to that of the reference drug sucralfate.^[22,23,24] Further, gastric juice and mucosal studies showed that *Cissus* at a dose of 500 mg/kg given for 10 days significantly increased the mucosal defensive factors like mucin secretion, mucosal cell proliferation, glycoproteins and life span of cells.^[25-29] The present investigation suggests that *Cissus* not only strengthens mucosal resistance against ulcerogens but also promotes healing by inducing cellular proliferation. Thus, *Cissus quadrangularis* has potential usefulness for treatment of peptic ulcer disease.^[30-38]

Cynodon dactylon

It is commonly known as Durva grass or Doobghas, belonging to family Poaceae. Doobg has was proved for antiulcer activity in albino rats at a dose level of 200, 400 and 600 mg per kg. Doob grass herb contains flavonoids. The alcoholic extract showed the presence of flavanoids, which is supposed to be responsible for antiulcer property^[39,40,41]. The alcoholic extract inhibited ulceration by inhibiting output volume and total acidity. The ulcer healing activity of the plant extract may be due to antisecretory property associated with an enhancement of the local healing process, which was comparable with the standard drug ranitidine (H₂-antagonist). Flavonoids are reported to have antiulcer activity.^[42]

Patil MB. et. al., studied the, Antiulcer properties of alcoholic extract of *Cynodon dactylon* in rats. Alcoholic extract of *Cynodon dactylon* was evaluated for preliminary identification of Phytoconstituents and screened at 200, 400, and 600 mg/kg body weight given orally for pylorus ligated and Indomethacin induced gastric ulcer models in albino rats. Results showed the presence of flavonoids and proteins. Alcoholic extracts at 400 mg/kg and 600 mg/kg showed significant (>0.001) antiulcer activity, comparable to the standard drug ranitidine, which may be due to the presence of flavonoids.^[43]

Elettaria cardamomum

The cardamom, *Elettaria cardamomum* L. (Maton) (Zingiberales: Zingiberaceae), called the "Queen of Spices" in India, is a tall, perennial, reed-like herb that grows wild and is cultivated in India and Sri Lanka. Cardamom is an important economic crop and is a highly valued spice.^[44] Results obtained from experimental model of ethanol induced acute ulcer in rats showed 76.36% protection when 50 mg/kg

essential oils of *E. cardamomum* were administered. *E. cardamomum* is more potent in inhibiting gastric ulcer than *A. subtulatum*.^[45] The Essential oil (50 mg/kg) derived from *E. cardamomum* was found to be effective in decreasing by 65% the ulcer index in alcohol induced gastric ulceration in Shay rats but total volume of gastric secretion, total acidity and mucus wall thickness remained unaffected. The ulcer index (mm) for the control and essential oil-treated animals were 2.08 ± 0.08 and 0.73 ± 0.08 , respectively.^[46]

Table 1. Some common herbs used for Peptic ulcer

S.No	Botanical name	Family	Tamil name	Parts used
1	<i>Aloe vera</i>	Liliaceae	Katrazhai	Mucilage tissue
2	<i>Anona squamosa</i>	Annonaceae	Seetha	Leaves
3	<i>Azima tetraantha</i>	Salvadoraceae	Sangan	Leaves
4	<i>Cissus quadrangularis</i>	Vitaceae	Pirandai	Whole plant
5	<i>Cynodon dactylon</i>	Poaceae	Arugan	Leaves, root
6	<i>Elettaria cardamomum</i>	Zingiberaceae	Elam	Seed
7	<i>Ficus religiosa</i>	Moraceae	Arasu	Leaves
8	<i>Glycyrrhiza glabra</i>	Leguminosae	Athimathuram	Root
9	<i>Ocimum sanctum</i>	Lamiaceae	Thulasi	Leaves
10	<i>Sesbania grandiflora</i>	Fabaceae	Agathi	Leaves

Ficus religiosa

Ficus religiosa (Moraceae) is an important traditional medicinal plant distributed throughout India, most nearly to the Indian temple for the spirituality. It has several vernacular names including peepal tree and arasamaram. The bark of the plant contains carbohydrates, flavanoids, amino acids, steroids, saponins and tannins etc. are present^[47]. Bark and leaf extract of this plant is being used in the traditional medicine. The animals treated with *F. religiosa* leaf extract 500 mg/kg did not produce any significant change in the volume of gastric secretion as compared to rats which received standard drug ranitidine. Microscopical examination of the stomachs removed from animals that were not treated with either ranitidine of *F. religiosa* showed complete ulceration. However, a protective effect against ulceration (in terms of ulcer area) was noticed in animals treated with ranitidine, 250 mg/kg and 500 mg/kg ethanolic extract of *F. religiosa* was found to be 45.23% and 61.42% respectively.^[48]

Glycyrrhiza glabra

It is commonly known as licorice, belonging to family Leguminosae. It showed effective healing on ethanol-induced ulcers. It reduces stomach secretions and also produces thick protective mucus which covers the lining of stomach, therefore protects from peptic ulcers. Further it has been reported to increasing the local concentration of prostaglandins which promotes mucous secretion and cell proliferation in the

stomach.^[49,50] Higher doses of hydroalcoholic extract of *G. glabra* and omeprazole showed a similar reduction in ulcer index when compared to the control on Ethanol induced ulcer model. On Hypothermic restraint stress induced ulcer model, the oral administration of HEGG at doses of 100, 150 and 200 mg/kg reduced the gastric ulcer indices to 15.66 ± 0.17 , 8.41 ± 0.64 and 4.15 ± 0.33 , respectively, compared to the control group (32.28 ± 0.97). The HEGG induced gastroprotection in higher and lower doses were more effective. 150-200 mg/kg doses of HEGG inhibited the ulcers more significantly than did omeprazole and cimetidine^[51].

Ocimum sanctum

It is commonly known as Tulsi and belongs to family Lamiaceae. It is considered as a sacred plant by the Hindus in India. Advanced studies on this plant have been reported that it has antiulcer activity. The fixed oil has proved to show antiulcer activity because of its lipoyxygenase inhibitory activity, histamine antagonistic and anti-secretory effects^[52,53,54]. Oral administration of ethanol produces severe ulceration and significantly elevate lipid peroxide level, glutathione level. The aqueous extract of *Ocimum sanctum* significantly reduces the incidence and severity of ulceration in ethanol induce ulcer model. The dose rate of 100mg/kg and 200 mg/kg b.wt. Orally afforded dose dependant i.e. 33.07% and 52.52% protection whereas the reference drug omeprazole exhibited 60% protection^[55].

Sesbania grandiflora

Sesbania grandiflora Miq (Fabaceae), popularly known as “Basna”, is a short lived, quick growing, soft wooded tree, 6-9 m high and 0.6 m in girth and is an ornamental plant. It is a native of Malaysia and is grown in many parts of India such as Punjab, Dehli, Bengal, Assam and the Andaman^[56]. The bark and leaves are reported to cure diarrhoea, dysentery, snake bite, malaria, smallpox, eruptive fever, scabies, ulcer, and stomach disorders in children^[57]. Ethanolic extract of leaves of *S. grandiflora* at the dose of 400 mg/kg has decreased the intensity of gastric mucosal damage induced by ulcerogenic agents. EELSG at the dose of 400 mg/kg and omeprazole at 20mg/kg produced a significant ($P < 0.05$) reduction in the ulcer index 21.41 and 18.5 and has protection index of 84.95 % and 87.00 % respectively^[58]. The bark extract of *S. grandiflora* prevented acute gastric mucosal injury induced by restraint stress and water immersion in a dose-dependent manner with ED50 of 36.75 mg/kg (p. o.)^[59].

Discussion

Peptic ulcer is now a days common among the population because of change in food habits, life style changes, increasing stress etc. Many studies proved that herbal medicines could be a better alternative to modern drugs. Aloe vera juice, Aloe vera juice with banana stem juice and *Aloe vera* juice with banana flower juice exhibited significant gastro protection in alcohol induced ulcerated rats. Muthusamy et al stated that the extract of *A. tetraanthahad* ulcer protective activity comparable with standard drugs ranitidine and omeprazole. Gastric juice and mucosal studies showed that *Cissusnot* only increased the mucosal defensive factors but also strengthens the mucosal resistance to ulcerogens. The ulcer healing activity of the *Cynodondactylon* extract may be due to antisecretory property associated with an enhancement of the local healing process, which was comparable with the standard drug ranitidine as discussed by MB Patilet al. *E. cardamomum* is more potent in inhibiting gastric ulcer than *A. subulatum*. The animals treated with *F. religiosaleaf* extract 500 mg/kg did not produce any significant change in the volume of gastric secretion as compared to rats which received standard drug ranitidine as explained by Gregory Met al. Hydro alcoholic extract of *Glychirzhaglabra* reduced ulcer index and increased the mucus secretion and prostaglandin level. The fixed oil of *Ocimum sanctum* has proved to show antiulcer activity because of its lipoxygenase inhibitory activity, histamine antagonistic and anti-secretory effects^[52,53,54]. Ethanolic extract of leaves of *S. grandiflora* at the dose of 400 mg/kg has reduced the intensity of gastric mucosal damage induced by ulcerogenic agents and the bark extract of *S. grandiflora* prevented acute gastric mucosal damage

induced by restraint stress to significant extent as discussed by Aboinsertie et al.

Conclusion

Traditional medicinal systems in the world provide therapeutically useful compounds from plants. Therefore, traditional knowledge along with modern science is necessary for isolation, and standardization of the active constituents from herbs. This combination of traditional and modern knowledge helps to develop better anti-ulcer drugs. A large number of herbal extracts are used in folk medicine to treat various types of disorders. This review has wide scope for researcher to compile literature data of antiulcer drug and intense study on evaluated use of certain herbs for their better acceptability in therapeutics. Hence the review study is concluded that the herbal drug possesses antiulcer activity it has been proved by different animal models give many links to develop the future trials.

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