Herbal Drugs With Anti Ulcer Activity

Dilpreet Kaur, A. C. Rana, Nidhi Sharma and Sunil Kumar

ABSTRACT

A peptic ulcer is an erosion in a segment of the gastro intestinal mucosa, typically in the stomach (gastric ulcer) or first few centimeters of duodenum (duodenal ulcer) that penetrates through the muscularis mucosae. 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. Literature suggests that number of synthetic drugs are used in the management of peptic ulcers but elicit several adverse effects. Therefore Indian herbal plants stand out as being exceptional for its ethnic, ethobotanical and ethno-pharmaceutical use. In this review attempts have been made to know about some plants which may be used in treatment or prevention of peptic ulcers. Various plants like Cynodon dactylon, Ocimum sanctum, Glycyrrhiza glabra, Ficus religiosa proved active in antiulcer therapy.

Keywords: Peptic ulcer, medicinal plants, antiulcer activity.

INTRODUCTION

Peptic ulcer is defined as a break off in the continuity of the mucosa of stomach or duodenum as a consequence of some medications like non-steroidal anti-inflammatory drugs (NSAIDS), gastric acids and pepsin finally causes lesions in intestinal mucosa (Verma et al., 2010). Basically, word “peptic” is derived from Greek term “peptikos” whose meaning is related to digestion .Various reports indicates that old age group patients are more prone to gastric ulcer. Younger individuals have higher risk of duodenal ulcers (Richardson, 1990, Lunevicius and Morkevicius, 2005, Pahwa et al., 2011). The pathogenesis of peptic ulcer disease includes a complex imbalance between gastric offensive factors like acid, pepsin secretion, Helicobacter pylori (H.pylori), bile salts, ethanol, some medications like NSAIDS, lipid peroxidation, nitric oxide (NO) and defensive mucosal factors like prostaglandins (PG’s), gastric mucus, cellular renovation, blood flow, mucosal cell shedding, glycoproteins, mucin secretion, proliferation and antioxidant enzymes like catalase (CAT), superoxide dismutase (SOD) and glutathione levels (Marietta and John, 2010). Peptic ulcer can be categorized on the basis of location and on the severity of disease. Numerous other factors are also responsible for progression of peptic ulcers like tumor necrosis factor-α (TNF α), reactive oxygen species (ROS), release of histamine, incidence of apoptosis and bile acids secretion (Singha et al., 2008; Fatemeh et al., 2011).
Evidences indicate that NSAIDS-induced ulcers are very common (Griffin, 1991). NSAIDS helps in progression of ulcer by conquering the expression of enzyme cyclo-oxygenase (COX) which has been documented to inhibit the conversion of arachidonic acid (AA) to PG’s (Vane and Botting, 1995) that impairs the mucosal barrier and results in corrosive action with pepsin that together are responsible for progression of peptic ulcers. There is pronounced evidence that oxygen derived free radicals plays a crucial role in the pathogenesis of the injury of various tissues, including the digestive system (Vaanen et al., 1991). The role of TNF-a in the pathogenesis of gastric ulcer is well established. TNF-a is a cytokine which initiates the inflammatory process through stimulation of migration of leukocytes into inflammatory sites therefore plays a significant role in formation of gastric ulcers (Lychkova et al., 2010). Besides TNF-a also activates extrinsic apoptotic pathway through caspase-3 initiation which leads to gastric injury (Hwang et al., 2008). Increased TNF-a activate caspase-3, which is one of the major effector caspases involved in apoptotic cell death. Finally, caspases leads to neutrophil activation through various chemotactants thus a vicious cycle exists which leads to gastric damage (Abazarov et al., 2008). Moreover H. pylori is too implicated in peptic ulcer progression. H. pylori is a gram negative bacillus, motile, microaerophilic, flagellated, spiral shaped bacterium, which secretes the distinct enzyme urease that converts urea to ammonia, which further reduces the acidity of stomach, making it sanatorium for H. pylori (Pandey et al., 2010). Type I strains of H. Pylori possess a pathogenic activity, that encodes the effector protein cytotoxin-associated gene A (cagA). After translocation into the host cell, cagA effects cell shape, increases cell motility, disturbs cell junctional activity and thus responsible for gastric carcinomas and gastric ulcers (Buti et al., 2011).

There are enormous chemical agents available for the treatment of peptic ulcers but proclaim serious side effects like H₂ antagonists is the precipitating cause of impotence, headache, skin rash, arrhythmias where as the use of proton pump inhibitors is an unforeseeable cause for hypergastrinemia and atrophic gastritis. The use of antacids leads to stomach distention, belching, constipation and there is risk of ulcer perforation and other drug interactions. It is hoped that C. dactylon would serve as a useful tool for the researchers for proper evaluation of the plant and for the development of new, safer, potent and cost effective drugs in future.

**Cynodon dactylon**

*Cynodon dactylon* (L.) pers. is a creeping grass found in warm climates all over the world (Singh et al., 2009). It belongs to the family Poaceae. It is also known as Durva grass, Bermuda grass, Dog’s Tooth grass, Bahama grass, Devil’s grass, Couch grass, Indian Dooab, Scutch grass, Dhub, Doob and Durba in different regions (Oudhia, 2003). It is the most sacred plant of India next to tulsi. The plant contains crude proteins, carbohydrates, mineral constituents, oxides of magnesium, phosphorous, calcium, sodium, potassium, vitamin-c, carotene, hydroquinone, levoglucosenone, furfural, hexadecanoic acid, ethyl ester, linolenic acid, ethyl ester and d-mannose (Shabi et al., 2010). The plant has been long used in the traditional medicines to treat various ailments such as cancer, convulsions, cough, cramps, diarrhea, dropsy, dysentery, epilepsy, headache, hemorrhage, hypertension, hysteria, measles, rubella, snake bite, sores, stones, tumors, urogenital disorders, warts and wounds (Chopra et al., 1999, Pal, 2009). Advanced studies on this plant have been reported that it possess antiulcer, anti diabetic, anti diarrheal, diuretic, antimicrobial, immunomodulatory, anti epileptic, anti inflammatory, anti arrhythmic, antibacterial, chemoprotective and hepatoprotective activities (Parekh et al., 2005, Patil et al., 2005, Parekh et al., 2005, Singh et al., 2007, Najifi et al., 2008, Surendra et al., 2008, Kumar et al., 2004, Ravindra et al., 2009, Baskar and Ignacimuthu, 2010, Kumar et al., 2010, Santhi and annapoorni, 2010, Garg and paliwal, 2011). Alcoholic extract of *C. dactylon* was screened for antiulcer activity in albino rats at dose level of 200,400 and 600 mg kg⁻¹ b.wt (Patil et al., 2005). The extract at 400 mg kg⁻¹ and 600 mg kg⁻¹ showed significant (>0.001) antiulcer activity as compared to the standard drug ranitidine. 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. Aerial parts of Bermuda grass herb are reported to contain flavonoids (Nair, 1995). The preliminary phytochemical investigation of the alcoholic extract of bermuda grass showed the presence of flavanoids, which may be responsible for antiulcer property. It is hoped that *C. dactylon* would serve as a useful tool for the researchers for proper evaluation of the plant and for the development of new, safer, potent and cost effective drugs in future.

**Ocimum sanctum**

*Ocimum sanctum*, commonly known as Tulsi is the most popular member of the genus *ocimum* and is considered as a sacred plant by the Hindus in India (Singh et al., 2011). The name tulsi is derived from ‘Sanskrit’ which means “matchless one” (Bansod and Rai, 2008). The plant grows wild in India but it is widely cultivated in home and temple gardens. There are about 160 species in this genus broadly dispersed over the warm region of the globe *ocimum sanctum*, *ocimum gratissimum* (Ramtulsi), *ocimum* (Dulaltulsi), *ocimum basilicum* (bantulsi), *kilimandscharicum*, *ocimum americanum*, *ocimum camphora*, *ocimum miranthum* are examples of known important species of genus *ocimum* which
grow in different parts of the world and has been used extensively used in traditional medicine for a wide range of ailments (Shahedur et al., 2011, Vinod et al., 2011). The whole parts of plant such as leaves, flowers, stem, root, seeds etc are known to possess a wide range of pharmacological properties and have been used by traditional medical practitioners as a expectorant, analgesic, anticancer, antiasthmatic, antiemetic, diaphoretic, antidiabetic, antifertility, hepatoprotective, hypotensive, hypolipidemic antistress agents (Heinrich, 2009). The chemical composition of O. sanctum is highly complex, containing many nutrients and other biologically active chemically compounds but eugenol is the principle constituent of tulsi, has been found to be largely responsible for the management of various types of diseases (Lalit et al., 2011). Tulsi has specific aromatic odour because of presence of essential or volatile oil, mainly concentrated in the leaf. The leaf contains eugenol, euginal (also called as eugenic acid), urosoic acid, carvacrol, linalool, limatrol, caryophyllene, methyl carvicol (also called as estragol) while the seed volatile oil have fatty acids and sitosterol, in addition seed mucilage contains small amounts of sugars and the anthocyanins are present in green leaves (Yanpallewar et al., 2004). Ocimum is known as general vitalizer and increases physical endurance but it does not contains caffeine or other stimulants. The stem and leaves contains number of constituents including saponins, flavonoids, triterpenoids and tannins (Shishoda et al., 2003). In addition it contains phenolic compounds which exhibit antioxidant and anti-inflammatory activities (Dhar et al., 1968). It also contains two water soluble flavanoids orientin and vicenin shows protection against radiation induced chromosomal damage in human blood lymphocytes (Uma et al., 2000). Advanced studies on this plant have been reported that it possess antiulcer activity, insecticidal activity, antiemetic activity, antistress activity, analgesic activity, antioxidant activity, heart tonic activity, antidiabetic activity, antitubercular activity, immunomodulator activity and antifertility effect (Rajeswari, 1952, Sen, 1993, Singh, 1995, Hussain et al., 2001, Prakash and Gupta, 2005, Glolade and lockwood, 2008, Shankar et al., 2009, Khan et al., 2010, Tabassum et al., 2010, Vinod et al., 2011). A team of scientist evaluated the antiulcerogenic activity in Aspirin (ASP), Alcohol (AI), cold restraint (CRU), pyloric ligation (PL) induced gastric ulcer models in rats, histamine-induced (HST) duodenal ulcer in guinea pigs and ulcer healing activity in acetic-acid induced (AC) chronic-ulcer model (Dharmani et al., 2004). O. sanctum significantly reduces acid secretion and enhances mucus secretion (Madal et al., 1993). It has been reported that fixed oil of O.sanctum possess significant antiulcer activity against Aspirin, Indomethacin, alcohol (ethanol 50%), histamine, reserpine, serotonin or stress-induced ulcers in rats (Singh et al., 2007). The fixed oil shows antiulcer activity due to its lipooxygenase inhibitory, histamine antagonistic and anti-secretory effects (Singh and Majumdar et al., 1999). Research must be attempted towards purifications of tulsi components and their characterization in terms of chemical nature and bio-pharmaceutical activities. Probably such natural components might prove to be potentially beneficial but comparatively less toxic. So plants belonging to Ocimum genus could contribute a lot towards economy and healthy problem.

Glycyrrhiza glabra

Glycyrrhiza glabra is most commonly used herb in western and eastern herbal medicine and has been used in the management of various diseases for more than 4000 years. The name glycyrrhiza is derived from the ancient greek term “glykos” meaning sweet, and “rhiza” meaning root (Lakshmi et al., 2011). It is commonly known as licorice root, reglisse (French), lacrosse (German), sweet wood. It is from the leguminosae family which belongs to the genus containing fourteen species. Liquorice also contains amino acids, asparagin, bitters, essential oil, fat, female hormone estrogen, glycosides, gums, mucilage, protein resin, saponins, starches, steroids, tannin, volatile oil, flavonoids include liquiritin, isoliquiritin, liquiritigenin and rhamnoilliquiritin and other present flavonoids are glucoliquiritin, apioside, prenylloflavone A, shin flavanone and shinptero carpen glycosides, female hormone estrogen, protein resin, saponins, steroids, yellow colouring matter- the yellow colour is due to the presence of anthoxathin glycoside known as isoliquiritin (Ishrucker RA and Burdock GA, 2006). The root of G. glabra contains the chief constituent known as glycyrrhizin which is 60 times sweeter than sugar. In traditional siddha system of medicine, liquorice is used as a demulcent, expectorant, antitussive, laxative and sweetener. It is also used in the treatment of acute respiratory problems, gastric ulcers, gastritis, inflammatory conditions in general and adrenal exhaustion (Fukai et al., 2002) Components of licorice root have both estrogenic and anti-estrogenic activity. So it is therefore an important herb in the management of hormone related female disorders. G. glabra exhibit wide spectrum of activities antiulcer-activity, antioxidant-activity, immunostimulatory effects, antihyperglycemic, anticonvulsant, antiflammatory, antimicrobial, anticarcinogenic effects (Segal et al., 1985, Demizu et al., 1988, Chopra and Simon, 2000, Ambawade et al., 2002, Taro et al., 2002, Krausse et al., 2004, Shirazi et al., 2007, Panneerselvam et al., 2009). Bafna PA were studied pepticare, which is a herbornimeral formulation of the ayurveda medicine consisting of the herbal drugs glycyrrhiza glabra lim, Emblica officinalis and tinospora cordifolia at various doses (125, 250,500,1000m/kg, P.O) of pepticare on gastric on gastric secretion and gastric ulcers in pylorus-ligation and on ethanol-induced ulcers (Bafna and Balaraman, 2005). Bennett demonstrated deglycyrrhizinated licorice using a rat model of Aspirin-induced gastric mucosal damage (Bennett et al., 1980). He suggested that several components exist in the extract which promote gastric healing, although in consistencies are apparent between these studies. Glabra reduces stomach secretion produces thick protective mucus which covers the lining of stomach and therefore protects from peptic ulcers and other inflammatory diseases. Further it has been reported to raising the local concentration of prostaglandins which promotes mucous secretion and cell proliferation in the stomach (Khare, 2004). Presence of such a wide range of chemical compounds indicates that the plant
could serve as a “lead” for the development of novel agents having good efficacy in various disorders in the coming years.

**Ficus religiosa**

*Ficus religiosa,* commonly known as “peepal tree” is one of the foremost plants utilized from antiquity till to date (Ghani, 1998). It is also known by various other names as bo tree, bodhi tree, Buddha tree, sacred tree etc. It belongs to family moraceae (Hamed, 2011). The bark of *F. religiosa* is reputed to have a number of chemical constituents. It contains tannins, saponins, flavonoids, steroids, terpenoids and cardiac glycosides (Ruby et al., 2000). The bark has also been reported to contain bergapten, bergaptol, lanosterol, β- sitosterol, stigmasterol, lupen-3-one, β- sitosterol-α-glucoside (phytosterolin), vitamin K1, lupeol, lupeol acetate, α-amyrin acetate (Joseph and Justin, 2010). *Ficus religiosa* has been extensively used in traditional medicine for the management of various types of diseases like diarrhoea, asthma, cough, toothache, migraine, in gastric problems, haematuria, diabetes, diarrhoea, leucorrhoea, anxiety, cardiac tonic, vomiting (Pandit et al., 2010, Khan et al., 2011). *F. religiosa* possess a wide range of pharmacological activities anti-ulcer activity, anti-inflammation activity, anti-microbial activity, anti-annelmient activity , anti-asthmatic and anti-annual (Malhotra et al., 1960, Viswanathan et al., 1990, Hemaiswarya et al., 2009, Kaur et al., 2010, Khan et al., 2011, Patil et al., 2011, Sawarkar et al., 2011). The alcoholic extract of *F. religiosa* was screened for antulcer activity in swiss albinio rats against pylorus ligation induced ulcers, ethanol induced ulcers and aspirin-induced ulcers at dose level of 250 mg/kg and 560 mg/kg. The alcoholic extract of *F. religiosa* inhibited ulceration by significantly decreasing the gastric volume, total acidity, free acidity and ulcer index (Saha and Goswami, 2010). The ethanolic extract of stem bark of *F. religiosa* also exhibited potential antitriulcer activity exhibited potential antioxidant activity. The antiulcer activity of *F. religiosa* was evaluated in vivo against cold restrained stress and indomethacin-induced gastric ulcers and pylorus ligation assay. The extract (100, 200 and 400 mg/kg) significantly reduced the ulcer index in all assay used (Khan et al., 2011). Since *F. religiosa* is a non toxic, highly promising natural crude drug having a wide spectrum of biological functions. It is expected that it may find application as a novel drug in the near future to control various diseases.

**ACKNOWLEDGEMENT**

We are highly thankful to Management and Chairman of our college S. Gurwinder Bahra and S. Nirmal Singh Rayat for their co-operation and providing us scientific facilities.

**REFERENCES**


Mandal S., D.N.Das., K.De. Ocimum sanctum linn a st


Taro N., Toshio F., Toshiyuki A. Chemistry of phenolic compounds of licorice (Glycyrrhiza species) and their estrogenic and cytotoxic activities. J Pure Appl. Chem. 2002; 74(7): 1199-1206.


