A Comprehensive Review on Antiulcer properties of Herbal drugs

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ABSTRACT
Herbal medicines are very useful in treating various human ailments. The plants and herbs consumed in its natural state have proved to have lesser side effects and are cost effective too. Recognition of this fact has created a demand for herbal medicines, both in developing and developed countries across the globe. Peptic ulcer disease in clinical practice is one of the common gastrointestinal disorders where duodenal ulcer, gastric ulcer, NSAIDs triggered ulcer and stress ulcer are common forms of peptic ulcer. Gastric ulcers are commonly found in the geriatrics and in the lower socio-economic class of people. Most synthetic drugs are used to treat peptic ulcers, but they cause adverse effects of various kinds. For its ethnic, ethno botanical and ethnopharmacological use, herbal medicines are therefore exceptional. In this review, attempts were made to know the natural antiulcer drugs with their recommended drug portion, screening method and sort of extract used for appraisal and observations to show its usage. The reason for this assessment is to assemble literature and the antiulcer residences of the herbal medicines used frequently. Different plants such as Allium sativum, Centella asiatica, Lawsonia inermis, Ocimum sanctum, Sesbania grandiflora, Adansonia digitata, Ficus religiosa, Glycyrrhiza glabra, Cynodon dactylon, have been shown to be involved in antiulcer care.

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INTRODUCTION
Peptic ulcers are acid-induced abscess found in the stomach and duodenum characterized by assets mucosa with the defect extending into the submucosa or muscularis propria (Vimala and Shoba, 2014). Peptic ulcers are most frequently found on the lower skin, uttermost parts of the body and in the GI tract, almost everywhere they can fight. There are various forms of ulcers such as peptic ulcer, oesophageal and genital ulcer. Many people are affected by peptic ulcers. It is considered as abrasion of “Tummy” or “Duodenal” lining (Bhowmik et al., 2010). Commonplace varieties of peptic ulcers are known as “Duodenal” as well as “Gastric ulcer”. These ulcers are also called as ulceration. A person may have at the same time both duodenal and gastric ulcer. Abscess is found inside the tummy, with the symptom of ache. Lesions are especially common within the aged. A few other signs may additionally consist of weight reduction, nausea, and vomiting. Although humans with peptic ulcers have regular or decreased production of acid, it may also occur without the presence of acid (Wandre et al., 2013). Duodenal ulcers are visible at the beginning of the small intestine and are characterized by too much ache with a burning sensation within the higher part of the abdomen that may disturb the sufferers sleep. Ache occurs usually when the belly is empty and gets alleviated after ingesting. Peptic ulcer is more common

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in male youth. In the duodenum, ulcers that are present on each the anterior and posterior partitions of duodenum (Brooks, 1985). Symptoms such as severe abdominal pain, bloody stools, cramps, and bloody vomiting may be life-threatening in some cases (Sharma and Bhatt, 2014). Pathophysiology involves an imbalance between “aggressive” and “defensive” variables. Acid, Helicobacter pylori, and pepsin are “defensive” variables. Prostaglandin, mucin, bicarbonate and, nitric oxide are “defensive” variables (Hoogerwerf and Pasricha, 2001). The cause of peptic ulcers were once thought as spicy food or stress and a closer look has revealed that the reasons could be the difficulty in encompassing the bacterial infection or in response to a couple of drugs during a treatment, especially NSAIDs (Marshall and Warren, 1984). The main etiological variables correlated with peptic ulcers are H. pylori, NSAIDs, aid, mental stress, alcohol, and smoke (Malfertheiner et al., 2009). The H. pylori (gram-negative bacteria) remains pressing among the Mucous and intestinal epithelium and is strategically intended to live in an aggressive belly placing (Longo et al., 2012). The present research was performed to examine medicinal plants deemed to be gastro-protective and ayurvedic relief agents for ulcers and gathering pieces of evidence of their effectiveness and biological processes in contemporary research (Nadkarni’s, 1996).

FINDINGS AND DISCUSSION

Allium Sativum

Allium sativum from the Liliaceae family is often cited as garlic and locally referred to as Vella-pundu. It has evolved at some stage in India. The pungent volatile oil is the main phytochemical whereas albumen, starch, mucilage, sugar and aromatic oil are also present. Garlic is an excellent treatment for maggots in the Ayurveda, oil of mustard or coconut fried infecting ulcers, and ulcerations. Aggregate of the all extracts with three or four components of ordinary or aqueous was used as a wound and foul ulcers washing lotion (Azamthulla et al., 2009). Sativum bulb juice has been administered orally to cysteamine intoxicated peptic ulcer in rats at doses between 250 and 500 mg / kg in recent studies. The extract significantly improves gastric ulcer healing and prevented rodents from developing experimental gastric and duodenal ulcer. Essential oil, allinase, and allicin are regarded as important phytochemicals (Azamthulla et al., 2009).

Aloe Vera

It belongs to the Liliaceae family is generally said as “aloe gel”. It is locally stated as “Kattalai” determined throughout India. The phytochemicals are emodin, aloin, and saponins (Borra, 2011). In Ayurveda, for chronic ulcer treatment, Aloe leaves are used effectively in America. The pain first decreases and the ulcers cure after a few weeks. In the latest research, Aloe vera powder changed into blended with gum acacia. For indomethacin intoxicated gastric ulcer, leaf extract was given through the mouth in experimental animals at a dosage of 200 mg/kg. Its concentrate has been exposed to control specific antiulcer action. Functional components is regarded barbaline, isobarboline, and saponins (Borra, 2011).

Azadirachta Indica

It belongs to the Meliaceae family is native to almost all of India and Bengal and grows there. It is often referred to as “neem” and is locally referred to as “vembu.” The functional components of this plant are, nimbinde, saponine, flavonoid and phenolic. This contains a margosine, bitter alkaloid and Seeds contain around 10–31% of a set natural bitter oil. The oil includes fatty acids that are free and volatile. The unstable fatty acids are likely a combination of stearic and oleic acids with little lauric acid (Divakar et al., 2001). In Ayurveda, a concoction of greens combined with sesame seed is really effective in unhealthy ulcerations. This extract of leaf is safe for pylorus ligation and restriction of cold pressure has stomach ulcer triggered in rats in recent studies (Pillai and Santhakumari, 1984). Active elements are isomeldenin, nimbin, nimbinene, and quercetin. Neem bark and leaves are filled with tannins and oil.

Balsamodendron Mukul

Balsamodendron mukul which belongs to Burseraceae family is often called gum-gugul, grown in Rajputana, Bengal, Assam, khandesh, and Mysore, known regionally as “Gukkulu”. Antiulcer Activity: Mixed with coconut oil or lime juice it is used for treating ulcer. Guggul gum is applied as a plaster or as a lotion in indolent ulcers (Kottaimuthu, 2008).

Carica Papaya

It belongs to family Caricaceae is usually called Papaya and is domestically referred to as Papalipazham, developing in sure areas and a few of the countries. Chymopapain, papain, caposide, pectin, carpaine, and carotenoids are chemical compounds found in the above plant. It is generally utilized in natural medicines. Its ripe drupe is nutritious and can be prepared without recurrent ulcer. Sun-dried fruits could be prepared as lettuce, stew, and jellies , whereas the mature fruit is usually served
| Sl. No. | Scientific Name of plant (Family) | Phytochemicals | Therapeutic uses |
|--------|-----------------------------------|----------------|-----------------|
| 1      | Allium Sativum (Liliaceae)        | Essential oil, allinase, allicin | Antimicrobial, duodenal ulcer |
| 2      | Aloe barbadensis (Liliaceae)      | Emodin, aloin, saponins | Gastric ulcer |
| 3      | Azadirachta Indica (Meliaceae)    | Nimbidine, saponine, flavonoid | Stomach ulcer |
| 4      | Balsamodendron Mukul (Burseraceae) | Flavonoid, terpenes | Indolent ulcers, Antimicrobial |
| 5      | Carica Papaya (Caricaceae)        | Papain, caposide, pectin, carpaine | G.I.T problems, Stomach ulcer |
| 6      | Euphorbia Neriifolia (Eurphorbiaceae) | Euphorbor, resin, latex, calcium malate | Gastric ulcer |
| 7      | Centella Asiatica (Umbelliferae) | Crystalline Vellarin, Tannin, Sugar | Stomach ulcer |
| 8      | Indigofera Tintorial (Papilionaceae) | Indicans (Glucosides) | Gastric ulcer |
| 9      | Lawsonia Inermis (Lythraceae)     | Hanno, tannin, tannic acid | Injuries and abscesses |
| 10     | Mangifera Indica (Anacardiaceae)  | Saponins, flavonoids, tannins | Stomach ulcer |
| 11     | Mimosa Pudica (Fabaceae)          | Quercetin, Naringin, Saponins, Tannins | Gastric ulcer |
| 12     | Momordica Charantia (Cucurbitaceae) | flavonoids, saponins and sterols | G.I.T problems, Stomach ulcer |
| 13     | Hibiscus Rosa Sinensis (Malvaceae) | Flavonoids, quercetin anthocyanins | Gastric ulcer |
| 14     | Galega Purpurea (Papilionaceae)   | glucoside, and querritrin or quercetin | Antimicrobial, Gastric ulcer |
| 15     | Ocimum Sanctum (Lamiaceae)        | Alkaloids, saponins tannins, flavonoids | Intestinal illnesses |
| 16     | Myrica Nagi (Myricaceae)          | saccharin, salts, and tannin | Gastric ulcer |
| 17     | Sesbania Grandiflora (Fabaceae)  | saponin and tannins | Antimicrobial, Gastric ulcer |
| 18     | Psidium Guyava (Myrtaceae)        | cellulose, tannin, volatile oil, mineral salts | Stomach ulcer |
| 19     | Phyllanthus Niruri (Eurphorbiaceae) | saponins, flavonoids, starches and glycosides | Gastric ulcer |
| 20     | Odina Wodier (Anacardiaceae)      | Tannin, potassium carbonate | persistent ulcers, chronic ulcer |
| 21     | Moringa Oleifera (Moringaceae)    | Tannins, alkaloids, saponin, quercetin | Stomach ulcer |
| 22     | Adansonia Digitate (Malvaceae)    | Tartrate, Glucose, Gum and Potash acetic acid | Syphilitic ulcer |
fresh are free of shell and core. The intake of the unripe fruit of the plant was correlated with the effect of antulcer (Indran et al., 2008). Research findings have shown that, Papaya administered with ethanol at concentrations 50 and 100mg / kg doses orally in rats with gastric ulcer caused significant reduction in ulcer. The extract shielded the stomach mucosa from the impact of ethanol. Carica papaya extract considerably decreased the quantity of stomach juice and stomach acid. Active components include, chymopapain and papain are commonly known to help with G.I.T problems (Drenth et al., 1971).

**Euphorbia Neriifolia**

This shrub belongs to family Euphorbiaceae and is frequently referred to as prevalent dairy conserve. It’s known as Ilaikkalli regionally. It is a leafless shrub is found in Southern India and cultivated in Bengal. Gum, euphorbon, resin, latex, calcium malate and so on are the viscose components in the above plant. In Ayurveda, herb extract is used mostly with fresh or clarified food to treat ulcer sores (Ahmed et al., 2011).

**Centella Asiatica**

*Centella Asiatica* Umbelliferae is often referred to as Asian penny-wort and is locally as Vaelari. This tiny plant is widespread in India and grows abundantly in humid areas. Chemicals in the above plant are rich in true Crystalline Vellarin, the main ingredient of plants, fibers, and some fat Aromatic flesh, Tannin, Sugar and Gum (Jamil et al., 2007). The substance in Herbal medicine, for ulcers might be given three times each day in 3 to 5 grain portions; at a similar minute, a segment of the moulder could be sprinkled on the new leaves, abscesses or ideally healing potions (Gohil et al., 2010).

**Indigofera Tinctoria**

This plant belongs to family Papilionaceae is also referred to as “true indigo” but is commonly referred to as possible alluded as “Bitter gourd”. Locally it is known as Thottal Sinungee. It is growing throughout the world's tropical countries and many subtropical areas. Phytochemicals in the whole plant include Flavonoids, Quercetin, Naringin, Saponins, Tannins, Gums and Mucilage (Vinothapooshan and Sundar, 2010). In Ayurveda, crisp leaves and seed decoction is eaten for a bowel ulcer (Vimala and Shoba, 2014). In the latest study, ethanolic extract of *Mimosa pudica* leaves has been recorded to have dose-dependent antulcer activity and these leaf extracts can be helpful in the therapy of ulcer as a natural antioxidant (Azmi and A, 2011). The main active components is alkaloid, mimosine (Azmi and A, 2011).

**Momordica Charantia**

It belongs to family Cucurbitaceae which is as often as possible alluded as “Bitter gourd”. Locally it is alluded to as Pavakka-Chedh. The above mentioned plant is harvested in gardens crosswise over India for its herbal extract (Rao et al., 2011). In Ayurveda, the whole powdered plant is used to clean infected as well as other stubborn abscesses and to treat injuries; combined with Long Pepper, Cinnamon, Chaulmugra oil and rice it forms a beneficial ointment in endangering Ulcers (Rao et al., 2011). In the most recent investigations, Watery and alcoholic concentrate of this organic product is utilized exclusively at dose range of 200 and 400 mg/kg against pyloric sphincter, headache medicine and Stress Ulcer in rodents. It is observed that these concentrations there is a considerable decline in the record.

**Lawsonia Inermis**

*Lawsonia inermis* (Lythraceae) is frequently referred to as henna and is locally referred to as maruthoni, common throughout India, for the most part developed as a support and nursery plant. Concoction segments are leaves in this plant that produce a coloring substance 12-15% Hanno, tannin, tannic acid, and alcohol soluble olive-green resin. Oil yielding seeds. The plant also contains glucoside (Chaudhary1 and Poonia, 2010). In Ayurveda, a leafy ointment is used to mend injuries and abscesses (Semwal et al., 2014).
of ulcer comparative with control (Rao et al., 2011). Active components include flavonoids, saponins and sterols.

**Hibiscus Rosa Sinensis**

It belongs to family Malvaceae is often referred to as “Changing Rose” and is referred to as “Chembaruthi” in private. It is indigenous to China and is generally developed throughout India as an elaborate plant. Flavonoids, quercetin, anthocyanins, kaempferol, cyanine and hydrocitric corrosive are synthetic compounds in this plant (Udayakumar, 2011). In the medication of society, the Hibiscus root, in Kanyakumari region, Tamil Nadu, Rosa sinensis is customarily used to treat ulcer among the kani clans (Srivastava et al., 2013). In the most recent examinations, the concentrates of watery and liquor from this plant roots had significant antulcer property in 250 and 500 mg/kg pyloric sphincter rodents. Hence, it has been experimentally shown that, these concentrations have adequate potential as an antiulcerogenic operator (Srivastava et al., 2013). Quercetin and flavonoids are considered as the main phytochemicals.

**Galega Purpurea**

It belongs to family Papilionaceae and is generally alluded to as the “purple nephrosis”, privately alluded to as Kollik-kay-welai, and is being found all over India, especially in Southern India. The plant grows on rocky surface. Phytochemicals in this plant are glcoside, and querritrin or quercetin (Johnson-Saint, 1927). In Ayurveda, the root of this plant is crushed to fine powder which is mixed with honey and applied on ulcers.

**Ocimum Sanctum**

*Ocimum Sanctum* (Lamiaceae) is much of the time alluded to as "heavenly basil" and is privately alluded to as tulsi. Tulsi’s name suggests the exceptional one. It is one of the Indian subcontinent’s holy herbs for Hindus. Alkaloids, saponins tannins, flavonoids and sterols are phytochemical compounds in this plant (Ghangale et al., 2009). In Ayurveda, Indian medicinal products explain the plant’s use in a multitude of diseases. For many years, millions of Indians take the new leaves as Prasad. A tea made with Tulsi leaves is widely used for intestinal illnesses (Singh and Majumdar, 1999). In rodents with ibuprofen, indomethacin, liquor and stress-incited ulceration, sanctum was directed intraperitoneally at dose range of 1, 2, and 3mL/kg. It decreases ulcer in a dose dependent manner (Singh, 1999). Active components include, fixed oil eugenol (Dharmani et al., 2004).

**Myrica Nagi**

It belongs to family Myricaceae and generally alluded to as the “Myrtle bag”. Locally it’s miles known Asmarudam-Pattai. It is a subtropical Himalayan evergreen herb, aboriginal of Shimla, area of Sylhet and south to Singapore and furthermore present in the ridge of Khasia and Burma. It’s a tree that is widely grown in Japan and China. Within this herb, phytochemicals are saccharin, salts, and tannin (Ganesan et al., 2008). An emollient produced in Ayurveda by winding the bark and washing it in liquid and mixing it in indian meal until it gets the right consistency to treat Scrofulous abscesses (Tukina). At the point when bubbled, natural products survive a type of wax named Myrtle wax that is utilized to treat ulcers (Ganesan et al., 2008).

**Sesbania Grandiflora**

*Sesbania Grandiflora* (Fabaceae) is as often as possible alluded to as “Basna” and is privately alluded to as “Akathi”. It is a decorative plant found in Western Himalayan fields in Sri Lanka. Saponins, tannins and triterpenes are chemicals in this plant (Bhalke et al., 2010). In the prescription of people Sesbania grandiflora leaves are set up as a sauce and received orally by the Valaiaian clan of alagarkoil hills, madurai locale, Tamil Nadu, India. 50mL of leaf decoc is taken by the ancestral and country populace of Sirumalai Hills, Dindigul area, Tamil Nadu, India, orally on a vacant stomach as a vermifuge. Leaves are bubbled in bovine milk and taken orally for the treatment of peptic ulcers in Kikuku town, Muleba locale, Tanzania. Paliyar tribals in Tamil Nadu, India, orally take the cooked leaves for ulcer (Bhalke et al., 2010). In Recent Studies, the concentrate of ethanol extract of leaf from *S. Graniflora* was controlled orally at a portion of 400 mg/kg in rodents with ibuprofen, ethanol and peptic ulcer brought about by indomethacin. The concentrate impressively hindered mischief to the gastric mucosa and diminished the discharge of basal gastric corrosive (Sertié et al., 2001). Phytochemicals like saponin and tannins are taken into account (Sertié et al., 2001).

**Psidium Gujava**

It belongs to family Myrtaceae normally called as “guava” and is alluded to referred as the koyya tree. The above plant is grown almost throughout India and is widespread in Bengal. Confection parts of the whole Plant are barks that contain Tannin, tar, and calcium oxalate gems of 27.4 percent. Leaves incorporate pitch, fat, cellulose, tannin, volatile oil, mineral salts and chlorophyll (Umana et al., 2012). Leaf decoc is used locally in Ayurveda for unfortunate ulcers and is a convincing wash for turgid Gums and Ulceration of the mug (Kamath et al., 2009).
The methanol leaf extract with Guava was orally administered to rodents in portions of 500 and 1000 mg/kg for 10 days of ethanol-instigated stomach Ulcer. The reported phytochemicals are quercetine, guaijaverine (Joseph and Priya, 2011).

**Phyllanthus Niruri**

It belongs to family, Euphorbiaceae which is also known as Stonebreaker or Seed-Under-Leaf. It's named Kizhkhay Nelli privately. It is prevalent in Southern, and central India and extends to ceylon. Alkaloids, tannins, saponins, flavonoids, starches and glycosides are noted phytochemicals from this plant (Okoli et al., 2009). In Ayurveda, the entire plant beat with root and rice water is used for ulcers (Okoli et al., 2009). In ongoing experiments, the ethereal themetanolic component concentrate of P. niruri was orally instilled in experimental animals at a portion of 400mg / kg and impressively impeded indomethacin-promoted ulcer production (Cipriani et al., 2008).

**Odina Wodier**

It belongs to family Anacardiaceae also known as “odiyamaram”. It is usually grown in the warm regions of India. Phytochemicals of the bark contains tannin and ash which contains significant amount of potassium carbonate (Ojha et al., 2014). Bark made as fresh juice is a good treatment for persistent ulcers. Bark in powdered form is used for chronic ulcer.

**Moringa Oleifera**

It belongs to family Moringaceae and is alluded to as “drum-stick”, Horse radish plant and is privately alluded to as murungai. It is indigenous to the locale of the Western Himalayas. Flavonoids, Tannins, alkaloids, saponin, quercetin, zeatin and terpenoids are phytochemicals present in this plant (Okoli et al., 2009). Antiulcer Activity: In the drug of society, the therapeutic estimation of the various parts of the plant in old stories medication has for some time been recorded (Ruckmani et al., 1998). Oleifera are generally eaten in Pakistan and antiulcer movement has been recorded (Ruckmani et al., 1998). Oleifera was given orally in portions of 125, 250 and 500 mg/kg in rodents with Pylorus-ligated, Ethanol, Cold restriction and Peptic Ulcer ibuprofen instigated. The example indicated reduces in the emission of Ulcer and Pepsin corrosive. Main active ingredients include, quercetine, beta-sitosterol and beta-carotene (Swati and Kansara, 2013).

**Adansonia Digitata**

Adansonia Digitata from the Malvaceae family is much of the time alluded to as Monkey-bread tree or Africa’s Boabab. It is privately alluded to as Paparapuli. It is considered as one of the world’s greatest and enduring plants, for the most part found in Gujarat, Bombay, Ceylon and Coromandal Coast. Above this plant, concoction segments are mash containing adhesive, Phobaphenes or Tartrate, Glucose, Gum and Potash acetic acid derivation and different Salts. Albuminoids, Gum, Salt, Glucose are found in a leaf. Bark incorporates wax, solvent and insoluble tannin, corrosive gum, sodium and potassium albuminous carbonate and chloride, and adansoin glucoside (Sundarambal et al., 2015). In Ayurveda, the crisp extract of the Leaf blended with ginger powder and the communicated extract of the new Salvador indica origin are applied to slothful syphilitic ulcer with extensive advantage. Leaves are utilized to advance touchy fiery ulcers and poultices (Varudharaj et al., 2015).

The compiled information about the scientific name, phytoconstituents of few plants which has the potential of anti-ulcer activity are provided in Table 1.

By this report, it is understood that on various diseases, a vital role is played by medicinal plants. Our results of the analysis show that the above described medicinal plants can prevent ulcer with the concept of the underlying mechanism stated. It has been documented that a number of botanical substances have antiulcer activity. Then we found that substances like Alkaloids, flavonoids, glycoside, terpenoids, tannins, steroids, saponin and many others, with their particular therapeutic importance, have antiulcer activity. The drug’s antiulcer activity can be due to free-radical scavenging properties, inhibition of gastric acid secretion providing strength of gastric mucosal barrier; decrease in vascular permeability and MDA material, enhancement of gastric mucosal cytoprotective mechanisms, elevation of glutathione rates, etc. Due to the presence of essential phytoconstituents in respective plant extracts, the different mechanism of ulcer inhibition can occur. The results of this study indicate that leaf extracts and whole part of some medicinal plant have good potential for use in the disease of peptic ulcer. According to comparison herbal medicines, these have mucoprotective function and gastric anti-secretory effects. Even at relatively high concentrations these extracts are non-toxic.

**CONCLUSIONS**

Gastric ulcer, one of the most common gastrointestinal disorder, was thought to arise out of an imbalance between protective and aggressive factor. It is inferred from this analysis that plant extracts in ani-
nal models have significant antiulcer activity.

Conflict of Interest
None.

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REFERENCES
Ahmed, S. A., Nazim, S., Siddik, P. M., Wahid, C. A., et al. 2011. Euphorbia neriifolia Linn: A phytopharmacological review. International research journal of pharmacy, 2(5):41–48.

Azamthulla, M., Mohammed Asad, P., S, V. 2009. Antiulcer activity of Allium sativum bulb juice in rats. Saudi Pharmaceutical Journal, 17(1):70–77.

Azmi, M. K. S. L., A, A. K. 2011. Pharmacological and biological overview on Mimosa pudica Linn. International Journal Of Pharmacy & Life Sciences, 2(11).

Bhalke, R. D., Giri, M. A., Anarthe, S. J., P, S. C. 2010. Antiulcer activity of the ethanol extract of leaves of Sesbania grandiflora (Linn.). International Journal of Pharmacy and Pharmaceutical Sciences, 2(4):206–208.

Bhowmik, D., Chiranjib, T. K., Pankaj, K. S. 2010. Recent trends of treatment and medication peptic ulcerative disorder. Int J Pharm Tech Research, 2(1):970–80.

Borra, S. K. 2011. Anti-ulcer effect of Aloe vera in non-steroidal anti-inflammatory drug induced peptic ulcers in rats. African Journal of Pharmacy and Pharmacology, 5(16):1867–71.

Brooks, F. P. 1985. The pathophysiology of peptic ulcer disease. Digestive Diseases and Sciences, 30(S11):15S–29S.

Chaudhary, S. G. G., Poonia, P. 2010. Lawsonia inermis Linnaeus: a phytopharmacological review. International Journal of Pharmaceutical Sciences and Drug Research, 2(2):91–98.

Cipriani, T. R., Mellinger, C. G., de Souza, L. M., Baggio, C. H., Freitas, C. S., Marques, M. C., Gorin, P. A., Sassaki, G. L., Iacomini, M. 2008. Acidic heteroxylans from medicinal plants and their anti-ulcer activity. Carbohydrate Polymers, 74(2):274–278.

Dharmani, P., Kuchibhotla, V. K., Maurya, R., Srivastava, S., Sharma, S., Palit, G. 2004. Evaluation of anti-ulcerogenic and ulcer-healing properties of Ocimum sanctum Linn. Journal of Ethnopharmacology, 93(2-3):197–206.

Divakar, M. C., Rao, S. B., Nair, G. R. N., Hisham, A. 2001. The role of fatty acids on the ulcer healing property of the nimbobin fraction of the neem oil. Journal of Medicinal and Aromatic Plants Science, 23(3):404–408.

Divya, K. M., Nair, R. C. S. R., A, I. J. 2017. A review: Neeli: An integral drug in the management of Visha. Journal of Pharmacognosy and Phytochemistry, 6(6):1690–1695.

Drenth, J., Jansonius, J. N., Koekoek, R., Wolthers, B. G. 1971. The Structure of Papain. Advances in Protein Chemistry, 25, pages 79–115.

Edirweera, M. K., Tennekoon, K. H., Samarakoon, S. R. 2017. A Review on Ethnopharmacological Applications, Pharmacological Activities, and Bioactive Compounds of Mangifera indica (Mango). Evidence-Based Complementary and Alternative Medicine. pages 1–24.

Ganesan, S., Pandi, N., Banumathy, N. 2008. Ethnomedicinal survey of Alagarkoil Hills. Tamilnadu, India. E Journal of Indian Medicine, 1(1):1–18.

Ghangale, G. R., Tushar, M., Jadhav, N. 2009. Evaluation of anti-ulcer activity of Ocimum Sanctum in rats. Veterinary World, 2(12):465–466.

Gohil, K., Patel, J., Gajjar, A. 2010. Pharmacological review on Centella asiatica: A potential herbal cure-all. Indian Journal of Pharmaceutical Sciences, 72(5):546–546.

Hooijerwerf, Pasricha 2001. Agents used for control of gastric acidity and treatment of peptic ulcers and gastroesophageal reflux disease. The Pharmacological Basis of Therapeutics. GH Joel & EL Lee, Eds, pages 1010–1011.

Indran, M., Mahmood, A. A., U, K. 2008. Protective effect of Carica papaya L leaf extract against alcohol induced acute gastric damage and blood oxidative stress in rats. West Indian Med J, 57(4):323–326.

Jamil, S. S., Nizami, Q., Salam, M. 2007. Centella asiatica (Linn.) Urban: a review. Indian Journal of Natural Products and Resources, 6(2):158–170.

Johnson-Saint, P. 1927. The Indian Materia Medica. 1142, clxix, lxxxviii. Bombay.

Joseph, B., Priya, M. 2011. Review on nutritional, medicinal and pharmacological properties of guava (Psidium guajava Linn. International Journal of Pharma and bio sciences, 2:53–69.

Kamath, J., Rahul, N., Kumar, C., Lakshmi, Sm 2008. Psidium guajava L: A review. International Journal of Green Pharmacy, 2(1).

Kottaimuthu 2008. Ethnobotany of the Valaiyans of Karandamalai. India. Ethnobotanical Leaflets, (1).

Lima, Z. P., Severi, J. A., Pellizzon, C. H., Brito, A. R. M. S., Solis, P. N., Cáceres, A., Girón, L. M., Vilegas,
W., Hiruma-Lima, C. A. 2006. Can the aqueous decoction of mango flowers be used as an antiulcer agent? Journal of Ethnopharmacology, 106(1):29–37.

Longo, D., Fauci, A., Kasper, D., Hauser, S., Jameson, J., Loscalzo, J. 2012. Harrison’s Principles of Internal Medicine. 18th ed. New York, NY: McGraw-Hill Professional.

Malfertheiner, P., Chan, F. K., McColl, K. E. 2009. Peptic ulcer disease. The Lancet, 374:1449–1461.

Marshall, B., Warren, J. R. 1984. Unidentified Curved Bacilli In The Stomach With Gastritis And Peptic Ulceration. The Lancet, 323:1311–1315.

Nadkarni’s, K. M. 1996. Unani-Tibbi, Siddha, allopathic, homeopathic, naturopathic & home remedies, appendices & indexes. 1. Popular Prakashan.

Indian materia medica: with Ayurvedic.

Ojha, D., Mukherjee, H., Mondal, S., Jena, A., Dwivedi, V. P., Mondal, K. C., Malhotra, B., Samanta, A., Chattopadhyay, D. 2014. Anti-Inflammatory Activity of Odina wodier Roxb, an Indian Folk Remedy, through Inhibition of Toll-Like Receptor 4 Signaling Pathway. PLoS ONE, 9(8):e104939–e104939.

Okoli, C. O., Ezike, A. C., Akah, P. A., Udegbunam, S. O., Okoye, T. C., Mbanu, T. P., Ugwu, E. 2009. Studies on Wound Healing and Antiulcer Activities of Extract of Aerial Parts of Phyllanthus niruri L. (Euphorbiaceae). American Journal of Pharmacology and Toxicology, 4(4):118–126.

Parvez, G. M. 2016. Pharmacological activities of mango (Mangifera Indica): A review. Journal of Pharmacognosy and Phytochemistry, 5(3):1–07.

Pillai, N., Santhakumari, G. 1984. Toxicity Studies on Nimbidin, a Potential Antiulcer Drug. Planta Medica, 50(02):146–148.

Rao, V., Venu, N., K, U, Gangadi, S., J, Anirudh, K. 2011. Evaluation of antiulcer activity of Momordica charantia in rats. International Journal of Pharmacy and Biological Sciences, 1(1):1–16.

Ruckmani, K., Kavimani, S., Jayakar, B., R, A. 1998. Anti-ulcer activity of the alkalai preparation of the root and fresh leaf juice of Moringa oleifera Lam. Anc Sci Life, 17(3):220–223.

Semwal, R. B., Demwal, D. K., Combrinck, S., Cartwright-Jones, C., Viljoen, A. 2014. Lawsonia inermis L. (henna): Ethnobotanical, phytochemical and pharmacological aspects. Journal of Ethnopharmacology, 155(1):80–103.

Sertié, J. A. A., Wiezel, G., Woisky, R. G., Carvalho, J. C. T. 2001. Antiulcer activity of the ethanol extract of Sesbania grandiflora. Braz J Pharm Sci, 37:107–112.

Sharma, D., Bhatt, S. 2014. A comprehensive review on ulcer healing potential of medicinal plants. International Journal of Pharmacy and Pharmaceutical Sciences, 6(10):3–11.

Singh, S. 1999. Evaluation of gastric anti-ulcer activity of fixed oil of Ocimum basilicum Linn. and its possible mechanism of action. Indian J Exp Biol, 37(3):253–257.

Singh, S., Majumdar, D. K. 1999. Evaluation of the gastric antiulcer activity of fixed oil of Ocimum sanctum (Holy Basil). Journal of Ethnopharmacology, 65(1):13–19.

Srivastava, S., Jaiswal, J., Gautam, H., Sharma, S., Rao, C. V. 2013. Anti-ulcer activity of methanol extract of Hibiscus rosa sinensis leaves. International Journal of Pharmacy and Pharmaceutical Sciences, 5(3):829–830.

Sundarambal, M., Muthusamy, P., Radha, R., A, J. S. 2015. A review on Adansonia digitata Linn. Journal of Pharmacognosy and Phytochemistry, 4(4):12–16.

Swati, S., Kansara, M. S. 2013. Evaluation of antiulcer activity of Moringa oleifera seed extract. J. Pharm. Sci. Biosci. Res, 3(1):20–25.

Udayakumar, M. 2011. Ethnomedicinal plants used by Kani tribals in Pechiparai forests of Southern western Ghats. International Research Journal of Plant Science, 2(12):349–354.

Umana, U., Timbuak, J., Musa, S. A., Ikyembe, D., Abdurashid, S., Hamman, W. 2012. Ulcercloprotective Effect of Methanol Extract of Psidium guajava Leaves on Ethanol Induced Gastric Ulcer in Adult Wistar Rats. Asian Journal of Medical Sciences, 4(2):75–78.

Varudharaj, T., Periyannan, M., Narayan, J., Rajkishore, V. B. 2015. A Review on Adansonia digitata-Potential Herb. Research Journal of Pharmacognosy and Phytochemistry, 7(1):57–57.

Vimala, G., Shoba, F. G. 2014. A Review on Antiulcer Activity of Few Indian Medicinal Plants. International Journal of Microbiology, 2014:1–14.

Vinothapooshan, G., Sundar, K. 2010. Anti-ulcer activity of Mimosa pudica leaves against gastric ulcer in rats. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 1(4):606–614.

Wandre, R. A., Bhagwat, G. B., Solunke, R. S., Yadav, M. B., Shaikh, A. M. 2013. A Review On Medicinal Plants With Anti Ulcer Activity. Journal of Pharmacognosy and Phytochemistry, 2(1).