Uses of Ethnomedicinal Plants for the Treatment of Ulcer in Pakistan

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ABSTRACT

The main objective of the study is to summarize the uses of plants by local communities in Pakistan for the treatment of ulcer. In the present review, the data regarding antiguicogenic plants were collected by searching different online data banks various research publications, PubMed, different books, thesis copies from libraries, and other national organizations. In the current review article, a total of 109 species belonging to 55 families were found to be used against ulcer treatment. Among these Asteraceae was the predominant family containing (11 species) followed by Fabaceae (6 species), Asclepiadaceae (5 species), Chenopodiaceae (5 species), Pinaceae (5 species), Brassicaceae (4 species), Polygonaceae (4 species), and so on. The highest number species used were herbaceous (67.88 %) followed by trees (17.43 %) and shrubs (14.67 %). The majority of the plants reported have significant and useful properties, but certain are cited in several papers that have sparked interest in further pharmacological research. It was occluded that whole plant and anthropogenic activities can make special interest to be exploited sustainably.

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INTRODUCTION

Ulcer syndrome has been a leading cause of gastrointestinal surgical treatments, with high morbidity and fatality rates (Chung et al., 2017). Ulcer is a disorder that causes severe bleeding in patients, open lesions on the epidermis of skin or a mucousa depicted by collapse of tissue (Chan et al., 2004). Generally, ulcer is a well-known disorder that can build up in the gastrointestinal system for example in the (mouth, esophagus, stomach, duodenum, jejunum, Zollinger-Ellison syndrome, and in connection with a Meckel's diverticulum having ectopic gastric mucosa). The ulcer also causes gentle abdominal suffering catastrophic harm and bleeding to patients, and even mental disorders (Pradip et al., 2012). Ulcer are classified into various forms peptic, mouth, esophagus and peptic ulcer of stomach (Debjit et al., 2010). Gastric and duodenal ulcers are the 2 most common types of peptic ulcers. In the stomach patients feel severe pain and such ulcer is most common in the older age group. Other manifestations are sickness; weight loss and vomiting for the reason that too much eating increases the stomach pain (Vyawaharen et al., 2009).

Gastric ulcers are present in the small intestine because of severe pain in the upper abdomen. Ulcers often appear...
on the posterior and anterior walls of duodenum (Wong et al., 2004). In several cases, peptic ulcer cause death due to the symptoms of abdominal pain, bloody stool, and contractions along with blood vomiting (Chung and Shelat, 2017). The peptic ulcer physiology infection involves an unevenness between offensive and defensive factors (Hoogerwerf et al., 2001, Tarnawski 2005, Kaunitz, 2004, Bandyopadhyay et al., 2001). Peptic ulcer has been found by researchers due to bacterial infections (Helicobacter pylori) or result in a variety of medications (Marshall et al., 1984). Helicobacter pylori, stress, nonsteroidal anti-inflammatory drugs, alcohol abuse, and smoking are the major causative factors associated with gastric ulcer (Malfertheiner et al., 2009). A gastric ulcer is a worldwide known gastrointestinal disease that affects 10 % of the world’s population (Zapata-Colindres et al., 2006).

Pakistan is situated in South Asia and is at the seam of Central Asia having a land boundary 6,774 km length Pakistan geographical position is very important and it has India in the east while Afghanistan and Iran in the west surrounding China in the northeast. Pakistan has diverse flora represented by just about 6000 wild plant species are habitually common in the Himalaya and Karakoram regions (Abbasi et al., 2010; Tardio et al., 2008). In Pakistan, little interest has been paid to the ethnomedicinal standards of medicinal plants (Qureshi et al., 2006; Husain et al., 2008; Qureshi et al., 2009; Mahmood et al., 2011). About 75-80 % of the world population still utilize herb medicine mostly in growing countries for basic health needs (Kumar et al., 2011). The presence of major secondary metabolites including flavonoids and tannins for antiulcer action was discovered by a phytochemical screening of medicinal plants (Patel et al., 2010). The present reserarch was aim to review the medicinal herbs for ulcers and put together potency for different biological processes in the latest investigation. The current review was focused to document the ethnomedicinal plant’s knowledge and usually medicinal plants against ulcer patients in Pakistan.

**Plants used for treatment of Ulcer and their diversity in Pakistan**

Ethnomedicinal investigations in various parts of Pakistan have revealed the indigenous use of medicinal herbs in the treatment of ulcers. In previous articles, a large number of local plants were used for the ulcer treatment. ((Hussain et al., 2018; Parvaiz 2014; Akhtar et al., 2013). In the recent review, it was discovered that the majority of these research lacked adequate information on the oral usage of the herbs. Approximately twenty percent of the plant species of the world are probably used in health management systems (Baillie et al., 2004).

In the current review research, 109 species from 55 families were discovered to be helpful for the treatment of ulcers.

Among these Asteraceae was leading family having (11 species) followed by 6 Fabaceae species, 5 Asclepiadaceae species, 5 Chenopodiaceae species, 5 Pinaceae species, 4 Brassicaceae species, 4 Polygonaceae species, 3 Apiaceae species, 3 Boraginaceae species, 3 Convolvulaceae species, 3 Cucurbitaceae species, 3 Lamiaceae species, 3 Mimosaceae species, 2 Aizoaceae species, 2 Capparidaceae species, 2 Cyperaceae species, 2 Malvaceae species, 2 Plantaginaceae species, 2 Portulacaceae species, 2 Rosaceae species, 2 Saxifragaceae species, 2 Solanaceae species, 2 Tamaraceae species, 1 Alliaceae species, 1 Amaranthaceae species, 1 Apocynaceae species, 1 Araliaceae species, 1 Aristolochiaceae species, 1 Asphodelaceae species, 1 Berberidaceae species, 1 Cactaceae species, 1 Caryophyllaceae species, 1 Cuscutaceae species, 1 Dioscoreaceae species, 1 Dryopteridaceae species, 1 Euphorbiaceae species, 1 Geraniaceae species, 1 Juglandiaceae species, 1 Linaceae species, 1 Meliaceae species, 1 Malvaceae species, 1 Nyctaginaceae 1 species, 1 Oleaceae 1 species, 1 Orobanchaceae 1 species, 1 Poaceae 1 species, 1 Punicaceae species, 1 Rhamnaceae species, 1 Rubiaceae species, 1 Salicaceae species, 1 Scrophulariaceae species, 1 Ulmaceae species, 1 Verbenaceae species, 1 Violaceae species and 1 Salvadoraceae species. Compare to previous literature indicates that the Asteraceae was frequently represented in the study areas (Wazir et al., 2004; Gorsi and Mairaj, 2002; Abbas et al., 2013, Abbasi et al., 2013.

Different plants have been reported due to their wide distribution pattern and ethnomedicinal potential in 8, 7, 6, 4, and 3 research papers, these plants are well-known as antiulcerogenic plants. Among different studies, Withania somnifera is reported in 8 publications have the highest value as an antiulcerogenic plant. Withania somnifera is followed by Calotropis Procera having (7 citations), Carthamus oxyantha (6 citations), Fragaria nubicola (6 citations), Bergenia ciliate (4 citations), Cleome viscose (4 citations), Pinus roxburghii (4 citations)
and Tamarix dioica (4 citations). Eleven plants Ajuga bracteosa, Asphodelus tenuifolius, Berberis lyceum, Bergenia ciliata, Bistorta amplexicaulis, Capparis deciduas, Chenopodium album, Dryopteris ramosa, Geranium wallichianum, Olea ferruginea and Solanum nigrum are reported in 3 publications each as ethnomedicinally used against ulcer.

Plants sections used
In Pakistan, practically all components of the plant, including the whole plant, leaves, seeds, roots, bark, and fruit, flower, rhizome, latex, stem, aerial parts, oil, resin, bulb, shoot, and wood are used in the ulcer treatments (Arif et al., 2021). Data analysis shows that Whole plant (28.48 %) are mostly used against ulcer followed by leaves (24.24 %), seeds (10.30 %), roots (9.09 %), bark (7.87 %), fruit (7.27 %), flower (6.66 %), rhizome (2.42 %), latex (2.42 %), stem (1.81 %), aerial parts (1.21 %), oil (1.21 %), resin (1.21 %), bulb (0.60 %), shoot (0.60 %) and wood (0.60 %). Leaves were reported as frequently used part in the ethnobotanical study of tehsil Kabal, district Swat, Pakistan (Khan et al., 2015). However, if mistakenly exploited, the use of root and whole plant in remedy compositions may exert pressure on the flora.

Preparation, forms, dose and using time of herbal remedies
Out of total 109 plant species, different people in Pakistan against ulcer use different methods of preparation of remedies. However, in the majority of the reports preparation methods and the dosage time is not declared. Various people employ different portions of the plant in their cures, such as fresh parts, dry parts, or both (fresh and dry) at a time. Water is used mostly as a medium for preparing recipes while occasionally milk, oil, and butter are used for application. Decoction (22.44 %) is the most commonly utilized formulation method, followed by infusion (19.72 %), powder (18.36 %), extract (12.92 %), vegetable (7.48 %), directly used (5.44 %), juice (4.08 %), paste (4.08 %), poultice (2.72 %), ointment (2.04 %) and demulcent (0.68 %). According to the present review article, the people of Pakistan have kept medicinal plant remedies on hand in case of emergency. The highest number species used for ulcer treatment were an herbaceous habit (67.88%) followed by trees (17.43 %) and shrubs (14.67 %) (Ullah et al., 2013).

Ethnomedicinal and pharmacological validation of important plants
Medicinal plants are an important element in pharmaceutical industry to find out active ingredients and develop a new drug. An appropriate way for selecting plants for complete pharmacological screenings is to employ ethnomedicinal assessment (Redzi, 2007; Sari-Kundali et al., 2010). The reported plants in the current review investigate various parts of Pakistan and the rest of the World with most of the plants having strong curative and beneficial effects as antiulcerogenic plants. Calotropis Procer is a perennial shrub, component of Asclepiadaceae. The whole plant decoction, extract, powder and infusion is used to treat ulcer (Ahmad et al., 2014). The plant extracts were tested for antiulcer activity in pylorus ligated rats and prominent protection was observed in histamine-induced duodenal ulcers in guinea pigs (Yadav et al., 2011).

Carthamus oxyacantha is a small herb and belongs to Asteraceae. The seeds and leaves paste and extract are used to treat ulcer (Adeel et al., 2011, Mahmood et al., 2013, Taj et al., 2009, Hussain et al., 2010, Hayat et al., 2008, Choudhary et al., 2014). Methanolic extract of seeds of Carthamus oxyacantha was evaluated in different acute gastric ulceration in albino mice prevented the increase of gastric mucosal lesion and decreased the gastric toxicity produced by ulcerogenic agents (Hussain et al., 2015).

Chenopodium album is an annual herb and belongs to Chenopodiaceae. The whole plant is used as a vegetable and the infusion is used in the treatment of ulcer (Khan, S.W. and S. Khatoon, 2008, Ahmad et al., 2014, Khan et al., 2013b). The ethanolic extract was analyzed in rats to check the antiulcer activity through three models and ranitidine was used as reference standard. The alcoholic withdraw significantly lessens the capacity of gastric acid secretion and ulcer ratio with respect to control group (Nigam et al., 2011).

Cleome viscosa is herbaceous and belongs to Brassicaceae and the leaves, seeds and roots decoction and infusion are used in ulcer management (Arshad et al., 2011, Hussain et al., 2010, Nisar et al., Weiss et al., 2014). The 70 % ethanolic extract of the aerial parts was investigated in various stomach ulcer models in rats. The Cleome viscosa extract showed significant inhibition (p < 0.01) lesion ratio in ethanol (15.93–42.30 percent), PL (26.34–59.28 percent) and (CRS 22.58–54.03 percent), correspondingly and inhibit the oxidative injuries of gastric mucous membrane by preventing peroxidation of lipids and by a remarkably decrease (p < 0.001) in SOD, and an increment in catalase activity. A prominent decrease (p < 0.01) happened in the amount
of H⁺K⁺-ATPase, the degree of stomach juice and overall increase in pH (Gupta et al., 2013).

**Heliotropium indicum** is herbaceous and belongs to Boraginaceae. The leaves extract is used against ulcer (Taj et al., 2009). The ethanolic withdraw of *Heliotropium indicum* exhibited anti ulcer activity against pylorus ligated induced gastric ulcer in rats, HCl- Ethanol induced ulcer in mice and water immersion stress induced ulcer in rats that indicates that *Heliotropium Indicum* leaves extract to have possible anti-ulcer action in the 3 models tested (Ashoka et al., 2011).

**Hippophae rhamnoides** is herb and belongs to Asteraceae. The whole plant decoction is used to cure ulcer (Shedayi et al., 2012). It significantly lessens ulcer development in H20-immersion (P<0.05) and reserpine-induced (P<0.01) models in rats and it is recommended that the CO₂-extracted sea buckthorn seed and pulp oils have both preventive and curative effects against gastric ulcers in the study in rats (Xing et al., 2002).

**Linum usitatissimum** is an herb and belongs to Linaceae. The seed, bark, leaves, flower and oil decoction are used to treat ulcer (Iqbal et al., 2011). In a rat model of ethanol-induced gastric ulcer; the oil and mucus were evaluated, and they dramatically reduced the number and length of ethanol-induced gastric ulcers. An oral dose of flax seed oil (5 ml/kg) reduced ulcer severity more than ranitidine (50 mg/kg), showing that both flax (seed oil) and flax (seed mucus) may protect rats from ethanol-induced stomach ulcers. (Dugani et al., 2008).

**Momordica charantia** is an herb and belongs to Cucurbitaceae. The fruits are used as a vegetable and are used to cure ulcer (Khan et al., 2013b). Inpylorus-ligated rats were given a methanol extract of *Momordica charantia* fruits to explore duodenal and gastric duodenal ulcers which showed control in the ulcer index and an elevation in gastric mucosa content. In ethanol-induced, stress-induced, indomethacin-induced stomach ulcers, and cysteamine-induced duodenal ulcers, the extract reduces the ulcer ratio. (Alamed et al., 2009).

**Plantago lanceolata** is an herb and belongs to Plantaginaceae. The whole plant decoction is used to treat ulcer (Awan et al., 2013, Sultana et al., 2006). The aqueous extract of *Plantago lanceolata* demonstrated that higher doses offer better safety against gastroduodenal ulcers than the normal drugs implemented through antisecretory and cytoprotective mechanisms (Endale et al., 2011).

**Portulaca oleracea** is herbaceous and belongs to Portulacaceae. The whole plant is used as a vegetable and is useful in ulcer (Wariss et al., 2014). The ethanol and aqueous extracts were investigated in mice and both extracts exhibited a dose-related depletion in severity of ulcers. The retroperitoneal and oral management of extracts lessens the gastric increase in pH in pylorus-ligated mice and this suggests that *Portulaca oleracea* has gastroprotective action and validates its utilization in traditional medicine for stomach and intestine diseases (Gholamreza et al., 2004).

**Solanum nigrum** is an annual herb and belongs to Solanaceae. The aerial parts and whole sap are used to treat ulcer (Sultana et al., 2006, Wariss et al., 2014, Gulshan et al., 2012). The anti-ulcer effect of *Solanum nigrum* fruits extract on cryopreservation stress, indomethacin, pyloric ligature, and ethanol-induced gastric ulcer models, as well as ulcer healing activity on acetic acid-induced ulcer model in rats, significantly inhibited the CRU induced gastric lesions (76.6 percent), IND (73.8 percent), PL (80.1 percent), and EtOH (70.6 percent), with greater potential than omeprazole. These results reveal that Solanum nigrum extract has antiulcerogenic and ulcer-healing capabilities, which could be attributed to its antisecretory action (Mallika et al., 2006).

**Tephrosia purpurea** is a shrub and belongs to Fabaceae. The whole plant powder and decoction is used locally for ulcer treatment (Ahmad et al., 2014a). When compared to control vehicle animals, the ulcer ratio in *Tephrosia purpurea* treated animals was much lower in all models, and this antiulcer action was even more obvious in animals with ulcers produced by HCl, indomethacin, or pyloric ligation. Comparative to the control group, omeprazole (8 mg/kg³) provided considerable stomach and duodenal ulcer prevention. (Deshpande et al., 2003).

**Withania somnifera** is shrubby and belongs to Solanaceae. The juice, powder, poultice, and paste of the whole plant is used against ulcer (Muslim et al., 2010, Arshad et al., 2011, Kamal et al., 2009, Hussain et al., 2010, Nisar et al., 2011, M. Hamayun, 2007, Zereen et al., 2013). Preventer ulcer activities of uproot of *Withania somnifera* and its measure against stress plus posterior ligated induced peptic ulcer in rats has minimize ulcer index as compared to control group.

Moreover, *Withania somnifera* have the property to control the release of hydrochloric acid in the stomach, however, it boosts body’s defense mechanisms, such as
the antioxidant defense system to avoid gastric mucosal damage. (Bhatnagar et al., 2005).

CONCLUSION
Herbal plants are best choice for the treatment of ulcer available in large quantity as compared to other synthetic drugs. In Pakistan, treatment of ulcer is done with various local plant remedies. However, in most cases, the ethnomedicinal research reports gave important information about the recipes preparation method, amount of dose, and time of application of remedies. Future pharmacological investigation shows the majority of the plants with various positive and therapeutic properties. In conclusion, the viable utilization and alteration of primitive knowledge will be useful and enhance the lifestyle of deprived communities.

CONFLICT OF INTEREST
The authors declares that they have no conflict of interest.

REFERENCES


Khan, S.W. and S. Khatoon. 2008. Ethnobotanical studies on some useful herbs of Haramosh and Bugrote


