OPEN ACCESS J. Plant Environ. 04 (01) 2022. 77-85 DOI: 10.33687/jpe.004.01.3991

Check for updates

Available Online at EScience Press

Journal of Plant and Environment

ISSN: 2710-1665 (Online), 2710-1657 (Print)

https://esciencepress.net/journals/JPE

Uses of Ethnomedicinal Plants for the Treatment of Ulcer in Pakistan

Munzer Ullah[1*], Maliha Sarfraz[2], Hayat Ullah[3], Zia-ur-Rahman[4], Zarif Gul[3], Misbah Ullah Khan[5], Rashid Iqbal[6], Maheen Kanwal[1], Nadia Nadeem[3], Amir Sohail[3], Ghazala Arshad[3]

[1]Department of Biochemistry, University of Okara, Okara-56300, Punjab, Pakistan.

[2]Department of Zoology, Wildlife and Fisheries, University of Agricultural, Faisalabad, sub campus Toba Tek Singh, 36050, Pakistan.

[3]Department of Chemistry, University of Okara, Okara-56300, Punjab, Pakistan.

[4]Department of animal breeding & Genetics, University of Agriculture Faisalabad, Sub Campus Toba Tek Singh, Pakistan.

[5]Center of Nano Science, University of Okara, Okara-56300, Punjab, Pakistan.

[6]Department of Agronomy, Faculty of Agriculture and Environment, The Islamia University of Bahawalpur, Pakistan.

ARTICLE INFO

Article History

Received: January 05, 2022

Revised: March 20 2022

Accepted: April 03, 2022

Keywords

Ulcer treatment

Ethnomedicinal plants

Pharmacological research

Anthropogenic activities

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 antiulcerogenic 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 (11species) 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.

Corresponding Author: Munzer Ullah

Email: munzer.qau@gmail.com

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 Karakorum 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 reserach 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 (11species) followed by 6 Fabaceae species, 5 Asclepiadaceae species, 5 Chenopodiaceae species, 5 Pinaceae species, 4 Brassicaceae species, 4 Polygonaceae species, 3 Apiaceae species, 3 Boraganaceae species, 3 Convolvulaceae species, 3 Cucurbitacea 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 Tamaracaceae 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 Molluginaceae species, Nyctaginaceae 1 species, Oleaceae 1 species, Orobanchaceae 1 species, Poaceae 1 species, 1 Punicaceae species, 1 Rhamanaeae 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 oxycantha* (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 is 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 oxycantha 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 oxycantha* 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*., 2011, Weiss *et al*., 2014). The 70 % ethanolic extract of the aerial parts was investigated in various stomach ulcer models in rats. The *Cleome viscose* 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 mucosus 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 antiulcer 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 CO_2-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 gastrric 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/kg[1]) 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 at., 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

Abbas, Q., R. Qureshi, A.U.N. Naqvi, S.N. Khan and I. Hussain. 2013. Floristic inventory and ethnobotanical study of the naltar valley (Karakorum ranges), Gilgit Pakistan. Pakistan Journal of Botany, 45: 269–277.

Abbasi, A.M., M.A. Khan, N. Khan and M. H. Shah, 2013. Ethnobotanical survey of medicinally important wild edible fruits species used by tribal communities of Lesser Himalayas-Pakistan. Journal of Ethnopharmacology, 148: 528–536.

Abbasi, A.M. and M.A. Khan. 2013. Ethnomedicinal assessment of some selected wild edible fruits and vegetables of lesser Himalayas, Pakistan. Journal of Ethnopharmacology, 45: 215–222.

Adeel, M., A. Mahmood, H. Shaheen, R.A. Qureshi, Y. Sangi and S.A. Gilani. 2011. Ethno medicinal survey of plants from district Bhimber Azad Jammu and Kashmir, Pakistan. Journal of Medicinal Plants Research. 5(11): 2348-2360.

Afzal, S., N. Afzal, M.R. Awan, T.S. Khan, A. Gilani, R. Khanum and S. Tariq. 2009. Ethno-botanical studies from Northern Pakistan. Journal of Ayub Medical College Abbottabad, 21(1).

Ahmad, M., M.A. Khan, S. Manzoor, M. Zafar and S. Sultana. 2006. Check List of Medicinal Flora of Tehsil Isakhel, District Mianwali-Pakistan. Ethnobotanical Leaflets, 10: 41-48.

Ahmad, M., S. Sultana, S.F. Hadi, T.B. Hadda, S. Rashid, M. Zafar, M.A. Khan, M.P.Z. Khan and G.Yaseen. 2014b. An Ethnobotanical study of Medicinal Plants in high mountainous region of Chail valley (District Swat-Pakistan). Journal of Ethnobiology and Ethnomedicine, 10: 36.

Ahmad, S., H.M. Wariss, K. Alam, S. Anjum, M. Mukhtar. 2014. Ethnobotanical Studies of Plant Resources of Cholistan Desert, Pakistan. International Journal of Science and Research, 3(6).

Ahmad, S.S., F. Mahmood, Z.U.H. Dogar, Z.I. Khan, K. Ahmad, M. Sher, I. Mustafa and E.E. Valeem. 2009. Prioritization of medicinal plants of margala hills national park, Islamabad on the basis of available information. Pakistan Journal of Botany, 41(5): 2105-2114.

Ahmad, S.S., S. Erum, S.M. Khan, M. Nawaz and A. Wahid. 2014a. Exploring the Medicinal Plants Wealth: A Traditional Medico-Botanical Knowledge of Local Communities in Changa Manga Forest, Pakistan. Middle-East Journal of Scientific Research, 20(12): 1772-1779.

Ahmed, E., M. Arshad, A. Saboor, R. Qureshi, G. Mustafa, S. Sadiq and S.K. Chaudhari. 2013. Ethnobotanical appraisal and medicinal use of plants in Patriata, New Murree, evidence from Pakistan. Journal of Ethnobiology and Ethnomedicine, 9: 13.

Ajaib, M., Z. khan and A. Zikrea. 2014. Ethnobotanical survey of some important herbaceous plants of District Kotli, Azad Jammu & Kashmir. Biologia, 60(1): 11-22.

Akhtar, N., A. Rashid, W. Murad and E. Bergmeier. 2013. Diversity and use of ethno-medicinal plants in the region of Swat, North Pakistan. Journal of Ethnobiology and Ethnomedicine, 9: 25.

Akhtar, N., A. Rashid, W. Murad, and E. Bergmeier. 2013. Diversity and use of ethno-medicinal plants in the region of Swat, North Pakistan. Journal of ethnobiology and ethnomedicine, 9(1):1-14.

Alam, S., M. Asada, S.M.B. Asdaqa and V.S. Prasad. 2009. Antiulcer Activity of Methanolic Extract of *Momordica charantia* L. In Rats. Journal Of Ethnopharmacology, 123: 464–469.

Alamgeer, T., M. Rashid, M.N.H. Malik, M.N. Mushtaq, J. khan, R. Qayyum, A.Q. Khan and N. Muhammad. 2013. Ethnomedicinal Survey of plants of Valley Alladand Dehri, Tehsil Batkhela, District Malakand, Pakistan. International Journal of Basic Medical

Sciences and Pharmacy, 3(1): 124.

Amjad, M.S., M. Arshad and R. Qureshi. 2015. Ethnobotanical inventory and folk uses of indigenous plants from Pir Nasoora National Park, Azad Jammu and Kashmir. Asian pacific journal of tropical biomedicine, 5(3): 234-241.

Arif, U., K.H. Bhatti, K. Hussain, M. Ajaib, M. Majeed and J. Zeb. 2021. Ethnobotanical indigenous knowledge of Tehsil Charhoi, District Kotli, Azad Jammu and Kashmir, Pakistan. Ethnobotany Research and Applications, 22: 1-24.

Arshad, M., M.F. Nisar, A.M. Sajilsmail and M. Ahmad. 2011. Ethnomedicinal Flora in District Sialkot, Punjab, Pakistan. Middle-East Journal of Scientific Research. 9(2): 209-214.

Ashoka, M., S. Shashidhar, C. Shastry and P. Shetiya. 2011. Anti-Ulcer Activity of *Heliotrpium indicum* Leaves Extract. International Journal of Pharmaceutical Sciences and Research, 2: 5.

Awan, M.R., Z. Jamal and A. Khan. 2013. Ethno-botanical studies of economically important plants from mountainous region of Gilgit-Baltistan. Pakistan Science and Technology Division, 32(4): 308-318.

Baillie, J.E.M. 2004. IUCN Red list of threatened species. A global species assessment. IUCN-SSC.

Bandyopadhyay, D., K. Biswas, M. Bhattacharyya, R.J. Reiter and R.K. Banerjee. 2001. Gastric toxicityand mucosal ulceration induced by oxygen-derived reactive species: protection by melatonin. Current Molecular Medicine, 1: 501-513.

Bano, A., M. Ahmad, M. Zafar, S. Sultana, S. Rashid and M.A. Khan. 2014. Ethnomedicinal knowledge of the most commonly used plants from Deosai Plateau, Western Himalayas, Gilgit Baltistan. Pakistan Journal of Ethnopharmacology, 155: 1046–1052.

Barkatullah, M. Ibrar, A. Rauf, T.B. Hadda, M.S. Mubarak and S. Patel. 2015. Quantitative ethnobotanical survey of medicinal flora thriving in Malakand Pass Hills, Khyber Pakhtunkhwa, Pakistan. Journal of Ethnopharmacology. 169: 335–346.

Basu, A., T. Sen, S. Pal, N. Mascolo, F. Capasso and A.K.N. Chaudhuri. 1997. Studies on The Antiulcer Activity of The Chloroform Fraction of *Calotropis procera* Root Extract. Phytotherapy Research, 11: 163–165.

Bhatnagar, M., C.P. Jain and S.S. Sisodia. 2005. Anti-Ulcer Activity of *Withania somnifera* in Stress Pluspyloric Ligation Induced Gastric Ulcer in Rats. Journal Of Cell and Tissue Research, 5(1): 287-292.

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

Chan, F.K.L. and D.Y. Graham. 2004. Review article: prevention of non-steroidal anti-inflammatory drug gastrointestinal complications—review and recommendations based on risk. Alimentary pharmacology & therapeutics, 19(10): 1051-61.

Choudhary, B.A., M.S. Aslam, A.S. Ijaz, M. Uzair, A.J. Awan and T.R. Khan. 2014. Survey of ethno-medicinal weeds of district Toba Tek Singh, Punjab, Pakistan. Indian Research Journal of Pharmacy and Science, 2: 124-132.

Chung, K.T. and V. G. Shelat. 2017. Perforated peptic ulcer-an update. World journal of gastrointestinal surgery, 9(1): 1.

Debjit, B.C., K.K. Chiranjib, T. Pankaj, and K.P.S. Kumar. 2010. Recent trends of treatment and medication peptic ulcerative disorder. International Journal of PharmTech Research, 2: 970–980.

Deshpande, S., G.B. Shah and N.S. Parmar. 2003. Antiulcer Activity of Tephrosia Purpurea in Rats. Indian Journal of Pharmacology; 35: 168-172.

Dhanasekaran, S. and Palayan. 2008. Muralidaran1anti-Ulcerogenic Evaluation of the Ethanolic Extract of water Spinach (*Ipomoea aquatica* Forsk) In Aspirin Ulceratedrats. Journal of Pharmacy Research, 1: 2.

Ejaz Ur-Rehman. 2006. Indigenous Knowledge on Medicinal Plants, Village Barali Kass and its Allied Areas, District Kotli Azad Jammu & Kashmir. Ethnobotanical Leaflets, 10: 254-264.

Endale, M., K. Asres, M. Asad and E. Engidawork. 2011. Evaluation of The Antipeptic Ulcer Activity of The Leaf Extract of *Plantago lanceolata* L. In Rodents. Phytotherapy Research, 25: 1174–1180.

Gholamreza, K., H. Hosseinzadeh and N. Ettehad. 2004. Evaluation of the Gastric Antiulcerogenic Effects of *Portulaca oleracea* L. Extracts in Mice. Phytotherapy Research, 18: 484–487.

Gorsi, M.S. and S. Mairaj. 2002. Ethnomedicinal survey of plants of khanabad village and its allied areas, District Gilgit. Asian Journal of Plant Sciences, 1(5): 604–615.

Gulshan, A.B., A.A. Dasti, S. Hussain, M.I. Atta and M.A. Din. 2012. Indigenous uses of medicinal plants in rural areas of Dera Ghazi Khan, Punjab, Pakistan. Journal of Agricultural and Biological Science, 7: 9.

Gupta, P.C., V. Chandana and N. Sharma. 2013. Protective Effect of Standardized Extract of *Cleome viscose* against Experimentally Induced Gastric Lesions in Rats. Pharmaceutical Biology. 51: 5.

Hamayun, M. 2007. Traditional uses of some medicinal plants of Swat Valley, Pakistan. Indian Journal of Traditional Knowledge, 6(4): 636-641.

Haq, F. 2012. The Ethno Botanical Uses of Medicinal Plants of Allai Valley, Western Himalaya Pakistan. International Journal of Plant Research, 2(1): 21-34.

Haq, F., H. Ahmad and M. Alam. 2011. Traditional uses of medicinal plants of Nandiar Khuwarr catchment (District Battagram), Pakistan. Journal of Medicinal Plants Research, 5(1): 39-48.

Hayat, M.Q., M.A. Khan, M. Ahmad, N. Shaheen, G. Yasmin and S. Akhter. 2008. Ethnotaxonomical Approach in the Identification of Useful Medicinal Flora of Tehsil Pindigheb (District Attock) Pakistan. Ethnobotany Research & Applications, 6: 035-062.

Hazrat, A., M. Nisar, J. Shah, and S. Ahmad. 2011. Ethnobotanical study of some elite plants belonging to Dir, Kohistan Valley, Khyber Pukhtunkhwa, Pakistan. Pakistan journal of Botany, 43(2): 787-795.

Hoogerwerf, W.A. and P. J. Pasricha. 2001. Agents Used for Control of Gastric Acidity and Treatment of Peptic Ulcers and Gastro Esophageal Reflux Disease edition, 1005–19, McGraw-Hill, New York, NY, USA, 10th edition.

Husain, Z.S., R.N. Malik, M. Javaid. and S. Bibi. 2008. Ethnobotanical properties and uses of medicinal plants of Morgha Biodiversity Park, Rawalpindi. Pakistan Journal of Botany, 40: 1897–1911.

Hussain, K., M.F. Nisar, A. Majeed, K. Nawaz and K.H. Bhatti. 2010. Ethnomedicinal Survey for Important Plants of Jalalpur Jattan, District Gujrat, Punjab, Pakistan. Ethnobotanical Leaflets, 14: 807-25.

Hussain, L., S. Naseem, J. Ikram, M. Ali, I. Imran, M. Moga and M.Z.U. Haq. 2015. Antiulcerogenic Effect of *Carthamus oxycantha* M. Bieb (Asteraceae) in Mice and Rat Models. Pakistan Journal of Zoology, 47(2): 529-534.

Hussain, M., G.M. Shah and M.A. Khan. 2006. Traditional Medicinal and Economic uses of Gymnosperms of Kaghan Valley. Pakistan Ethnobotanical Leaflets, 10: 72-81.

Hussain, W., L. Badshah, M. Ullah, M. Ali, A. Ali and F. Hussain. 2018. Quantitative study of medicinal plants used by the communities residing in Koh-e-Safaid Range, northern Pakistani-Afghan borders. Journal of ethnobiology and ethnomedicine, 14(1): 1-18.

Ikram, S., K.H. Bhatti and M. Parvaiz. 2014. Ethnobotanical studies of aquatic plants of district Sialkot, Punjab, Pakistan. Journal of Medicinal Plants Studies, 2(1): 58-63.

Iqbal, H., Z. Sher and Z.U.D. Khan. 2011. Medicinal plants from salt range Pind Dadan Khan, district Jhelum, Punjab, Pakistan. Journal of Medicinal Plants Research, 5(11): 2157-2168.

Ishtiaq, M., A.S. Mumtaz, T. Hussain and A. Ghan. 2012. Medicinal plant diversity in the flora of Leepa Valley, Muzaffarabad (AJK), Pakistan. African Journal of Biotechnology, 11(13): 3087-3098.

Kamal, M., S.M. Wazir, M. Hassan, M. Subhan, S.U. Khan, A. Muhammad and S. Taj. 2009. Ethnobotanically important plants of district Bannu, Pakistan. Pakistan Journal of Pharmaceutical Sciences, 15(2): 87-93.

Kaunitz, J.D. and Y. Akiba. 2004. Gastroduodenal mucosal defense: role of endogenous mediators. Current Opinion in Gastroenterology, 20: 526-532.

Kayani, S., M. Ahmad, S. Sultana, Z.K. Shinwari, M. Zafar, G. Yaseen, M. Hussain and T. Bibi. 2015. Ethnobotany of medicinal plants among the communities of Alpine and Sub-alpine regions of Pakistan. Journal of Ethnopharmacology, 164:186-202.

Khan, A.M., M.A. Ahmad, M. Zafar, M. Sarwat and S. Sultana. 2010. Ethnopharmacological application of medicinal plants to cure skin diseases and in folk cosmetics among the tribal communities of North-West Frontier Province. Pakistan Journal of Ethnopharmacology, 128: 322–335.

Khan, I., N.M. AbdElsalam, H. Fouad, A. Tariq, R. Ullah and M. Adnan. 2014. Application of Ethnobotanical Indices on the Use of Traditional Medicines against Common Diseases. Evidence-Based Complementary and Alternative Medicine, 20: 21.

Khan, R.U., S. Mehmood, S.U. Khan and F. Jaffar. 2013b. Ethnobotanical Study of Food Value Flora of District Bannu Khyber Pakhtunkhwa, Pakistan. Journal of Medicinal Plants Studies, 1(4): 93-106.

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

Valleys in Gilgit, Northern areas of Pakistan. Pakistan Journal of Botany, 40(1): 43-58.

Lau, J.Y., J. Sung, C. Hill, C. Henderson, C.W. Howden and D.C. Metz. 2011. Systematic review of the epidemiology of complicated peptic ulcer disease: incidence, recurrence, risk factors and mortality. Digestion, 84: 102–113.

Mahmood, A., A. Mahmood, R.N. Malik and Z.K. Shinwari. 2013. Indigenous knowledge of medicinal plants from Gujranwala district, Pakistan. Journal of Ethnopharmacology, 148: 714–723.

Mahmood, A., R.N. Malik, Z.K. Shinwari and A. Mahmood. 2011. Ethnobotanical survey of plants from Nelum, Azad Jammu and Kashmir, Pakistan. Pakistan Journal of Botany, 43: 105–110.

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

Mallika, J. and C.S. Shyamala. 2006. Deviantiulcerogenic and Ulcer Healing Effects of *Solanum nigrum* (L.) on Experimental Ulcer Models: Possible Mechanism for the Inhibition of acidformation. Journal of ethnopharmacology, 104: 156–163.

Marshall, B.J. and J.R. Warren. 1984. Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration. The Lancet, 1: 1311–1315.

Murad, W., A. Azizullah, M. Adnan, A. Tariq, K.U. Khan, S. Waheed and A. Ahmad. 2013. Ethnobotanical assessment of plant resources of Banda Daud Shah, District Karak, Pakistan. Journal of Ethnobiology and Ethnomedicine. 9: 77.

Muslim, C.M. and S. Sikander. 2010. Ethnobotany of medicinal plants of Leepa Valley (Azad Kashmir). The Pakistan Journal of Forestry, 60: 2.

Nasir, S., J. Ahmed and M. Asrar. 2014. Medicinal plants: a promising resource for poverty alleviation in the Milieu of Swat. FUUAST Journal of Biology, 4(2): 237-245.

Nigam, V., M. Padmaa and M. Paarakh. 2011. Anti-Ulcer Effect of *Chenopodium album* Linn. against gastric ulcers in rats. International Journal of Pharmaceutical Sciences and Drug Research, 3(4): 319-322.

Nisar, M.F., S. Ismail, M. Arshad, A. Majeed and M. Arfan. 2011. Ethnomedicinal Flora of District Mandi Bahaudin, Pakistan. Middle-East Journal of Scientific Research, 9(2): 233-238.

Parvaiz, M. 2014. Ethnobotanical studies on plant resources of Mangowal, district Gujrat, Punjab, Pakistan. Avicenna Journal of Phytomedicine, 4(5): 364.

Patel, G. and S. Jain. 2010. Antiulcer activity of *Neriutn indicum* in rats. Research Journal of Pharmacology, 4: 66–68. Pharmaceutical sciences and research, 15: 2487-2493.

Pradip, K.M., S.K. Jain, N. Lal and S. Alok. 2012. A Review on antiulcer activity. International journal of Pharmaceutical Sciences and Research, 3(8): 2487.

Qureshi, R. and G.R. Bhatti. 2008. Ethnobotany of plants used by the Thari people of Nara Desert, Pakistan. Fitoterapia, 79: 468–473.

Qureshi, R., A. Waheed, M. Arshad and T. Umbreen. 2009. Medico-ethnobotanical inventory of Tehsil Chakwal, Pakistan. Pakistan Journal of Botany, 41(2): 529-538.

Qureshi, R., G.R. Bhatti and R.A. Memon. 2010. Ethnomedicinal uses of herbs from northern part of Nara desert, Pakistan. Pakistan Journal of Botany, 42(2): 839-851.

Qureshi, R.A., I. Ahmah and M. Ishtiaq. 2006. Ethnobotany and phytosociological studies of Tehsil Gugar Khan district Rawalpindi, Pakistan. Asian Journal of Plant Sciences, 5: 890–893.

Qureshi, R.A., M.A. Ghufran, K.N. Sultana, M. Ashraf and A.G. Khan. 2006. Ethnobotanical Studies of Medicinal Plants of Gilgit District and Surrounding Areas. Ethnobotany Research and Applications, 5:115-122.

Qureshi, R.A., M.A. Ghufran, S.A. Gilani, Z. Yousaf, G. Abbas and A. Batool. 2009. Indigenous medicinal plants used by local women in southern Himalayan regions of Pakistan. Pakistan Journal of Botany, 41: 19–25.

Kumar, R. 2011. A review on medicinal plants for peptic ulcer. Scholar Research Library. Der Pharmacia Lettre, 3: 414–420.

Redzi, C.S.S. 2007. The ecological aspect of ethnobotany and ethnopharmacology of population in Bosnia and Herzegovina. Collegium Antropologicum, 31: 869–890.

Sabeen M. and S.S. Ahmad. 2009. Exploring the Folk Medicinal Flora of Abbotabad City, Pakistan. Ethnobotanical Leaflets, 13: 810-33.

Saqib, Z., A. Mahmood, R.N. Malik, A. Mahmood, J.H. Syed and T. Ahmad. 2014. Indigenous knowledge of medicinal plants in Kotli Sattian, Rawalpindi

district, Pakistan. Journal of Ethnopharmacology, 151: 820–828.

Sari, K. 2010. Ethnobotanical study on medicinal use of wild and cultivated plants in middle, south and west Bosnia and Herzegovina. Journal of Ethnopharmacology, 131: 33–55.

Shaheen, H., Z.K. Shinwari, R.A. Qureshi and Z. Ullah. 2012. Indigenous plant resources and their utilization practices in village populations of Kashmir Himalayas. Pakistan Journal of Botany, 44(2): 739-745.

Shedayi, A.A. and B. Gulshan. 2012. Ethnomedicinal uses of plant resources in Gilgit-Baltistan of Pakistan. Journal of Medicinal Plants Research, 6(29): 4540-4549.

Sher, Z., Z.U.D. khan and F. Hussain. 2011. Ethnobotanical studies of some plants of Chagharzai Valley, District Buner, Pakistan. Pakistan Journal of Botany, 43(3): 1445-1452.

Sultana, S., M.A. Khan, M. Ahmad and M. Zafar. 2006. Indigenous Knowledge of Folk Herbal Medicines by the Women of District Chakwal, Pakistan. Ethnobotanical Leaflets. 10: 243-253.

Taj, S., S.M. Wazir, M. Subhan, M. Hassan, S.U. Khan and M. Kamal. 2009. Some of the ethnobotanically important plants of Godi Khel & its Outskirts hilly areas, District Karak, Pakistan. Pakistan Journal of Plant Science, 15(1): 39-43.

Tardio, J. and M. Pardo-de-Santayana. 2008. Cultural importance indices: a compara-tiveanalysis based on the useful wild plants of Southern Cantabria (Northern Spain). Economic Botany, 62: 24–39.

Tareen, R.B., T. Bibi, M.A. Khan, M. Ahmad and M. Zafar. 2010. Indigenous knowledge of folk medicine by the women of Kalat and Khuzdar regions of Balochistan, Pakistan. Pakistan Journal of Botany, 42(3): 1465-1485.

Tarnawski, A.S. 2005. Cellular and molecular mechanisms of gastrointestinal ulcer healing. Digest. Digestive Diseases and Sciences, 50: 24-33.

Ullah, M., M.U. Khan, A. Mahmood, R.N. Malik, M. Hussain, S.M. Wazir, M. Daud and Z.K. Shinwari. 2013. An ethnobotanical survey of indigenous medicinal plants in Wana district South Waziristan agency, Pakistan. Journal of Ethnopharmacology, 150: 918–924.

Vyawahare, N.S., V.V. Deshmukh, M.R. Godkari and V.G. Kagathara. 2009. Plants with anti-ulcer activity. Pharmacognosy Review, 3: 108–115.

Wariss, H.M., S. Ahmad, S. Anjum, K. Alam. 2014. Ethnobotanical Studies of Dicotyledonous Plants of Lal Suhanra National Park, Bahawalpur, Pakistan. International Journal of Science and Research, 3: 6.

Wazir, S.M., A.A. Dasti and J. Shah. 2004.Common medicinal plants of chapursan valley, Gojal II, Gilgit- Pakistan. Journal of Research (Science) Bahauddin Zakariya University, Multan, Pakistan, 15: 41–43.

Xing, J., B. Yang, Y. Dong, B. Wang, J. Wang and P. Heikki. 2002. Kallio effects Of Sea Buckthorn (*Hippophaë rhamnoides* L.) Seed and Pulp Oils on Experimental Models of Gastric Ulcer in Rats. Fitoterapia, 73: 644–650.

Yadav, D.K., N. Singh, K. Dev, R. Sharma, M. Sahai, G. Palit and R. Maurya. 2011. Anti-ulcer constituents of Annona squamosa twigs. Fitoterapia, 82(4): 666-675.

Zabihullah, Q., A. Rashid and N. Akhtar. 2006. Ethnobotanical survey in Kot Manzaray Baba valley Malakand Agency, Pakistan. Pakistan Journal of Plant Science, 12(2): 115-121.

Zapata-Colindres, J.C., S. Zepeda-G´omez, A. Monta˜no-Loza, E. V´asquez-Ballesteros, J. de Jes´us Villalobos and F. Valdovinos- Andraca. 2006. The association of Helicobacter pylori infection and nonsteroidal anti-inflammatory drugs in peptic ulcer disease. Canadian Journal of Gastroenterology, 20: 277–280.

Zereen, A. and Z.U.D. Khan. 2012. A survey of ethnobotanically important trees of Central Punjab, Pakistan. Biologia, 58: 21-30.

Zereen, A., Z.U.D. Khan and M. Ajaib. 2013. Ethnobotanical evaluation of the shrubs of Central Punjab, Pakistan Biologia, 59(1): 139-146.