

Full length Research Paper

Ethno botanical studies of medicinal plants used in the management of Peptic ulcer disease in Sokoto State, North Western Nigeria

Alebiosu Celestina Oluranti¹, Ugwah Oguejiofor Michael², Ugwah-Oguejiofor Chinenye Jane^{3*} and Njan Anoka Ayembe³

¹Department of Pharmaceutical and Medicinal Chemistry, Faculty of Pharmaceutical Sciences, Usmanu Dan Fodiyo University, P.M.B. 2346, Sokoto, Nigeria.

²Department of Pharmacology, College of Health Sciences, Usmanu Dan Fodiyo University, P.M.B. 2346, Sokoto, Nigeria.

³Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, Usmanu Dan Fodiyo University, P.M.B. 2346, Sokoto, Nigeria.

Accepted September 18, 2012

This survey was carried out in randomly selected Local government areas in Sokoto, North West Nigeria in order to document plants used by traditional healers in the area for the management of Ulcer. Seventy traditional healers who claim to have knowledge and use medicinal plants for treating ulcer were interviewed. The documentation contains botanical, local, and common names of the plants and the plant parts used. It also contains the method of preparation and other ailments that are treated with them locally. Those plants that have been scientifically validated to have activity against ulcer were also noted in the documentation. Thirty-seven plants commonly used by traditional healers in the region were identified. The survey showed that plants from the various families including Mimosaceae, Anacardiaceae, Euphorbiaceae and Moraceae families are commonly used by traditional healers in North West Nigeria for the treatment of ulcer. The methods of preparation of the plants were usually by decoction or maceration. 51.35% of all plants have been validated scientifically as having ulcer properties. This documentation there serves as an inventory for plants used by traditional healers in Sokoto state to treat peptic ulcer disease.

Keywords: Traditional healers, Medicinal plants, Ethnobotanical Survey, Ulcer, North West Nigeria.

INTRODUCTION

Peptic ulcer disease (PUD) is a benign lesion occurring at stomach or duodenum where the mucosal epithelium is exposed to acid and pepsin (Khazaei and Salehi, 2006; John, 2005; Tripathi, 2003). It develops when the delicate balance between some gastroprotective and aggressive factors in the gastrointestinal tract is lost (Kent and Debas, 1994; Lima *et al.*, 2006; Jainu *et al.*, 2006). It is the most prevalent gastrointestinal disorder (Shristi *et al.*, 2012). An estimated 15,000 deaths occur each year as a consequence of PUD ((Shristi *et al.*, 2012). A lot of

orthodox medications have been employed in the treatment of this ailment which include, proton pump inhibitors, antacids, H₂ receptor blockers, prostaglandin analogues etc. In traditional African societies, phytotherapy is highly valued and widely utilised. Majority of the population use plant materials as their sources of primary healthcare (Farnsworth *et al.*, 1985). A lot of traditional medicine have been utilised in the treatment of peptic ulcer diseases.

Ethnobotanical studies are today recognized as the most viable method of identifying new medicinal plants or refocusing on those earlier reported for bioactive constituents (Farnsworth, 1996). The method is reported to show greater percentage yield of bioactive useful medicinal compounds over other methods of random

*Corresponding Author E-mail: nenye789@yahoo.com; Tel: 234 803 609 8241

Table 1. List of plants used in the treatment of Ulcer in the North West, Nigeria.

S/N	Botanical name	Family	Local name	Common name	Plant Part used	Frequency of citation
1	<i>Acacia nilotica</i> (Linn)	Mimosaceae	Bagaruwa	Thorn mimosa	Bark	60
2	<i>Acacia polyacantha</i> (Willd)	Mimosoideae	Karo	Catechu tree	root	51
3	<i>Alchornea cordifolia</i> (Schum & thonn)	Euphorbiaceae	Bámámí	Christmas bush	leaves	45
4	<i>Amblygonocarpus andongensis</i> (Kunth)	Leguminosae	Kolo	Scotsmans rattle	bark	57
5	<i>Anacardium occidentale</i> (Linn)	Anacardiaceae	Kanjuu	Cashew	leaves	30
6	<i>Andropogon gayanus</i> (Kunth)	Formicidae	Gamba	Gamba Grass	leaves	32
7	<i>Anogeissus leiocarpus</i> (DC)	Combretaceae	Marke	Chewing stick tree	bark	22
8	<i>Azadirachta indica</i> (A.Juss)	Meliaceae	Dogon yaro	Neem	Leaves, fruit	33
9	<i>Balanites aegyptiaca</i> (Linn)	Zygophyllaceae	Aduwa	desert date	Leaves, Bark	59
10	<i>Bombax buonopozense</i> (P.Beauv)	Bombacaceae	Kuryaa	Gold coast bombax	flower	50
11	<i>Boswellia dalzielii</i> (Hutch)	Burseraceae	Hannuu	frankinscence	bark	51
12	<i>Bridelia ferruginea</i> (Benth)	Euphorbiaceae	Kisni		bark	39
13	<i>Capsicum annuum</i> (Linn)	Solanaceae	Tatashe	Chilli pepper	fruit	43
14	<i>Caralluma dalzielii</i> (N. Br)	Asclepiadaceae	Kalan Massallachi	Mosque stalk	Aerial part	34
15	<i>Carica papaya</i> (Linn)	Caricaceae	Gwándà	pawpaw	Fruits, seeds	19
16	<i>Cochlospermum tinctorium</i> (A. Rich)	Cochlospermaceae	Balge	The red fruits	root	19
17	<i>Euphorbia convolvuloides</i> (Hochst. Ex benth)	Euphorbiaceae	Noonon kurciyaa	dove milk	bark	19
18	<i>Ficus platyphylla</i> (Del.)	Moraceae	Gamji	Gutta percha tree	Bark, leaves	22
19	<i>Ficus thonniigii</i> (Blume)	Moraceae	Cediya	loin cloth fig tree	leaves	14
20	<i>Gardenia aqualla</i> (Stapf & Hutch)	Rubiaceae	Guade		Leaves, bark	24
21	<i>Guiera senegalensis</i> (J. F. Gmel)	Combretaceae	Saabaraa	Dry zone mahogany	leaves	22
22	<i>Hibiscus sabdariffa</i> (Linn)	Malvaceae	Soobaroodo	roselle calyx	calyx	39
23	<i>Lannea acida</i> (A. Rich)	Anacardiaceae	Faru	Atina barteri	bark	41
24	<i>Mangifera indica</i> (Linn)	Anacardiaceae	Mangwaoro	Mango	leaves	27
25	<i>Momordica charantia</i> (Linn)	Cucurbitaceae	Daddagu	Bitter melon	fruits	32
26	<i>Musa sapientum</i> (var <i>paradisical</i>)	Scitaminaceae	Kwandan	banana	Unripe fruit	23
27	<i>Mytragne africana</i>	Rubiaceae	Dafa		Bark	32
28	<i>Ocimum gratissium</i> (Linn)	Lamiaceae	Tagida	African basil	leaves	22
29	<i>Piliostigma reticulatum</i> (DC) Hochst	Fabaceae	Kalgoo		Bark, root	32
30	<i>Psidium guajava</i> (Linn)	Myrtaceae	Gwava	Guava	leaves	27
31	<i>Saccharum spontaneum</i> (Linn)	Poaceae	Kibiya	Wild Sugar cane	leaves	19
32	<i>Scoparia dulcis</i>	Scrophulariaceae	Hántsàr sáániyáá	sweet broomweed	Aerial part	18
33	<i>Terminalia macroptera</i> (Guill et Perr)	Combretacea	Bayankada		Bark, root	24

Table 1 Cont.

34	<i>Vernonia kotschyana</i> (Sch. Bip.)	Scrophulariaceae	Doomashii	Angular winter cherry	leaves	24
35	<i>Waltheria indica</i>	Sterculiaceae	yankufa	Sleepy morning	leaves	35
36	<i>Zingiber officinale</i> (Rosc)	Zingiberaceae	Cittáá mà yáátsàa	ginger	Seeds, oil, root	29
37	<i>Ziziphus abyssinica</i> (A. Rich)	Rhamnaceae	Magaryaa	Catch thorn	root	62

Table 2. Other medicinal uses of plants used in the treatment of Ulcer and their method of preparation.

S/N	Botanical name	Mode of preparation	Proof of antiulcer	Other uses
1	<i>Acacia nilotica</i> (Linn)	decoction	Y	Analgesic, Antimutagenic, antibacterial
2	<i>Acacia polyacantha</i> (Willd)	decoction	N	Antiplasmodial,
3	<i>Alchornea cordifolia</i> (Schum and thonn)	maceration	Y	Anti-inflammatory, Antibacteria
4	<i>Amblygonocarpus andongensis</i> (Kunth)	decoction	N	Antidiarrhoea, anti-inflammatory
5	<i>Anacardium occidentale</i> (Linn)	decoction	Y	Antidiabetes, antihypertension
6	<i>Andropogon gayanus</i> (Kunth)	maceration	N	antifungal
7	<i>Anogeissus leiocarpus</i> (DC)	decoction	N	Antimalaria, antifungal, antibacterial
8	<i>Azadirachta indica</i> (A.Juss)	decoction	Y	antipyretic, antimalarial, antimicrobial, CNS-depressive
9	<i>Balanites aegyptiaca</i> (Linn)	decoction	Y	leucoderma, coughs, snake bite, worm infestation
10	<i>Bombax buonopozense</i> (P.Beauv)	decoction	N	antidiarrhoea
11	<i>Boswellia dalzielii</i> (Hutch)	decoction	N	Antidiarrhoea, antibacterial
12	<i>Bridelia ferruginea</i> (Benth)	decoction	Y	Anti-inflammatory
13	<i>Capsicum annum</i> (Linn)	Added to decoction	N	Anti cancer, anti rheumatism
14	<i>Caralluma dalzielii</i> (N.Br.)	decoction	N	Anticonvulsant, antiemetic, anti-inflammatory
15	<i>Carica papaya</i> (Linn)	maceration	Y	Anti-inflammatory, laxative, wound healing
16	<i>Cochlospermum tinctorium</i> (A. Rich)	decoction	N	Antiplasmodium, hepatoprotective
17	<i>Euphorbia Convolvuloides</i> (Hochst. ex Benth)	decoction	N	Antimalaria, antiviral
18	<i>Ficus platyphylla</i> (Del)	decoction	N	Anti-inflammatory, anticonvulsant
19	<i>Ficus thonningii</i> (Blume)	maceration	Y	Antituberculosis, antidiabetic and antifungal
20	<i>Gardenia aqualla</i> (Stapf and Hutch)	Decoction/maceration	N	Treating impotence, dysmenorrhoea
21	<i>Guiera senegalensis</i> (J.F.gmel)	maceration	Y	Anticonvulsant, antileprosy, antimalaria
22	<i>Hibiscus sabdariffa</i> (Linn)	maceration	Y	Antihypertension, antimicrobial
23	<i>Lannea acida</i> (A. Rich)	decoction	N	Eye problems, anti-diarrhoea, fertility promoting
24	<i>Mangifera indica</i> (linn)	decoction	Y	Analgesic, antimalaria
25	<i>Momordica charantia</i> (Linn)	decoction	Y	Anti diabetes, abortifacient, anti herpes
26	<i>Musa sapientum</i> (var <i>paradisical</i>)	maceration	Y	Antimicrobial, anti stress, antidepressant
27	<i>Myrtagne africana</i>	decoction	N	Antidiarrhoea, stomach problems
28	<i>Ocimum gratissium</i> (Linn)	maceration	Y	Antibacterial, anti cancer,
29	<i>Piliostigma reticulatum</i> (DC) Hochst	maceration	Y	Antibacterial, anti-inflammatory
30	<i>Psidium guajava</i> (Linn)	maceration	Y	Wound healing, soft tissue infection, anti-diarrhoea

Table 2 Cont.

31	<i>Saccharum spontaneum</i> (L)	maceration	N	Anti-inflammatory, antibacterial
32	<i>Scoparia dulcis</i>	maceration	Y	Antidiabetes, antiviral, antimalaria
33	<i>Terminalia macroptera</i> (Guill et Perr)	decoction	N	Epilepsy and convulsion, haemorrhoids; diarrhoea,
34	<i>Vernonia kotschyana</i> (Sch. Bip.)	maceration	Y	Tuberculosis, gonorrhoea, gingivitis, arthritis
35	<i>Waltheria indica</i>	decoction	N	Anti-diarrhoea, Analgesic, Asthma
36	<i>Zingiber officinale</i> (Rosc)	decoction	Y	anti-inflammatory, antithrombotic
37	<i>Ziziphus abyssinica</i> (A.Rich)	decoction	N	Antidiarrhoea, antibacterial, mental disorders

Y= Scientific proof for Anti ulcer activities

N= No Scientific proof for Anti ulcer activities

selection and screening (Khafagi and Dewedar, 2000). Several ethnobotanical surveys have been conducted on the medicinal plants used in various areas for the management of ulcer (Adjanohoun et al., 1996), but none has been documented in the Northwest, Nigeria. Therefore, this survey seeks to document plants, plant parts and their method of preparation for the treatment of peptic ulcer disease in the area.

MATERIALS AND METHODS

Data were collected through oral interviews of traditional healers in 15 selected Local government areas (LGA) of Sokoto state in the North West, Nigeria and their responses recorded in a pre-piloted form (Ahmad et al., 2003). These LGA selected represent fairly well the ecological nature, people and geographical features of the region. The indigenous population of these LGA belong to the Hausa ethnic group but other ethnic groups are represented. A traditional healer for the purpose of this study is "a person who is recognized by the community in which he lives as competent" to provide healthcare by using vegetable, animal and mineral substances and certain other methods. These methods are based on social, cultural and religious backgrounds as well as on knowledge, attitude and belief that are prevalent in the community regarding physical, mental and social well-being and the causes of disease and disability (Sofowora, 1982).

Identification of traditional healers was through signpost, notice, enquiries in the neighbourhood and also at the market stalls where herbs are sold. The traditional healers were approached and asked for their consent in talking about ulcer and its management. Traditional healers were interviewed within their localities. Among the questions asked during the interviews were age, sex, years of experience and tribe of the traditional healer. Presenting symptoms upon which the diagnosis of the disease is made, estimated number of ulcer patients

treated and their responses, names and parts of the plants used in the treatment of the disease were some of the other questions asked to the healers. Samples of all the medicinal plants cited by the healers were collected with their assistance. Further identification and validation was done by a Taxonomist in the Department of Pharmacognosy, Usmanu Danfodiyo University, Sokoto (UDUS). Voucher specimens were prepared, labelled and deposited in the Herbarium of Pharmacognosy Department, UDUS.

RESULT

A total of 70 Traditional healers were interviewed across the LGA. Four of the respondents were excluded from the final collation because they could not define convincingly the clinical presentation of the disease from their responses. About 95% of the healers were males with estimated age range of 40–70 years and 93% of them were Hausa by tribe. Eighty-three (85%) of the respondents gave a 20 or more years experience and attributed their experience in managing ulcer to family lineage. The traditional healers believe that pain in the upper part of the stomach and occasionally lower back and chest pain are the indication for the treatment of ulcer. They claim that treatment can be permanent between 1-3 months. In this study, 37 plants from various families were cited as used in the treatment of ulcer (Table 1). Other ailments which these plants can treat were also mentioned. Those plants with scientific documentation as having anti ulcer activities were also noted (Table 2).

DISCUSSION

The main objective of the present ethnobotanical survey was to collect information on herbal remedies used traditionally in Sokoto State, North West, Nigeria for the

treatment of peptic ulcer. A total of 37 medicinal plants belonging to 27 families were recorded. Literature review showed that some of these plants are equally used in other areas for ulcer treatment (Noumi and Dibakto, 2000; Siddqui, 2002). The high number of plant species recorded in the present study may be an indication of the rich plant diversity of the Sokoto state people despite the climatic risk as earlier recognized by Scoones et al. (1995). The procedure used in this study was similar to that of Ahmad *et al.* (2003) who studied the ethnobotanical potentials of some cultivated plants in Chung region. The antiulcer potential of 19 of these medicinal plants has been proven scientifically. These are *Acacia nilotica* L. (Bansal and Goel, 2012), *Alchornea cordifolia* Schum & thonn (Nguelefack et al., 2005), *Anacardium occidentale* L (Samanta et al., 2010), *Azadirachta indica* A.Juss (Bandyopadhyay et al., 2004), *Balanites aegyptiaca* L (Mishra, 2010), *Bridelia ferruginea* Benth (Akuodor et al., 2012), *Carica papaya* Linn (Ezike et al., 2009), *Ficus thonningii* Blume (Aliyu et al., 2006), *Guiera senegalensis* J. F. Gmel (Aniagu et al., 2005), *Hibiscus sabdariffa* L (Alqasoumi et al., 2010), *Mangifera indica* L (Carvalho et al., 2007), *Momordica charantia* L (Alam et al., 2009), *Musa sapientum* var *paradisical* (Prabha et al., 2011), *Ocimum gratissimum* L (Aka et al., 2007), *Piliostigma reticulatum* (DC) Hochst (Salawu, 2009), *Pisidium guajava* L (Livingston Raja and Sundar, 2012), *Scoparia dulcis* (Babincová et al., 2008), *Vernonia kotschyana* Sch. Bip. (Germano et al., 1996), and *Zingiber officinale* Rosc (Al-Yahya et al., 1989). Others are yet to be validated for their anti ulcer activities.

CONCLUSION

Many plant species are known as sources of treating human ailments, this study documents the plants used in Sokoto state North West, Nigeria by traditional healers for the treatment of peptic ulcer diseases. Further experimental investigation of these plants may possibly offer effective and alternative affordable management of this disease condition.

ACKNOWLEDGEMENT

The authors are grateful to Mal. Rabi for translating some of the vernacular to English Language.

REFERENCES

- Adjanooun JF, Aboubakar N, Dramane K, Ebot ME, Ekpere JA, Enow-Orock EG, Focho D, Gbile ZO, Kamanyi A, Kamsu KJ, Keita A, Mbenkum T, Mbi CN, Nkongmeneck B, Satabie B, Sofowora A, Tamze V, Wirmum CK (1996). Traditional Medicine and Pharmacopoeia: Contribution to Ethnobotanica and Floristic Studies in Cameroon. Organization of African Unity Scientific, Technical and Research Commission. Centre Nationale de Production des Manuels
- Scolaires, Porto-Novo. Benin. Pp.207-209.
- Ahmad M, Khan MA, Qureshi RA (2003). Ethnobotanical study of some cultivated plants of chung region (District Attock). J. Hamdard Medicus. 3: 15-19.
- Aka PA, John-Africa L, Nworu CS (2007). Gastro-protective properties of leaf extract of *Ocimum gratissimum* L Against experimental ulcer in rat. Int. J. Pharmacol. 3: 461-467.
- Akuodor GC, Mbah CC, Essien AD, Akpan JL, Ezeokpo BC, Iwuanyanwu TC, Osunkwo UA (2012). Ulcer-protective and Antidiarrhoeal Effects of the Aqueous Stem Bark Extract of *Bridelia ferruginea* in Rodents. Pharmacol. 3:591-597.
- Alam S, Asad M, Asdaq SMB, Prasad VS (2009). Antiulcer activity of methanolic extract of *Momordica charantia* L. in rats. J. Ethnopharmacol. 123: 464:469.
- Aliyu R, Adebayo AH, Umar MB, Mangse KG (2006). Anti ulcer activity of the aqueous left extract of *Ficus thonningii moracae* (Chinese Banyan). J. Med. Tropics. 8: 26-31.
- Alqasoumi S, Al-Dosari M, Al-Sohaibani M, Al-Howiriny T, Al-Yahya M, Rafatullah S (2010). Gastric ulcer protective activity of *Hibiscus sabdariffa*: An experimental, biochemical and histological study. Clin. Exp. Med. J. 4:115-127.
- Al-Yahya MA, Ageel AM, Rafatullah S, Mossa JS, Parmar NS, Tariq M (1989). Gastroprotective activity of ginger *Zingiber officinale* Rose, in Albino rats. Am. J. Chinese Med. 17: 51-56.
- Aniagu SO, Binda LG, Nwinyi FC, Orisadipe A, Amos S, Wambebe C, Gamaniel K (2005). Anti-diarrhoeal and ulcer-protective effects of the aqueous root extract of *Guierasenegalensis* in rodents. J. Ethnopharmacol. 97: 549–554.
- Babincová M, Schronerová K, Sourivong P (2008). Antiulcer activity of water extract of *Scoparia dulcis*. Fitoterapia. 79: 587-588.
- Bandyopadhyay U, Biswas K, Sengupta A, Moitra P, Dutta P, Sarkar D, Debnath P, Ganguly CK, Banerjee RK (2004). Clinical studies on the effect of Neem (*Azadirachta indica*) bark extract on gastric secretion and gastroduodenal ulcer. Life Sci. 75: 2867-2878.
- Bansal VK, Goel RK (2012). Gastroprotective effect of *Acacia nilotica* young seedless pod extract: role of polyphenolic constituents. Asian Pac. J. Trop. Med. 5:523-528.
- Carvalho AC, Guedes MM, De Souza AL, Trevisan MT, Lima AF, Santos FA, et al. (2007). Gastroprotective effect of mangiferin: A xanthonoid from *Mangifera indica*, against gastric injury induced by ethanol and indomethacin in rodents. Planta Med. 73:1372–1376.
- Ezike AC, Akah PA, Okoli CO, Ezeuchenne NA, Ezeugwu S (2009). *Carica papaya* (Paw-Paw) Unripe Fruit May Be Beneficial in Ulcer. J. Med. Food. 12:1268-1273.
- Fansworth NR (1996). Biological and Phytochemical screening of plants. J. Pharmaceut. Sci. 55, 3: 225-226.
- Farnsworth NR, Kinghorn AD, Soejarto DD, Waller DP (1985). Siberian Ginseng (*Eleutherococcus senticosus*) current status as an Adaptogen. In: Wagner H, Hikino H, Farnsworth NR (Eds.), Econ. Med. Plant Res. Academic Press, Orlando, FL. 1: 155–215.
- Germano MP, de Pasquale R, Lauk L, Galati EM, Keita A, Sanogo R (1996). Antiulcer activity of *Vernonia kotschyana* sch. bip. Phytomed. 2: 229-233.
- Jainu M, Devi CSS (2006). Antiulcerogenic and ulcer healing effects of *Solanum nigrum* (L.) on experimental ulcer models: Possible mechanism for the inhibition of acid formation. J. Ethnopharmacol. 104:156–163.
- John DV (2005). Peptic ulcer disease and related disorders. Harrison's Principles of Internal medicine, sixteenth ed. McGraw Hill, USA, pp.1746-1762.
- Kent Lloyd KC, Debas HT (1994). Peripheral regulation of gastric acid secretion, in: Johnson LR (Ed.), Physiology of the Gastrointestinal Tract. Raven Press, New York, pp. 1126-1185.
- Khafagi IK, Dewedar A (2000). The effect of Random versus ethno directed research in the evaluation of sinai medicinal plants for bioactive compounds. J. ethnopharmacol. 71: 365-376.
- Khazaei M, Salehi H (2006). Protective Effect of *Falcaria vulgaris* Extract on Ethanol Induced Gastric Ulcer in Rat. Iranian J. Pharmacol. Ther. 5:1.
- Lima ZP, Severi JA, Pellizzon CH, Brito ARMS, Solis PN, Cáceres A, Girón LM, Vilegas W, Hiruma-Lima CA (2006). Can the

- aqueous decoction of mango flowers be used as antiulcer agent? J. Ethnopharmacol. 106: 29-37.
- Livingston Raja NR, Sundar K (2012). Psidium guajava Linn confers gastroprotective effects on rats. Eur. Rev. Med. Pharmacol. Sci. 16:151-156.
- Mishra M (2010). Phytochemical investigations and antiulcer activity of *balanites aegyptiaca* (L) del. Leaves. A dissertation in Pharmacognosy at Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore.
- Nguelefack TB, Watcho P, Maniyeh N, Wansi SL, Kamanyi A (2005). Effects of the methanolic leaf extract of *Alchornea cordifolia* (Schum & Thonn) Muell. Arg. On different gastric ulcer models in rats. Cameroon J. Exp. Biol. 01: 54-56.
- Noum E, Dibakto TW (2000). Medicinal plants used for peptic ulcer in the Bangangte region, western Cameroon. Fitoterapia, 71: 406-412.
- Prabha P, Karpagam T, Varalakshmi B, Packiavathy ASC (2011). Indigenous anti-ulcer activity of *Musa sapientum* on peptic ulcer. Pharmacognosy Res. 3: 232-238.
- Salawu OA, Tijani AY, Obidike IC, Rafindadi HA, Emeje M (2009). Anti-ulcerogenic properties of methanolic root extract of *Piliostigma reticulatum* (DC) Hoechst (Syn. *Bauhinia reticulata* DC) - Leguminosae in rats. Afr. J. Pharm. Pharmacol. 3: 252-258.
- Samanta KC, Khatri P, Purohit AP (2010). Antiulcer effect of homeopathic drug formulation: *anacardium occidentale* linn. J. global pharm. Tech. 2:3.
- Scoones I (1995). Living with uncertainty, new directions in pastoral development in Africa. London, pp. 1-36.
- Shristi B, Neha J, Indu, Bharat P, Rajesh G (2012). A Review on some Indian Medicinal Plants for Antiulcer Activity. J. Sci. Res. Pharm. 1: 6-9.
- Siddiqui MB (2002). Traditional treatment of ulcer through medicinal plants in rural Uttar Pradesh, India. Anc. Sci. Life. 21: 208-211.
- Sofowora A (1982). Medicinal Plants and Traditional Medicine in Africa. John Wiley, Chichester.
- Tripathi KD (2003). Essential of Medical Pharmacology, fifth ed. Jaypee Brothers Medical Publishers limited, New Delhi, India, pp.587-597.