Review of Ethnobotanical and Ethnopharmacological Evidence of Some Ethiopian Medicinal Plants Traditionally Used for Peptic Ulcer Disease Treatment

Tesfaye Yimer Tadesse, Mulugeta Molla Zeleke, Samuel Berihun Dagnew

Pharmacology and Toxicology Unit, Department of Pharmacy, College of Health Sciences, Debre Tabor University, Debre Tabor, Amhara, Ethiopia

Correspondence: Tesfaye Yimer Tadesse, Department of Pharmacy, Health Science College, Debre Tabor University, Debre Tabor, Amhara, 272, Ethiopia, Tel +251 9313476, Email tesfyim@dtu.edu.et

Abstract: A peptic ulcer is described as the rupture of the mucosal integrity of the stomach, the duodenum, and, in certain cases, the lower esophagus as a result of contact with chloridopeptic secretions. The two most common kinds of peptic ulcer disorders are referred to as “gastric ulcer” and “duodenal ulcer.” The name is derived from the location of the ulceration. Despite the promise of a wide range of antiulcer treatments, these therapies are associated with several adverse reactions, including hypersensitivity, arrhythmia, impotence, gynecomastia, galactorrhea, hematological abnormalities, and kidney disease, which are intolerable for many patients. Nowadays, there is a lot of emphasis on finding new and innovative agents. As a result, herbal medicines are commonly utilized in circumstances when drugs are used for long periods and are also cost-efficient, effective, and readily available. In this review paper, a total of 82 medicinal plants have been identified and reported for their use in the treatment of peptic ulcer disease. The majority of these medicinal plants are widely used throughout Ethiopia. However, only the safety and efficacy of Plantago lanceolata, Osyris quadripartita, Rumex nepalensis, Cordia africana, Croton macrostachyus, and Urtica simensis have been scientifically studied in animal models. Despite this, many medicinal plants’ pharmacological effects and chemistry have not been well studied scientifically. As a result, further bioactive compound characterization, efficacy, mechanism of action evaluation, and toxicity evaluation of medicinal plants should be carried out. A study that can improve the documentation of indigenous knowledge and contribute to drug development and future self-reliance is also recommended.

Keywords: ethno pharmacological evidence, Ethiopia, medicinal plants, peptic ulcer disease

Introduction

Ulcers are open sores on the surface of the skin or mucous membrane that are characterized by the sloughing of inflamed dead tissue. Ulcers most commonly occur on the skin of the lower limbs and in the gastrointestinal tract, but they can occur anywhere. A variety of ulcers exist, including mouth ulcers, esophageal ulcers, peptic ulcers, and genital ulcers. Peptic ulcer disease is the most common gastrointestinal disorder, with high morbidity and mortality rates. A peptic ulcer is described as the rupture of the mucosal integrity of the stomach, the duodenum, and, in certain cases, the lower esophagus as a result of contact with chloridopeptic secretions. The two most prevalent kinds of peptic ulcers are referred to as “gastric ulcer” and “duodenal ulcer.” The name is derived from the location of the ulceration. Both gastric and duodenal ulcers can occur simultaneously in a person. Gastric ulcers are painful ulcers that occur in the stomach. They are more common in those over the age of 50. Eating may aggravate rather than alleviate pain. Nausea, vomiting, and weight loss are some of the other symptoms. Even though patients with gastric ulcers have normal or reduced acid production, ulcers can develop even in the absence of acid. Duodenal ulcers are present at the beginning of the small intestine and cause intense discomfort and a burning sensation in the upper abdomen, waking patients up. Pain is most
common when the stomach is empty and subsides after eating. A duodenal ulcer is more common in younger people and primarily affects men. Ulcers can occur on both the anterior and posterior walls of the duodenum. Peptic ulcers can be life-threatening in some situations, with symptoms such as bloody stool, severe stomach discomfort, cramping, as well as vomiting blood.6

An imbalance between offensive (gastric acid, pepsin, and Helicobacter pylori) and defensive (mucin, prostaglandins, bicarbonate ions, growth factors, and nitric oxide) factors are involved in the pathophysiology of peptic ulcer disease.7,8 Peptic ulcers were once thought to be caused by spicy foods and stress; however, research has revealed that the true causes are bacterial infection (Helicobacter pylori) or a reaction to certain medications, primarily nonsteroidal anti-inflammatory drugs.9,10 The main etiological variables associated with peptic ulcer disease are Helicobacter pylori, nonsteroidal anti-inflammatory medicines, emotional stress, alcohol misuse, tobacco smoking, fatty meals, free radical generation, Zollinger-Ellison syndrome, and an age-related decline in prostaglandin levels.11 Helicobacter pylori, a gram-negative bacterium, lives between the mucous layer and the gastric epithelium and is specifically engineered to thrive in the stomach’s hostile environment. At first, Helicobacter pylorus is found in the antrum, but it migrates to the stomach’s more proximal segments with time.6

Peptic ulcer disease is a global health concern because of its high rates of morbidity, mortality, and economic loss, as well as the high frequency of Helicobacter pylori infection. It is one of the most common gastrointestinal ailments in the world, affecting 10–15% of the population.12,13 Duodenal ulcers account for 19 out of every 20 peptic ulcers. Each year, an estimated 15,000 people die as a result of a peptic ulcer. Peptic ulcer bleeding and perforation had annual incidence estimates of 19.4–57 and 3.8–14 per 100,000 people, respectively. The average seven-day bleeding recurrence rate was 13.9%, while the average long-term perforation recurrence rate was 12.2%.14 Patients in Sub-Saharan Africa who had surgery for peptic ulcer disease revealed that 86% had a duodenal ulcer while the remaining 14% had a gastric ulcer. Major complications like perforation (35%), chronic cases (28%), obstruction (30%), and bleeding (7%) were indicated for surgery, and the overall fatality rate was found to be 5.7%.15

Despite the promise of a wide range of antiulcer treatments, these therapies are associated with several adverse reactions, including hypersensitivity, arrhythmia, impotence, gynecomastia, galactorrhea, hematological abnormalities, and kidney disease, which are intolerable for many patients.10,16 Furthermore, because of rising costs, drug-drug interactions, relapse, and resistance, which limit their usage, novel medications for peptic ulcer therapy are being developed.17,18 Nowadays, there is a lot of emphasis on finding new and innovative agents. As a result, herbal medicines are commonly utilized in circumstances when drugs are used for long periods and are also cost-efficient, effective, and readily available.17,18 For the treatment of peptic ulcers, extracts from medicinal plants and other natural products have become widely recognized sources of therapeutic agents.4,19-23 Many researchers have examined and proven the antiulcer activity of ethno medicinal plants, which are valuable as antiulcer medicines and have been used experimentally.

The purpose of this review was to analyze medicinal plants that have been used in traditional medicine as gastro-protective and healing agents for ulcers, as well as to gather evidence for their usefulness and biological mechanisms in a modern investigation.

**Materials and Methods**

Traditional Ethiopian medicinal plants used to treat peptic ulcer disease were gathered from available information in scientific publications and MSc thesis reports. For each of the medicinal plants for peptic ulcers, literature was searched in PubMed, EMBASE (Ovid interface), Scopus, MEDLINE, Science Direct, Elsevier, Scifinder, Research Gate, WorldCat, Web of Science, AJOL, and Cite Seerx, as well as other electronic database sources such as Google Scholar, and all retrieved articles were evaluated for any in vitro, in vivo, or clinical evidence for their efficacy and possible mechanisms. To find all relevant documents, no time restriction was set for the search. The studies found either show that these herbs are clearly effective or that they are indirectly effective in the treatment of peptic ulcers. The data was appropriately filtered if it was deemed relevant and related to the topic of interest. This scientific review included information on the use of medicinal plant species to treat peptic ulcer disease in Ethiopia from 63 publications and MSc theses. This review was conducted between August 2021 and December 2021.
Medicinal Plants Used for the Treatment of Peptic Ulcer Disease in Ethiopia

Traditional medicine is important in delivering primary health care all over the world. About 75–80% of people in underdeveloped countries use traditional medicine because of its better cultural acceptability. Plants have been used to treat a variety of ailments for decades, including peptic ulcer disease. Ethnobotanical investigations in Ethiopia have found a large array of plants belonging to numerous families as antiulcer medicinal plants. As a result, this review article lists a total of 82 medicinal plants that are used in Ethiopia to treat peptic ulcer disease (Table 1).

Medicinal Plants Diversity

For the treatment of peptic ulcer disease, 82 medicinal plant species from 45 families were identified. The Fabaceae family dominated the medicinal plants with nine species, followed by the Lamiaceae and Solanaceae families, each with five species (Table 2).

Habit Diversity of Medicinal Plants

In terms of habit diversity, the majority of the medicinal plants identified were herbs (39 species, 47.56%), followed by shrubs (21 species, 25.61%) (Figure 1).

Parts and Preparation Conditions of Medicinal PlantsUsed to Treat Peptic Ulcer Disease

Traditional medicines are made by harvesting various plant parts. According to this review, leaves 27 (31.76%) were the most commonly employed plant part in traditional medicine preparation. The other plant parts used were fruits 15 (17.65%), roots 10 (11.76%), and seeds 10 (11.76%) (Figure 2).

Herbal remedies are prepared using 56 (68.29%) fresh plant material followed by 24 (29.27%) dried plant materials (Figure 3).

Methods of Preparation of Medicinal Plants

Traditional remedies were prepared in different methods. Chewing 57 (55.34%) was the most popular method of preparation of traditional medicine from plant material, followed by boiling 21 (20.39%) (Figure 4).

Plants Having Ulcerogenic Activities That Have Been Scientifically Proven

Even though ethnobotanical studies revealed the presence of several traditionally used plants for the treatment of peptic ulcer illnesses in various parts of Ethiopia, only six of these plants were scientifically researched for their in vivo ulcerogenic activities. In this review, six different Ethiopian traditional herbs that are commonly used to treat peptic ulcer disease and have been studied by different researchers at different times and places were presented. Four plants (ie Cordia africana Lam, Urtica simensis Hochst. ex. A. Rich, Osyris quadripartita Deene, and Plantago lanceolata L) were evaluated for their anti-ulcer activities using crude extractions of the various plant parts, while the crude extracts, as well as solvent fractions of two of the plants, were evaluated.

Cordia Africana Lam (Boraginaceae)

The in vivo ulcer healing capabilities of an 80% methanol seed extract of C. africana Lam were examined using the pylorus ligation method. The investigators prepared a crude extract from the seed of the study plant using 80% methanol after drying under a shaded area to investigate the plant’s traditionally claimed uses of anti-ulcer effect. Then, using an oral acute toxicity test, multiple-dose ranges of crude extract of C. africana Lam were found. Following an oral acute toxicity investigation, three separate test dosages of 200 mg/kg, 400 mg/kg, and 600 mg/kg were determined. The major procedures were performed on albino rats of either sexes weighing 230–250g and an oral acute toxicity study was conducted on female Swiss albino mice weighing 25–35 g. The healing abilities of the selected test doses of C. africana Lam crude extract were then tested by comparing them to the negative and positive control groups. The rats...
Table 1 Traditionally Used Plant Species for Treatment of Peptic Ulcer Disease in Ethiopia

| S. No | Scientific Name - Habitat | Local Name | Family | Parts Used | Condition of Plant Part Used | Method of Preparation and Administration | Reference |
|-------|---------------------------|------------|--------|------------|-------------------------------|------------------------------------------|-----------|
| 1.    | Achyranthes aspera - Herb| Darguu [O]  | Amaranthaceae | Root | Fresh | Drink the concoction | [26] |
| 2.    | Afrocarpus falcatus - Tree| Dagucho [Sd] | Podocapaceae | Leaf | Not stated | Not stated | [27] |
| 3.    | Aloe gilbertii - Shrub    | Irate [A]  | Asphodelaceae | Leaf | Fresh | Young leaves are pulverized and the filtrate taken orally | [28] |
| 4.    | Aloe macrocarpa - Herb    | Irate [A]  | Aloaceae | Latex | Fresh | Given orally with honey | [29] |
| 5.    | Aloe pubescens - Shrub    | Irate [A]  | Aloaceae | Gel | Fresh | Fresh gel is eaten | [28] |
| 6.    | Asparagus africanus - Herb| Saritii [O]  | Asparagaceae | Tuber | Fresh | Drink the concoction | [26] |
| 7.    | Asystasia gangetica - Herb| Girbia [A]  | Acanthaceae | Root | Not stated | Chewing | [30] |
| 8.    | Brassica carinata - Herb  | Koza [Sh] | Brassicaceae | Leaf | Not stated | Oral | [31] |
| 9.    | Brassica oleracea - Herb  | Tikle gomen [A]  | Brassicaceae | Leaf | Dry | Powderize, then mix with honey for two days before eating | [32] |
| 10.   | Calpurnia aurea - Shrub   | Chakata [Sd] | Fabaceae | Leaf | Fresh | Chewing | [33] |
| 11.   | Carica papaya - Tree      | Papy [A]  | Caricaceae | Seed | Fresh | Oral | [34] |
|       |                           |            |        | Seed | Dry | Oral | [26] |
|       |                           |            |        | Fruit | Fresh | Oral | [31,35] |
| 12.   | Carissa edulis - Shrub    | Agamaa [O]  | Apocynaceae | Flower | Dry | Crushed and dispersed in milk and drink | [36] |
| 13.   | Cosmoira edulis - Tree     | Kazmir [Sd] | Rutaceae | Fruit | Fresh | Eating | [33] |
| 14.   | Catha edulis - Shrub       | Chat [Sd] | Celastraceae | Leaf | Fresh | Eating | [33] |
| 15.   | Caylusea abyssinica - Herb | Resedaceae  | Leaf | Fresh | The leaf is boiled and eaten with roasted powdered barley seeds | [37] |
| 16.   | Centaurium pulchellum - Herb| Gentianaceae | Not stated | Not stated | Decoction | [38] |
| 17.   | Cicer aritinum - Herb      | Shimbra [A]  | Fabaceae | Fruit | Dry | Immersed in water, filtered after one day, mixed withAllium sativum, and taken as a meal, chewing andswallowing it | [39] |
| 18.   | Citrus aurantifolia - Tree | Lomi [A]  | Rutaceae | Fruit | Fresh | Eating | [33] |
| 19.   | Citrus sinensis - Shrub    | Burtukan  | Rutaceae | Fruit | Fresh | Drink the juice | [35] |
| No. | Common Name | Family | Part Used | Form | Preparation/Method |
|-----|-------------|--------|-----------|------|--------------------|
| 20. | *Coffea arabica* - Shrub | Rubiaceae | Leaf | Dry | Crushed, powdered, then the powder is boiled and drunk |
|     | Buna [A] | | | | |
| 21. | *Commiphora hodai* - Herb | Burseraceae | Seed | Dry | Cocked, chewed, and swallowed |
|     | Hodai [Sm] | | | | |
| 22. | *Commiphora kua* - Tree | Burseraceae | Stem | Fresh | Drink the fluid from the stem extract with cold water |
|     | Xabagadi [Sm] | | | | |
| 23. | *Cordia africana* - Tree | Boraginaceae | Latex | Fresh | Given orally before food |
|     | Wanza [A] | | | | |
| 24. | *Croton macrostachyus* - Tree | Euphorbiaceae | Fruit | Fresh | Chewing |
|     | Masincho [Sd] | | | | |
| 25. | *Cucurbita pepo* - Climber | Cucurbitaceae | Fruit | Fresh | Chop, then boil with water and eat |
|     | Duba [A] | | | | |
| 26. | *Dichrostachys cinerea* - Tree | Fabaceae | Stem | Dry | Burns stem, make a solution from the ash and take orally |
|     | Jirmee [O] | | | | |
| 27. | *Dodonaea Angustifolia* - Tree | Sapindaceae | Seed | Dry | A small quantity of seed powder is mixed with honey and taken orally on an empty stomach |
|     | Kitkita [A] | | | | |
| 28. | *Ekebergia capensis* - Tree | Meliaceae | Root and bark | Dry | In powder form, two teaspoons of infusion into one cup of water are taken before meals |
|     | | | | | |
| 29. | *Enset ventricosum* - Tree | Musaceae | Root | Dry | Boil and drink the decoction up on cooling |
|     | Warqee [O] | | | | |
| 30. | *Erythrina brucei* - Tree | Fabaceae | Root and bark | Fresh | Drink the concoction |
|     | Walensu [O] | | | | |
| 31. | *Euphorbia abyssinica* - Tree | Euphorbiaceae | Latex | Fresh | Drink the liquid form |
|     | Kulkual [A] | | | | |
| 32. | *Flacourtia indica* - Tree | Flacourticaceae | Fruit | Fresh | Eaten as it is |
|     | Agnaneshewe [A] | | | | |
| 33. | *Galium simense* - Herb | Rubiaceae | Root | Fresh or dry | Chewing and swallowing juice |
|     | Jiddha [O] | | | | |
| 34. | *Girardinia bullosa* - Herb | Urticaceae | Root | Fresh | Drink the concoction |
|     | Dobii [O] | | | | |
| 35. | *Girardinia diversifolia* - Herb | Urticaceae | Leaf | Fresh | The leaf is crushed, filtered and the liquid is taken |
|     | Dobii [H] | | | | |
| 36. | *Guizotia abyssinica* - Herb | Asteraceae | Seed | Dry | Chew and swallow |
|     | Nog [A] | | | | Roasted, powdered, salted and mixed with one glass of water (one or two liters) and drunk per day until relief is obtained |
| 37. | *Hibiscus cannabinus* - Herb | Malvaceae | Fruit | Dry | Taking the decoction |
|     | Wayika [A] | | | | |

(Continued)
| S. No | Scientific Name - Habitat | Local Name | Family | Parts Used | Condition of Plant Part Used | Method of Preparation and Administration |
|-------|---------------------------|------------|--------|------------|------------------------------|------------------------------------------|
| 38.   | *Hordeum vulgare* - Herb | Nech gebs [A] | Poaceae | Seed       | Dry                          | The roasted powder is boiled in water and drunk until relief [34] |
|       |                           |            |        |            |                              | The roasted seed is eaten before the meal [48] |
|       |                           |            |        |            |                              | Powder mixed with water is given orally [50] |
|       |                           |            |        |            |                              | Drying the seed on fire and eating it [51] |
| 39.   | *Ipheionopsis rotundifolia* - Shrub | Gogobo [Sm] | Asteraceae | Root       | Not stated                   | Chewed [41] |
| 40.   | *Justicia schimperiana* - Shrub | Dhumuga [O] | Acanthaceae | Fruit      | Fresh                        | The fresh fruit is eaten [36] |
| 41.   | *Kalanchoe petiolaris* - Herb | Hanchululie [Sd] | Crassulaceae | Bulb       | Fresh                        | Eating [33] |
| 42.   | *Laggera crispata* - Herb | Keskesso [A] | Asteraceae | Leaf       | Fresh                        | Chewing and swallowing the juice [42] |
| 43.   | *Leonotis ocymifolia* - Shrub | Urgo [O] | Lamiaceae | Leaf       | Fresh                        | Chewing and swallowing the juice [47] |
| 44.   | *Lepidium sativum* - Herb | Fecoo [O] | Brassicaceae | Seed       | Dry                          | Crush and steep the plant part in cold water and drink the infusion [26] |
| 45.   | *Leucas jamesi* - Herb | Dahaanyuur [Sm] | Lamiaceae | Leaf       | Fresh                        | Crush leaves and eat them [41] |
| 46.   | *Linum usitatissimum* - Herb | Konter [Ha] | Linaceae | Seed       | Dry                          | Roast, pound and take oral [43] |
|       |                           | Telba [A] |        |            |                              | Boil the seeds with water and, after cooling, drink it [48,51] |
|       |                           |            |        |            |                              | A few seeds soaked in water overnight and one glass consumed continuously [34] |
|       |                           |            |        |            |                              | Add water, stay overnight and drink it [52] |
|       |                           |            |        |            |                              | The seed is crushed, powdered, mixed with water and sugar and then drunk when feeling pain [53] |
| 47.   | *Lippia adensis* - Herb | Kesiy [A] | Verbenaceae | Leaf       | Fresh                        | Chewing [34] |
| 48.   | *Momordica foetida* - Herb | Herasie [Sd] | Cucurbitaceae | Leaf       | Fresh                        | Grinding and eating [33] |
| 49.   | *Myrica salicifolia* - Tree | Barodoo [O] | Myricaceae | Leaf       | Fresh                        | Crush and steep the plant part in cold water and drink the infusion [26] |
| 50.   | *Nigella sativa* - Herb | Tikur azemud [Sd] | Ranunculaceae | Fruit      | Fresh                        | Chewing [33] |
| 51.   | *Ocimum lamifolium* - Herb | Demakase [A] | Lamiaceae | Leaf       | Fresh                        | Squeeze and drink [52] |
| No. | Name (Scientific) | Name (Local) | Family | Part | Freshness | Preparation and Administration |
|-----|------------------|--------------|--------|-------|-----------|---------------------------------|
| 52. | Olea europea – Tree | Weyira [H] | Oleaceae | Leaf | Fresh | Chewing the leaf and swallowing it |
|     |                  | Ejersa [O]  |         | Stem | Fresh | A very small amount of the oily liquid produced from the stem is drunk after each meal for three consecutive days |
| 53. | Oncoba spinosa – Tree | Hargora [Hz], jilbo [O] | Flacourticaceae | Fruit | Fresh | Its juice is kept for a day before being consumed orally |
| 54. | Opuntia ficus-indica – Shrub | Quqlal [A], Aabashaa [O] | Cactaceae | Fruit | Fresh | Eating |
| 55. | Osyns quadripartita – Herb | Keret [A] | Santalaceae | Leaf | Fresh | The juice of freshly squeezed leaves is mixed with milk and drink |
| 56. | Physalis peruviana – Herb | Nech awut [A] | Solanaceae | Leaf and fruit | Fresh | Fresh leaves and fruit boiled with tea are given orally |
| 57. | Plantago lanceolata – Herb | Kortebi [O] | Plantaginaceae | Leaf | Fresh | The decoction of fresh leaves in water medium is mixed with milk and drink |
|     |                  | Gorxobii [O] |         |       |          | Crush the leaves and take them three times a day |
| 58. | Polygonum senegalense – Herb | Gumma mila [H] | Polygonaceae | Whole plant | Fresh | The whole plant was crushed and the juice was taken |
| 59. | Portulaca oleracea – Herb | Merere hare [O], Siyo [Sm] | Portulacaceae | Whole plant | Fresh | Eat cooked vegetable |
| 60. | Psidium guajava – Tree | Zeytu [Sd] | Myrtaceae | Fruit | Fresh | Eating |
| 61. | Pterolobium stellatum – Shrub | Kanteefef [A] | Fabaceae | Root | Fresh | Root (after removing the cover) boiled together with Acacia sp. in water and drunk |
| 62. | Rhhamus prinoides – Shrub | Gesho [Sd] | Rhamnaceae | Leaf | Dry | Chewing |
| 63. | Rubus apetala – Shrub | Enjory [A] | Rosaceae | Leaf and fruit | Dry | Dried leaves and fruit soaked with water are given orally |
|     |                  |             |         |       |          | A teaspoon of root powder boiled in 200mL of water to make a decoction. A cup of this decoction is given orally in the morning for five consecutive days on an empty stomach |
|     |                  |             |         |       |          | A few roots were chewed and swallowed |
| 64. | Rumex nepalensis – Herb | Tult [A] | Polygonaceae | Root | Dry | A fresh whole plant boiled with water is administered orally |
| 65. | Rumex nervosus – Shrub | Dhaangagoo [O] | Polygonaceae | Bark | Fresh | Hold with teeth |
| 66. | Saccharum officinarum – Grass | Shonkora [K] | Poaceae | Stem | Fresh | Chewing |
| 67. | Salvia merjame – Herb | Jawula [A] | Lamiaceae | Whole plant | Fresh | A fresh whole plant boiled with water is administered orally |
| 68. | Senec didymobotrya – Shrub | Sanamiki [H] | Fabaceae | Leaf | Dry | Crushed, powdered, boiled and drunk |

(Continued)
| S. No | Scientific Name - Habitat | Local Name | Family | Parts Used | Condition of Plant Part Used | Method of Preparation and Administration | Reference |
|-------|---------------------------|------------|--------|------------|------------------------------|------------------------------------------|-----------|
| 69.   | Solanum nigrum - Herb    | Tikur awut [A] | Solanaceae | Leaf | Fresh | The washed or cleaned raw leaf is chewed before any meal | [45] |
| 70.   | Solanum chimplanionum – Shrub | Korenet [T] | Solanaceae | Leaf | Fresh | Some leaves were crushed, squeezed, filtered and one coffee cup was taken | [61] |
| 71.   | Solanum tuberosum - Herb | Dinich [A] | Solanaceae | Tuber | Fresh | The tuber is taken in the form of juice | [62] |
| 72.   | Stephania abyssinica – Climber | Kalala or Gura antuta [O] | Menispermaceae | Leaf | Fresh | Boil and drink the decoction up on cooling | [26] |
| 73.   | Teclea nobilis - Shrub    | Sihil [A] | Rutaceae | Bark | Fresh | Chewing and taking the sap from the internal part of the stem bark | [48] |
| 74.   | Thymus schimperi - Herb   | Tosign [A] | Lamiaceae | Seed | Dry | Crushed seeds are boiled in water and served as a drink | [63] |
|       |                           |            |        | Leaf | Dry   | Dried, powdered, and mixed with the seed powder of *Hordeum vulgare* and eaten in the form of “besso” | [48] |
| 75.   | Trigonella foenum-graecum – Herb | Abish [A] | Fabaceae | Seed | Dry | Grind, then add water and drink | [32, 52] |
|       |                           |            |        |      |       | Putting it in water, drying it, crushing and eating it by mixing it with water and sugar | [51] |
| 76.   | Urtica simensis - Herb    | Gurgubee [O] | Urticaceae | Shoot | Fresh | Eat the plant part (raw/cooked) | [26] |
|       |                           | Sama [A] | Urticaceae | Leaf | Fresh | Eaten in the form of stew (“wot”) | [48] |
|       |                           |           | Urticaceae |      |      | The fresh leaves are collected and roasted like “wot” and eaten withinjera | [53] |
| 77.   | Vernonio adoensis- Shrub   | Ese Mossie [A] | Asteraceae | Root | Fresh | Crush and powder before drinking with water or chewing and swallowing juice | [42] |
|       |                           | Eras abera [A] | Asteraceae |      |      | Baking with *Eragrostis teff* and eating, then drinking the decoction | [49] |
| 78.   | Vicia faba – Herb         | Baaqelaa [O] | Fabaceae | Seed | Dry | Chewing | [59] |
|       |                           | Bakela [A] | Fabaceae |      |      | Drink roasted and powdered grains soaked in water overnight | [62] |
| 79.   | Vigna sp. – Climber       | Mee chorkaye [Sd] | Fabaceae | Leaf | Fresh | Eating | [33] |
| 80.   | Withania somnifera - Shrub | Hunzo [O] | Solanaceae | Root | Dry | Decoction, pounding, and then drink | [47] |
| 81.   | Ximenia Americana - Shrub | Hudha [O] | Oleaceae | Fruit | Fresh | Eating | [36] |
| 82.   | Zingiber officinale - Herb | Zinjibila [A] | Zingiberaceae | Rhizome | Fresh or dry | Hold with teeth | [26] |

**Abbreviations:** [A], Amharic; [O], Afan Oromo; [T], Tigrigna; [Sm], Somaligna; [Sd], Sidamigna; [Sh], Sheko; [H], Halabenya; [Ha], Harari; [K], Kembatissa.
were divided into five groups of six rats each at random. The test group animals received 200 mg/kg, 400 mg/kg, and 600 mg/kg of the crude extract, whereas the negative and positive control groups received a vehicle (2% Tween 80) and a conventional anti-ulcer drug (ranitidine 50 mg/kg, respectively).

As the report revealed all test doses of *C. Africana* Lam possessed significant ulcer healing activity as compared with the negative control. The anti-ulcer activities of the hydroalcoholic seed crude extract of *C. africana* Lam were evaluated using gastric ulcers induced by pylorus ligation, and they were assessed by macroscopic evaluation. With this method, single-dose studies and repeated-dose studies were used to assess ulcer healing effects of the seed crude extract of *C. Africana* Lam. In a single dose study, the crude extract at all test doses (200mg/kg, 400mg/kg, and 600mg/kg) reduced gastric acid secretion to 4.45±0.37, 4.05±0.29, and 3.67±0.23, respectively, when compared to the negative control groups, which produced a gastric acid secretion of 5.92 ±0.63. Similarly, the results of the single dose study revealed that *C. africana* Lam significantly increased the pH of the stomach with doses of 400 mg/kg and 600 mg/kg as compared to the negative control group. The lowest dose of the extract (200mg/kg) showed weak acid redaction activity as compared with the standard anti-ulcer drug ranitidine, whereas the middle and the highest doses (400mg/kg and 600mg/kg, respectively) showed comparable elevation of gastric pH to ranitidine. Furthermore, the authors reported that the middle and highest doses of the crude extract demonstrated ulcer protection effects by significantly lowering ulcer scores when compared to the negative control groups.

The presence of active secondary metabolites from hydroethanolic crude seed extract of *C. Africana* Lam, including flavonoids, tannins, saponin, and phenolic compounds, contributes to the ulcer healing and gastric acid secretion reduction of the extract with different proposed mechanisms.

| S.No | Family     | Number of Species | Percent (%) |
|------|------------|------------------|-------------|
| 1.   | Fabaceae   | 9                | 10.97       |
| 2.   | Lamiaceae  | 5                | 6.10        |
| 3.   | Solanaceae | 5                | 6.10        |
| 4.   | Asteraceae | 4                | 4.88        |
| 5.   | Rutaceae   | 4                | 4.88        |
| 6.   | Others     | 55               | 67.07       |
| Total|            | 82               | 100.00      |

Figure 1 Habit diversity of reported medicinal plants.
The anti-ulcer activity of the root crude extract with its derived solvent fractions of *C. macrostachyus* was assessed by. In this experimental study, investigators used adult Sprague Dawley rats (150–200 g, 12–16 weeks) and Swiss albino mice (20–30 g, 10–14 weeks) of either sex to conduct an oral acute toxicity study and to detect the anti-ulcer activities of *C. macrostachyus* hydromethanol crude root extract and different solvent fractions. After determining the test doses of the crude extract and each solvent fraction from the oral acute toxicity study, the anti-ulcer effects of each dose were evaluated by comparing them with the positive control and negative control groups. The test doses of the crude extract...
and each solvent fraction determined from the oral acute toxicity study were 100mg/kg, 200mg/kg, and 400mg/kg, and the standard drugs used as positive controls were the proton pump inhibitor anti-ulcer drug (omeprazole 30mg/kg) and mucosal protectant (sucralfate 100mg/kg). The negative control group was treated with 2% tween 80.

The ulcer was induced on the test animals using HCl/ethanol-induced ulcer model and the anti-ulcer effects of each test dose were detected using different methods namely, Pyloric Ligation-Induced Ulcer Model, Macroscopic Evaluation of Stomach, and Determination of Gastric Volume and pH, Determination of Total Acidity, Acidified Ethanol-Induced Ulcer Model, and Determination of Gastric Mucus Content.

According to the report, all test doses of the crude extract of C. macrostachyus showed a dose-dependent anti-ulcer activity on Pyloric Ligation-Induced Ulcer in Rats as compared with the negative control group. As the pyloric ligation procedure caused the accumulation of gastric secretions, the anti-ulcer effects of the different doses of the crude extract were expressed in terms of lowering gastric volume. As detected from the experiment, the middle dose (200mg/kg), and the highest dose (400mg/kg) showed a significant lowering of gastric volume as compared with the lowest dose (100mg/kg) of C. macrostachyus crude extract while 400mg/kg C. macrostachyus crude extract showed comparable gastric volume reduction with the standard drug (omeprazole 30mg/kg).

The authors’ report revealed that gastric acidity in 200mg/kg and 400mg/kg pretreated groups was lowered than that of the negative control group and 100mg/kg pretreated groups, whereas 100mg/kg pretreated groups showed no acid-reducing activity as compared to the negative control group. Based on this it can be concluded that only the middle and highest doses (200mg/kg and 400mg/kg respectively) showed significant acid reduction activities as compared with the negative control. Besides, as reported the crude extract at the dose of 200mg/kg and 400mg/kg elevated gastric pH significantly as compared with the negative control, but the crude extract at the dose of 100mg/kg showed no pH elevation as compared with the negative control. On the other hand, as per the report pyloric ligation-induced gastric ulceration was reduced with C. macrostachyus crude extract in a dose-dependent manner. The highest dose (400mg/kg) showed a significant reduction in gastric ulceration than the middle dose (200mg/kg) and the lowest dose (100mg/kg) as compared with the negative control. Furthermore, C. macrostachyus crude extract at the dose of 400mg/kg and 200mg/kg possessed a significant ulcer protection activity by increasing gastric mucus as compared with the negative control and this effect was found to be comparable with the standard drug (omeprazole 30mg/kg), while the lowest dose of the extract (100mg/kg) possessed no significant effect on mucus content.

The authors also detected anti-ulcer effects of the crude extract using Acidified Ethanol-Induced Ulcer in Mice. In this model, the investigators induced superficial ulcer and hemorrhage using acidified ethanol (0.15 M HCl/ethanol) at a dose of 5 mL/kg in mice. The crude extract at the dose of 200mg/kg and 400mg/kg showed a significant antiulcerogenic effect as compared with the negative control while 100mg/kg showed no antiulcerogenic effect. The antiulcerogenic effect showed by the highest dose (400mg/kg) was comparable with the standard drug (sucralfate).

The effects of different solvent fractions of C. macrostachyus were also evaluated using Acidified Ethanol-Induced Ulcer in Mice. As detected by the investigators, chloroform fraction significantly prevented ulcer formation at the test dose applied (100mg/kg, 200mg/kg, and 400mg/kg) as compared with the negative control group. The results obtained from each dose were comparable with the standard drug (sucralfate 100mg/kg). Likewise, the middle doses (200mg/kg) and highest doses (400mg/kg) of ethyl acetate fractions significantly prevented the occurrence of ulcer formation as compared to the negative control group.

According to the report, the result obtained from 200mg/kg and 400mg/kg of ethyl acetate fractions were comparable with the standard drug (sucralfate 100mg/kg), while the lowest dose of ethyl acetate fraction (100mg/kg) showed no ulcer protection effect. And it is reported that all tested doses of the aqueous fraction showed no significant antiulcer activity as compared to negative control group mice.

In this experimental study, the authors conducted a qualitative phytochemical screening test and it was confirmed that C. macrostachyus crude extract has as components different active secondary metabolites including phenolic compounds, tannins, flavonoids, saponins, and polyterpenes. The presence of each active secondary metabolite contributes to the anti-ulcer activities of each dose of the crude extract and active solvent fractions with different proposed mechanisms.
**Urtica Simensis Hochst. Ex. A. Rich. (Urticaceae)**

Hydromethanolic Crude Extract of the Leaf of *U. simensis* was evaluated for its anti-ulcer activity to validate the traditionally claimed uses of the plant to heal gastric ulcer in Ethiopian folk medicine. According to hydromethanolic crude leaf extract of *U. simensis* was assessed for its anti-ulcer effect using different models namely, Pylorus Ligation-Induced Ulcer, Cold Restraint Stress-Induced Ulcer, and Acetic Acid-Induced Chronic Ulcer. On each model, the investigators used Healthy adult Wistar albino rats of either sex weighing 150–250 gm.

For Pylorus Ligation-Induced Ulcer in Rats, the investigators used to detect the effects of different test doses of *U. simensis* crude extract on decreasing gastric secretion and elevation of gastric pH by comparing with the negative control group. As the result showed, gastric acid secretion was significantly decreased while gastric pH was elevated by the tested doses of *U. simensis* (100mg/kg, 200mg/kg, and 400mg/kg) in a dose-dependent manner as compared with the negative control group. As the report revealed, the highest dose of *U. simensis* extract (400mg/kg) produced comparable ulcer protection with the standard drug (omeprazole 20mg/kg).

Similarly, the Effects of the test doses of *U. simensis* crude extract on Cold Restraint Stress-Induced Ulcer was detected by considering ulcer score. Accordingly, the crude extract reduced ulcer score significantly as compared with the negative control in a dose-dependent manner. The maximum dose (400mg/kg) comparably reduced the ulcer score with the standard drug (Cimetidine 100mg/kg). The investigators also observed that ulcer index reduction was statistically significant on 200mg/kg and 400mg/kg doses of *U. simensis* leaf crude extract as compared with the negative control group.

The test doses of the crude extract were also found to possess anti-ulcer activity on Acetic Acid-Induced ulcers. In this model, the investigators reported that the crude extract cured gastric mucosal ulcerations in a dose-dependent manner as compared to the negative control. The report also revealed that the test doses of *U. simensis* leaf crude extract possessed curative potential in both ulcer surface area and ulcer depth as compared with the negative control group.

As noticed by the investigators, the presence of various active phytoconstituents might contribute to the antiulcerogenic activity of the crude extract with different proposed mechanisms. In Preliminary Phytochemical Screening, the existence of terpenoids, saponins, tannins, flavonoids, alkaloids, and phenolic compounds was confirmed. These active secondary metabolites contribute the ulcer healing, decrease gastric secretion, raise gastric pH, and increase mucus secretion with a variety of proposed mechanisms.

**Osyris Quadripartite Decne. (Santalaceae)**

The traditionally claimed uses of *O. quadripartite* for healing peptic ulcer disease by traditional healers in Ethiopian folk medicine were evaluated scientifically upholding its traditionally claimed uses. As stated by the investigators, anti-ulcer activities of hydrometanolic crude extract of the leaf of *O. quadripartite* were evaluated in experimental rats. The effects of the extract on healing peptic ulcer disease were evaluated using different models namely, pylorus ligation-induced and ethanol-induced models. Depending on the models, the authors detected the effects of test doses of *O. quadripartite* extract in different parameters which include, volume and pH of gastric fluid, total acidity, ulcer score, the percent inhibition of ulcer score, ulcer index as well as percent inhibition of ulcer index by comparing with negative control groups.

For the Pyloric ligation-induced ulcer model, the effects of the test doses (100mg/kg, 200mg/kg, and 400mg/kg) of the extract were detected using single-dose and repeated dose study. In a single-dose study, all test doses (100mg/kg, 200mg/kg, and 400mg/kg) of *O. quadripartite* extract statistically reduced the volume of gastric secretion, whereas a statistically increased in gastric pH was noted with 200mg/kg and 400mg/kg as compared with the negative control group.

As reported, 400mg/kg of *O. quadripartite* extract showed a comparable effect in reducing gastric secretion as the standard drug (ranitidine 50mg/kg). Ulcer index was also significantly reduced by *O. quadripartite* 200mg/kg and *O. quadripartite* 400mg/kg doses where ulcer index reduction and percent inhibition ulcer score potential of 400mg/kg *O. quadripartite* extract were found to be better than the standard drug (ranitidine 50mg/kg).
In a repeated-dose study, the investigators used to detect the effects of the test doses of *O. quadripartite* extract for 10 days and 20 days of pretreatment method. As the result obtained revealed, from 10 days of pretreatment groups, only 200mg/kg of *O. quadripartite* exhibited a significant reduction in test parameters such as volume of gastric secretion and total acidity, ulcer score, and ulcer index similar to the standard drug (ranitidine 50mg/kg) as compared to the negative control. In addition, for 20 days of pretreatment groups, only 200mg/kg of *O. quadripartite* extract exhibited a significant reduction in the volume of gastric secretion and total acidity, ulcer score, and ulcer index similar to the standard drug as compared to the negative control.4

On ethanol-induced ulcer, the effects of the test doses of *O. quadripartite* extract were evaluated using single dose and repeated dose study as stated above. In a single-dose study, both the ulcer score and ulcer index were significantly reduced by 200 mg/kg and 400 mg/kg of *O. quadripartite* extract as compared with the negative control group. As the result obtained revealed the effect exhibited with a 400mg/kg dose of *O. quadripartite* extract was comparable to the standard drug (ranitidine 50mg/kg) regarding percent reduction in ulcer scores. On the other hand, repeated-dose study evaluation was carried out by 10 days and 20 days pre-treating groups. In both cases, it is reported that only 200mg/kg dose of *O. quadripartite* extract showed a significant effect on reduction in ulcer score and ulcer index as compared to the negative control group. The reduction in ulcer score and ulcer index was very high to the extract and sucralfate. In both cases, the results obtained were compared with the standard drug (sucralfate 100 mg/kg).4

In preliminary phytochemical screening, the investigators assured the presence of the following active secondary metabolites in *O. quadripartite* leaf crud extract, flavonoids, saponins, tannins, phenols, terpenoids, and alkaloids. The presence of these active metabolites contributed to the anti-ulcer activities of the extract with different proposed mechanisms (64, 66, 67, 69, 70).

*Plantago Lanceolata* L. (Plantaginaceae)
The aqueous leaf extract of *P. lanceolata* at the doses of (140mg/kg, 280mg/kg, 200mg/kg, and 400mg/kg) was assessed for its anti-peptic ulcer activity in rodents using different models of gastroduodenal ulcer namely, acetic acid-induced chronic gastric ulcer, indomethacin induced gastric ulcer, cysteamine induced duodenal ulcer and pylorus ligation induced gastric ulcer. In each of the aforementioned models, the authors revealed the effects of each test dose of the extract on gastric secretion and cytoprotection by comparing it with the negative control.23

The researchers used acetic acid to create large penetrating and/or deep ulcers on the serosal surface of the stomach of experimental rats in an acetic acid-induced ulcer model. The ulcer created in rats was quite comparable to the ulcer induced in humans. When compared to the negative control group, both doses (200mg/kg, 400mg/kg) of *P. lanceolata* leaf aqueous extract exhibited a substantial reduction in ulcer index. Even though both dosages of the leaf extract reduced the ulcer index, only the 400 mg/kg dose resulted in a statistically significant reduction in ulcer score, not the 200 mg/kg dose. The typical anti-ulcer drug (ranitidine 70mg/kg) showed a similar pattern of decline as 400mg/kg of PL extract, as the report validated in both ulcer index and ulcer score. While the difference was not statistically significant, the drop in ulcer index appeared to be slightly smaller than that seen with the leaf extract. Similar to what was observed with the leaf aqueous extract, the mucilage was capable of reducing the ulcer index as well as the ulcer score when compared to the negative control group.23

The effects of *P. lanceolata* aqueous leaf extract on indomethacin-induced ulcers were also investigated, with the results revealing that at doses of 280 mg/kg and 400 mg/kg, *P. lanceolata* extract demonstrated a statistically significant reduction in ulcer score compared to the negative control group. When compared to the negative control on cysteamine HCl generated ulcer, *P. lanceolata* extract resulted in a considerable reduction in ulcer score at a dose of 400 mg/kg. The results revealed that *P. lanceolata* dosages of 200mg/kg and 400mg/kg reduced the ulcerated area significantly.23

The effects of *P. lanceolata* leaf extract at the test doses were also investigated on a pylorus ligation-induced ulcer model, with the results revealing that the extract at the dose of 280mg/kg showed a significant reduction in ulcer score when compared to the negative control group score, with the 280mg/kg dose of *P. lanceolata* providing better protection than ranitidine 50mg/kg. The leaf extracts significantly increased mucin secretion at 140mg/kg and 280mg/kg doses compared to the negative control, according to the findings. The results from these doses were better than ranitidine at this stage. In comparison to the control values, both doses of the extract lowered overall acidity.23
Rumex Nepalensis

A root extract in 80% methanol and solvent fractions of *R. lanceolata* was investigated for its anti-ulcer activities by using different models, namely, pyloric ligation, cold restraint stress, and acetic acid-induced ulcer models in rats. As the investigators notified, the extract and each solvent fraction were assessed at the doses of 100mg/kg, 200mg/kg, and 400mg/kg, and all the experiments were conducted on Wistar rats of either sex weighing 150–250.

As notified by the investigators, at dosages of 100, 200, and 400 mg/kg, *R. lanceolata* extract statistically reduced the volume of stomach secretions as compared with the negative control group, on a pyloric ligation-induced ulcer. At doses of 100, 200, and 400 mg/kg/day of hydromethanolic crude extract *R. lanceolata*, the pH of the digestive fluid was considerably elevated in a dose-dependent manner as compared with the negative control. Furthermore, as compared to the negative control, overall acidity was lowered significantly. Additionally, pyloric ligation generated stomach ulcers, which were considerably decreased in a dose-dependent manner after pretreatment with *R. nepalensis* root extract was observed. In this model, *R. lanceolata* extract at the dose of 400mg/kg exhibited comparable percent inhibition of gastric ulceration as the standard drug (omeprazole 20mg/kg).

Investigators confirmed that at doses of 200mg/kg and 400mg/kg of *R. lanceolata* crude extract, both ulcer index and ulcer score were considerably reduced when compared to the negative control on Cold Restraint Stress-Induced Ulcer. In comparison to the negative control group, *R. lanceolata* extract at doses of 200 and 400 mg/kg cured ulcers after 15 days of treatment.

The researchers also looked into the anti-ulcer effects of different *R. lanceolata* solvent fractions on a Pylorus Ligation-Induced Ulcer model. The results showed that the chloroform fractions of 200mg/kg and 400mg/kg caused a percent reduction in ulcer score when compared to the negative control group, while the chloroform fraction of 100mg/kg caused no percent reduction in ulcer score. Ethyl acetate and aqueous fractions of *R. lanceolata*, on the other hand, caused increasing percent inhibition of ulcer score in all test doses (100mg/kg, 200mg/kg, and 400mg/kg). The researchers also confirmed that in all test doses, both ethyl acetate and aqueous fractions significantly reduced ulcer index and ulcer score when compared to the negative control. At 400 mg/kg/day, the ethyl acetate fraction exhibited high protection as compared with all test doses of other fractions.

In terms of gastric secretion reduction, all test doses of ethyl acetate and aqueous fractions (100mg/kg, 200mg/kg, and 400mg/kg) produced a significant reduction in gastric secretion when compared to the negative control, whereas the chloroform fraction only showed a percent reduction in gastric secretion at the dose of 400mg/kg.

As indicated in Table 3, 80% methanolic extract of the root of *R. lanceolata* proved positive for flavonoids, saponins, tannins, phenols, terpenoids, anthraquinones, glycosides, and alkaloids in a qualitative phytochemical study conducted.

### Table 3 Pharmacologically Evaluated Plants for Ulcerogenic Effects, Parts Used and Active Secondary Metabolites

| Plant Name and Parts                  | Secondary Metabolite                                                                 | References |
|--------------------------------------|-------------------------------------------------------------------------------------|------------|
| *Cordia africana* Lam Seed extract    | Tannins, flavonoids, saponins and phenols                                          | [64]       |
| *Croton macrostachyus* Hochst root extract | Phenols, tannins, flavonoids, coumarins, saponins, and polyterpenes                  | [67]       |
| *Urtica simensis* Hochst Leaf extract | Terpenoids, saponins, tannins, flavonoids, alkaloids, and phenols                    | [21]       |
| *Osyris quadripartita* Decne leaf extract | Alkaloids, phenols, terpenoids, tannins, saponins and flavonoid                      | [4]        |
| *Rumex nepalensis* root extract       | Flavonoids, saponins, tannins, phenols, terpenoids, anthraquinones, glycosides, and alkaloids | [66]       |
| *Rumex nepalensis* chloroform fraction | Alkaloids, anthraquinones, and glycosides,                                         |            |
| *Rumex nepalensis* ethyl acetate fraction | Flavonoids, saponins, tannins, phenols, terpenoids, anthraquinones, glycosides, and alkaloids | [66]       |
| *Rumex nepalensis* aqueous fraction   | Flavonoids, saponins, tannins, phenols, terpenoids, anthraquinones, and glycosides   | [66]       |
A preliminary phytochemical investigation of each solvent fraction revealed that the chloroform fraction was rich in alkaloids, anthraquinones, and glycosides, whereas all secondary metabolites reported in the crude extract were detected in the ethyl acetate solvent fractions. Except for alkaloids, all secondary metabolites found in the crude extract were found in the aqueous solvent fractions (Table 3). The presence of these active secondary metabolites contributed to the anti-ulcerogenic effects of the crude extract and each solvent fraction with different proposed mechanisms.4,17,20,21,23,64,66

Conclusion and Recommendations
In general commercial antiulcer drugs are becoming increasingly difficult to use due to their high costs, drug-drug interactions, and associated adverse reactions to the health of the patient. Both developing and developed countries are increasingly turning to medicinal plants to treat disorders like peptic ulcer disease. In this review paper, a total of 82 medicinal plants have been identified and reported for their use in the treatment of peptic ulcer disease. The majority of these medicinal plants are widely used throughout Ethiopia. However, only the safety and efficacy of Plantago lanceolata, Osyris quadripartita, Rumex nepalensis, Cordia africana, Croton macrostachyus, and Urtica simensis have been scientifically studied in animal models. Many researchers have found that the bioactive compounds found in plants have beneficial effects, such as reducing the volume of gastric secretions and stimulating the production of gastro-protective mucus. Despite this, many medicinal plants’ pharmacological effects and chemistry have not been well studied scientifically. As a result, further bioactive compound characterization, efficacy, mechanism of action evaluation, and toxicity evaluation of medicinal plants should be carried out. A study that can improve the documentation of indigenous knowledge and contribute to drug development and future self-reliance is also recommended.

Data Sharing Statement
The data sets used and or analyzed during the current work are available from the corresponding author upon a reasonable request.

Author Contributions
All authors made a significant contribution to the work reported; participated in the conception, study design, execution, and acquisition of data, analysis, and interpretation; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; agreed on the journal to which the article has been submitted; and agreed to be accountable for all aspects of the work. TYT conceived the idea and drafted the proposal. MMZ and SBD prepared and critically reviewed the final manuscript for publication. All authors read and approved the final version of the manuscript.

Disclosure
The authors report no conflicts of interest in this work.

References
1. Chan FKL, Graham DY. Prevention of non-steroidal anti-inflammatory drug gastrointestinal complications - review and recommendations based on risk assessment. Aliment Pharmacol Ther. 2004;19(10):1051–1061. doi:10.1111/j.1365-2036.2004.01935.x
2. Debjit B, Chiranjib C, Tripathi KK, Kumar KPS. Recent trends of treatment and medication peptic ulcerative disorder. Int J Pharm Tech Res. 2010;2(1):970–980.
3. Daniel VT, Wiseman JT, Flahive J, Santry HP. Predictors of mortality in the elderly after open repair for perforated peptic ulcer disease. J Surg Res. 2017;215:108–113. PMID: 28688634. doi:10.1016/j.sjs.2017.03.052
4. Abebaw M, Mishra B, Gelayee DA. Evaluation of antiulcer activity of the leaf extract of Osyris quadripartita decne. (Santalaceae) in rats. J Exp Pharmacol. 2017;9:1–11. doi:10.2147/EPJ.S125383
5. Vyawahare NS, Deshmukh VV, Godkari MR, Kagathara VG. Plants with anti-ulcer activity. Pharmacognosy Rev. 2009;3(5):108–115.
6. Vimala G, Shoba FG. A review on antiulcer activity of few Indian medicinal plants. Int J Microbiol. 2014;2014:1–14. doi:10.1155/2014/519590
7. Ayantunde AA. Current opinions in bleeding peptic ulcer disease. J Gastrointest Dig Syst. 2014;4:172. doi:10.4172/2161-069X.1000172
8. Byrne N, Barton RG, Enniss TM, Nirula R. Laparoscopic versus open repair of perforated gastro duodenal ulcer: a National surgical quality improvement program analysis. Am J Surg. 2013;206(6):957–963. PMID: 24112676. doi:10.1016/j.amjsurg.2013.08.014
9. Teka B, Gebre-Selassie S, Abebe T, Sero - prevalence of Helicobacter Pylori in HIV positive patients and HIV negative controls in St. Paul's general specialized hospital, Addis Ababa, Ethiopia. Sci J Public Health. 2016;4(5):387–393. doi:10.11648/j.sjph.20160405.14
10. Kumar M, Niyas M, Mani T, Rahman O, Kumar S. A review on medicinal plants for peptic ulcer. Der Pharmacia Lettre. 2011;3(2):180–186.
11. Stewart DJ, Ackroyd R. Peptic ulcers and their complications. Surgery. 2011;29(11):568–574.
45. Meragiaw M, Asfaw Z, Argaw M. The status of ethnobotanical knowledge of medicinal plants and the impacts of resettlement in Delanta, Northwestern Wello, Northern Ethiopia. *Evid Based Complement Altern Med.* 2016;2016:1–24. doi:10.1155/2016/5060247

46. Platie T, Gedif T, Asres K, Gebre-Mariam T. Ethnomedical survey of Berta ethnic group Assosa zone, Benishangul-Gumuz regional state, mid-west Ethiopia. *J Ethnobiol Ethnomed.* 2009;5:14. doi:10.1186/1746-4269-5-14

47. Yineger H. A Study on the ethnobotany of medicinal plants and floristic composition of the dry Afomontane forest at Bale mountains National park, Ethiopia MSc thesis. Addis Ababa University; 2005.

48. Amsalu N. An ethnobotanical study of medicinal plants in Farta wereda, South Gonder zone of Amhara region, Ethiopia MSc thesis. Addis Ababa University; 2010.

49. Mekidkant T, Zebene A, Solomon Z. Ethnobotanical study of medicinal plants in Chilga district, Northwestern Ethiopia. *J Nat Remedies.* 2015;15(2):88–112. doi:10.18311/jnr/2015/476

50. Enyew A, Asfaw Z, Kelbessa E, Nagappan R. Ethnobotanical study of traditional medicinal plants in and around Fiche district, Central Ethiopia. *Curr Res J Biol Sci.* 2014;6(4):154–167. doi:10.19026/crjbs.6.5515

51. Wubetu M, Abula T, Dejenu G. Ethnopharmacologic survey of medicinal plants used to treat human diseases by traditional medical practitioners in Dega Damot district, Amhara, Northwestern Ethiopia. *BMC Res Notes.* 2017;10:157. doi:10.1186/s13104-017-2482-3

52. Regassa R. Assessment of indigenous knowledge of medicinal plant practice and mode of service delivery in Hawassa city, Southern Ethiopia. *J Med Plant Res.* 2013;7(9):517–535. doi:10.5897/JMPR12.1126

53. Abebe E. Ethnobotanical study on medicinal plants used by local communities in Debark wereda, North Gondar zone, Amhara regional state, Ethiopia MSc thesis. Addis Ababa University; 2011.

54. Gebrehiwot M. An ethnobotanical study of medicinal plants in Seru wereda, Arsi zone of Oromia region, Ethiopia MSc thesis. Addis Ababa University; 2010.

55. Wondimu T, Asfaw Z, Kelbessa E. Medicinal plants potential and use by pastoral and agro-pastoral communities in Erer valley of Babile wereda, Eastern Ethiopia. *J Ethnobiol Ethnomed.* 2012;8:42. PMID: 23082585. doi:10.1186/1746-4269-8-42

56. Adane A. Ethnobotanical study of traditional medicinal plants used by indigenous people of Ankesha district, Awi zone, Amhara regional state, Ethiopia MSc thesis. Addis Ababa University; 2018.

57. Megersa M, Asfaw Z, Kelbessa E, Beyene A, Woldeab B. An ethnobotanical study of medicinal plants in Wayu Tuka district, East Welega zone of Oromia regional state, West Ethiopia. *J Ethnobiol Ethnomed.* 2013;9(1):68. PMID: 24295044. doi:10.1186/1746-4269-9-68

58. Maryo M, Nemomissa S, Bekele T. An ethnobotanical study of medicinal plants of the Kembatta ethnic group in Enset-based agricultural landscape of Kembatta Tembaro (KT) zone, Southern Ethiopia. *Asian J Plant Sci Res.* 2015;5(7):42–61

59. Wereta TB. Ethnobotany of medicinal plants in Erob and Gulomahda districts, Eastern zone of Tigray region, Ethiopia MSc thesis. Addis Ababa University; 2015.

60. Belay H, Wondimu T. Functional food plants in Debre Markos district, East Gojjam, Ethiopia. *Asian J Ethnobiol.* 2019;2(1):8–21. doi:10.13057/asianethnobiol/o20120

61. Atnafu H, Awas T, Alemu S, Wube S. Ethnobotanical study of medicinal plants used to study phytochemical screening, test for inorganic elements, proximate analysis, qualitative and quantitative characterization of phytoconstituents, antioxidant activities and free radical scavenging activity. *Eur J Pharm Med Res.* 2017;4(2):517–521.