
FACULTY OF SCIENCE AND EDUCATION

***ASSESSMENT OF MEDICINAL PLANTS USED IN TREATMENT OF PEPTIC ULCERS
IN NAGONGERA SUB COUNTY, TORORO DISTRICT.***

BY

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DEPARTMENT OF BIOLOGY

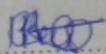
A REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
AWARD OF THE DEGREE OF BACHELOR OF SCIENCE EDUCATION IN BIOLOGY
DEPARTMENT OF BUSITEMA UNIVERSITY.

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DECLARATION.

I BWAMBALE LAWRENCE, declare to the best of my knowledge that the study entitled *Assessment of medicinal plants in the treatment of peptic ulcers in Nagongera Sub county, Tororo district*, is my original work and has been prepared and submitted to the department of biology, Faculty of science and education in the partial fulfilment of the requirement for the award of Bachelor's degree in science education at Busitema University, and has been presented for any award in institution of learning.

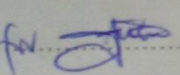
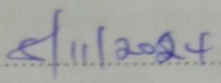
Sign.......... Date 5/11/24.....

BWAMBALE LAWRENCE

APPROVAL

This report entitled *Assessment of medicinal plants used in the treatment of peptic ulcers in Nagongera sub county Tororo District*, has been submitted for examination with the approval of the following supervisor evidenced by the signature in the consent below.

I have satisfactorily read through the dissertation and consent to its submission to the department of Biology, Nagongera campus for the award of Bachelor of Science and education of Busitema University.

Signature..  date 

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I take this opportunity to express my sincere, heartfelt gratitude to the ALMIGHTY GOD for giving me the health and wealth to make this research a reality.

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I sincerely appreciate the chairpersons and community of all the selected villages in the two Parishes of Nangongera sub county, Tororo district for the great cooperation to me during my survey. Thanks you very much.

DEDICATIONS:

To all my family members especially my beloved parents that is to say **Mr.NGENE & Mrs. NGENE JANE**, the beloved siblings for their extraordinary love, care, encouragement, guidance and support since childhood up to date. To the beloved friends like **charity** and madam **faith** whose love and support which pushed me through. May the Almighty God bless you?

DEFINITIONS, ABBREVIATIONS AND ACRONYMS

Herbalists: people managing health care using plants in the treatment of various diseases.

Local medicine: this refers to the herbs used in the treatment of various diseases including ulcers.

Decoction: involves boiling of hard parts of the plants during preparation for treatment of particular disease. It mostly involves hard parts like barks of trees among others.

Infusion: involves placement of a given measured quantity of powdered herbal medicine on warm or hot water during preparation for disease treatment.

NSAIDS: Nonsteroidal Anti-inflammatory Drugs

PUD: Peptic Ulcer Disease.

GPS: Global Positioning System.

PRK: Percentage Respondent knowledge.

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ABSTRACT.

Peptic ulcer is a lesion of gastric mucosa and submucosa or duodenum caused by increased secretion of gastric acid due to alcohol consumption, nonsteroidal anti-inflammatory drugs, continuous and prolonged hunger, continued stresses, *Helicobacter pylori* infection, and poor diet.

Symptoms include abdominal pain with severity relating to mealtimes, after around 3 hours of taking a meal; bloating and abdominal fullness; nausea, and copious vomiting; loss of appetite and weight loss etc.

Plants increasingly continue to form the basis of primary health care in many parts of the world (Tomlinson & Akerele, 2015). In many developing countries, a large proportion of the population relies on the traditional medicine to meet their primary health care need (Kim, Kim, Shin, Jang, & Ko, 2020).

Interestingly, medicines of plant origin are known to be among the most attractive sources of new drugs and have shown promising results in treatment of various diseases including peptic ulcers (Boakye-Yiadom, Kumadoh, Adase, & Woode, 2021). Many researchers have documented some of the medicinal plants used by traditional healers in most parts of the country and worldwide for treatment of peptic ulcers but due to the increased use of medicinal plants by the increasing population, plants may easily go to extinction without information documented. Also, most of the traditional healers are old and may easily lead to loss of information before documentations. Therefore, this research is aimed at documenting the medicinal plants used for ulcer treatment and management by people of Nagongera town council, Tororo district, how the plants are used in combating of ulcer disease including the plant part used, mode of preparation of the remedies, dosage, mode of administration and how long the treatment is used plus the most commonly used plant, also finding out the phytochemicals found in each of the plants used in ulcer treatment. The required information is to be obtained using open interviews, semi-structured questionnaires, and focus group discussions, transect walks and respondents identified using snowball and purposive sampling technique. Using the above methods and materials as well as techniques, I expect to establish the medicinal plants used in the treatment of peptic ulcers as well as the plant parts used and the mode of preparation of these remedies

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CHAPTER 1.0 INTRODUCTION

1.1 Background

The use of traditional medicine in developing countries contributes directly to the socio-economic status and wellbeing of the rural communities(Oyebode, Kandala, Chilton, & Lilford, 2016). Medicinal plants have long been used in most of African countries to manage major and minor illness(Ndhlovu, Omotayo, Otang-Mbeng, & Aremu, 2021). Many people rely on the use of medicinal plants based on the fact that they are easily accessed and cheaply available because they are locally made(Nsagha, Ayima, Nana-Njamen, & Assob, 2020). People especially traditional healers and herbalists generate income from medicinal plants. 20% of the total population in United States of America uses local herbs(Miranda, 2021). Local herbs are easily prepared and several researchers have documented that they don't present major side effects of the users, more that is cheap compared to the inorganic medicine in terms of cost in the mark(Welz, Emberger-Klein, & Menrad, 2018). Also, in recent days the need for medicinal plants by pharmaceutical companies in the world is high and this boost income levels for traditional healers who knows these medicinal plants because they are the ones who will be directing the pharmacist to those plants. Local medicines can be administered as food supplements which make it easy for many people to use them since they are utilized as a food addition(Alamgir & Alamgir, 2018). It is easy, local herbs for treatment of many illness including ulcers(Kuna et al., 2019).

Uganda is one of the developing countries where about 80% of the population largely depend on herbal medicine for treating various diseases including ulcers(Alamgir & Alamgir, 2018). The use of medicinal plants especially in primary health care has become more prominent(Kim et al., 2020). This has led to the increasing search for the plants with medicinal use. The search for plants with medicinal use has led to some ethnobotanical studies that have documented traditional medicinal plant species, the plant part used and the mode of preparation of the remedies used in treatment of diseases including ulcers by local communities in some parts of the country(Boakye-Yiadom et al., 2021)

In Uganda, most parts of the country remain unsurveyed for the medicinal plants despite the rich biodiversity that the country has(Ndhlovu et al., 2021) though in some parts medicinal plants have been documented(Kuna et al., 2019). Since research shows that many people take a wide range of natural products in addition to conventional therapeutic products to manage various ailments

including ulcers, more research is needed in documenting more medicinal plants used in ulcer treatment, the plant parts used, mode of preparation of the remedies, dosage and administration mode. Besides, a lot of valuable indigenous information about the use of medicinal plants is being lost from generation to another generation and with the increasing rate of habitat destruction, plant resources including medicinal plants for ulcer treatment are getting depleted or are threatened(Miranda, 2021) due to many factors like urbanization, modernization among others(Tomlinson & Akerele, 2015).

Also, many medicinal plants for ulcer treatment have been documented in various parts of the country without information about the bioactive components that is to say the phytochemicals found in those medicinal plants which may be important to the pharmacists in development of many treatments.

Therefore, this research was aimed at documenting the medicinal plants used in ulcer treatment by the people of Nagongera Town council ,Tororo district, Uganda, how the plants are used which includes; the plant parts used, mode of preparation, dosage, administration module among others

1.2 Statement of problem

In many developing countries, a large proportion of the population relies on the traditional medicine to meet their primary health care need(Tomlinson & Akerele, 2015). In Africa, traditional medicine has been part of the peoples' culture, and indigenous knowledge of medicinal plants is a source of new ideas for modern pharmaceutical science(Bouyahya, Abrini, Et-Touys, Bakri, & Dakka, 2017). Likewise, in Uganda, the phototherapy still maintains an important role in meeting the primary health care needs of more than 80% of the population. Plants have been a valuable source of new molecules and considered as an alternative strategy in search for new drugs. There is a rich abundance of plants used in traditional medicine known to possess antiulcer properties that may, after possible chemical manipulation provide new and improved antiulcer drugs(Bouyahya et al., 2017). Therefore, many people are resorting to use of medicinal plants for treatment of ulcerations as they can easily access them and more effective with less side effects compared to synthetic drugs(Bouyahya et al., 2017).

The prevalence of peptic ulcers in Uganda poses a significant health concern, and conventional treatments may not be universally accessible. Exploring the traditional use of medicinal plants for peptic ulcer treatment is crucial for understanding potential alternative remedies.

Therefore, this research was aimed at documenting the medicinal plants used in the treatment of peptic ulcers and management by the people of Nagongera Town council , Tororo district, safety and how the plants are used in combating of ulcer diseases including the plant part used, mode of preparations of the remedies ,dosage , mode of administration and how long the treatment is used and lastly the commonly used plant in the treatment of peptic ulcers among the people of Nagongera Sub county ,thereby contributing to the development of accessible and locally relevant health care solutions.

1.3 Research questions

What are the commonly used medicinal plants for treating peptic ulcers in Nagongera Sub Country?

Which part(s) of the medicinal plants is /are used in the treatment of peptic ulcers in Nagongera Sub County

What is the mode of preparation, administration, dosage and how long the treatment takes for the patient to recover from peptic ulcer disease?

1.4.0 Objectives

1.4.1 General of objectives

To identify the medicinal plants traditionally used in the treatment of peptic ulcers within Nagongera sub county , with the aim of providing insights into their potential as complementary treatments in the local health care system .

1.4.2 Specific objectives

To identify and document traditional medicinal plants used in the treatment of peptic ulcers within Nagongera sub county

To establish how medicinal plants are used for peptic ulcer treatment, that is which plant parts are used, mode of preparations, dosage and mode of administration and lastly the duration of the treatment

1.5.0 Hypothesis

1.5.1 Null hypothesis

There are no medicinal plants used in treatment of peptic ulcers by the people of Nagongera Sub County, Tororo district

1.5.2 Alternative hypothesis

There are medicinal plants used in the treatment of peptic ulcers by the people of Nagongera Sub County, Tororo district.

1.6.0 Significance of the study.

This work will add value to the biodiversity conservation whereby the identified medicinal plants used in the treatment of peptic ulcers will draw some attention to specific plant species.

This work will add to scientific understanding and identification of bioactive compounds present in medicinal plants which in turns becomes valuable for future research and the development of new pharmaceuticals

This work will add value to the community empowerment whereby the knowledge about the medicinal properties of local medicinal plants empowers communities to take charge of their health which reduces the dependence on external medicinal resources.

1.6.1 Expected outcome.

This study will provide a comprehensive review on medicinal plants in peptic ulcer treatment, how they are used and dosage of each medicinal plant.

1.7.0 Scope of the study.

The study determined the medicinal plants and their use in the treatment of Ulcer diseases used by the people of Nagongera Sub County, Tororo district. The use included like plant parts, mode of preparation, administration, dosage and the expected time of delivery.

Many methods were used to collect the data especially use of interviews, schedules and the specific respondents were determined using snowball method strictly on the traditional healers found in Nagongera sub county, Tororo district.

CHAPTER 2.0; LITERATURE REVIEW

2.1. What are peptic ulcers and medicinal plants?

Medicinal plants have been used for centuries in the treatment of various ailments, including ulcers. Many people rely on the use of medicinal plants based on the fact that they are easily accessed and cheaply available because they are locally made(Aware et al., 2022).

In ancient civilizations such as Egypt, Mesopotamia, China, and India, medicinal plants were extensively used for treating various diseases, including peptic ulcers. These civilizations had a deep understanding of herbal medicine and documented their knowledge in texts like the Ebers Papyrus (Egypt), the Huangdi Neijing (China), and the Ayurvedic texts (India). These texts contain descriptions of various medicinal plants and their uses in treating gastrointestinal disorders(Ong & Kim, 2020).

(Ozioma & Chinwe, 2019) reported that 20 percent of the total population in United States of America uses local herbs of develop. According to (Cunningham & Andrews, 2017)among south African black population, traditional medicine is apparently desirable and necessary for treating a range of health problems that western medicine cannot adequately treat. Traditional medicine practice comes in forms which can be confounding at times for example in Nigeria, arthropods are reportedly used to cure painful menstruation, child delivery, difficult in giving birth, yellow discharge from the virgina and a host of many other ailments that can be treated using western medicines and therapy. In Uganda (Miranda, 2021) reported that about 80 percent of the local population depend on herbal medicine for treatment of illness.

Medicinal plants include herbs, herbal materials, herbal preparations and finished products that contain parts of plants or other plant materials as active ingredients(Ong & Kim, 2020) Peptic ulcers are open sores that develop on the lining of the stomach, small intestines or esophagus. They are primarily caused by *Helicobacter pylori* bacteria, nonsteroid anti-inflammatory drugs (NSAIDs) and stress. Traditional treatments include antacids, H2 blockers and proton pump inhibitors. However, there has been increasing interest in the use of medicinal plants to treat peptic ulcers due to their potential efficacy, affordability, and minimal side effect(Ozioma & Chinwe, 2019).

Gastro-intestinal ailments are associated with inflammation of the gastro-intestinal tract resulting in abdominal pains and cramps of varying degree(Welz et al., 2018).Inflammation is defined as a complex, vascular lymphatic and local tissue reaction elicited in animals by the presence of viable and non-viable irritants(Boakye-Yiadom et al., 2021)The intestine is vulnerable to muscle spasm in patients suffering from gastro-intestinal infections and most patients suffering from such conditions often complain of abdominal cramps and pains(J. B. Asimwe et al.).

Ulcer is a disorder of the digestive tract, it's an inflamed break in the skin or in the mucus membrane lining the digestive tract. Whenever there is a change in the equilibrium, such as increased aggression or decreased mucosal resistance, ulcerations develop. Peptic ulcers are a general term for any type of stomach/gastric or duodenal ulcer(Rau, Hohaus, & Jessen, 2019).

Peptic ulcer can be categorized on the basis of location and on the severity of disease. Basically, word 'peptic' is derived from Greek term "peptikos" whose meaning is related to digestion. Various reports indicate that old age group patients are more prone to gastric ulcer. Younger individuals have higher risk of duodenal ulcers. A number of drugs have been used but therapeutic uses of plant are safe, economical and effective as their ease of availability(Rau et al., 2019)

Hydrochloric corrosive and pepsin harm the mucous film of the gastrointestinal tract as the outcome both gastric and duodenal ulcers happen. Ulcers for the most part extend between 3mm and a few centimeters in measurement(Alamgir & Alamgir, 2018).

Duodenal ulcers are more common in adult males. Gastric ulcers happen commonly at old age person and in the middle class of people. Peptic ulceration occurs in those areas where acid secretion is generally more(Nsagha et al., 2020).

2.2 Causes of peptic ulcers

The main cause of peptic ulcer is the increased acids secretion and disturbance of the normal equilibrium either caused by enhanced diminish or aggression in mucosal resistance. Other causes of peptic ulcers are a bacterial infection (*Helicobacter pylori*), long term uses of pain killers such as ibuprofen, naproxen sodium among others, stress and spicy food habit.(Toosi, 2016)

In Ayurveda Ancient System of India Medicine, Gastric disorder are classified as Sula, parinamsula and amlapitta which corresponds to clinical condition of peptic ulcers and functional dyspepsia(Kapoor, 2017).

2.3 Treatment

Synthetic drugs such as proton pump inhibitors, hydrogen receptors, cytoprotectants, demulcents, anti-cholinergic, antacids and prostaglandin analogues are used for the treatment of ulcerations but these drugs produce several side effects and are costly compared to medicinal plants. For example, proton pump inhibitors may cause nausea, abdominal pain, constipation, diarrhea (Haastrup, Thompson, Søndergaard, & Jarbøl, 2018).

In current medicine, ulcer therapy mainly includes H₂ receptor antagonist, proton pump inhibitors or cytoprotective agents such as sucralfate. Oxygen derived free radical have been implicated in the pathogenesis of a wide variety of clinical disorders and gastric damage (Patlevič, Vašková, Švorc Jr, Vaško, & Švorc, 2016).

The first drug effective against gastric ulcers was carbenoxolone, discovered as a result of research on a commonly used indigenous plant, *Glycyrrhizaglabra* (leguminosceae) (Patlevič et al., 2016).

Different classes of drugs are used in the treatment of peptic ulcers but most of these drugs exhibit serious side effects like arrhythmias, gynecomastia, impotence, arthralgia, hypergastrinemia and haemopoietic changes. Alternative approach in the recent days is the research of medicaments from ayurvedic or traditional medicinal system. The use of phytoconstituents as drug therapy to treat major ailments has proved to be clinically effective and less relatively toxic than the existing drugs and also reduces the offensive factors serving as a tool in the prevention of peptic ulcers (J. B. Asiimwe et al.).

Peptic Ulcer Disease (PUD) which includes gastric and duodenal ulcers is the most prevalent gastrointestinal disorder and requires a well targeted therapeutic strategy. The pathophysiology of PUD involves an imbalance between offensive (acid, pepsin, *Helicobacter pylori*) and defensive factors (mucin). The most common sites of ulcers are stomach and the first few centimeters of the duodenum. Acute peptic ulcers involve tissues down to the depth of the submucosa and the lesions may be single or multiple. Reasons for the development of ulcers include severe illness, shock, burns, severe emotional disturbance and postsurgical complications. Chronic peptic ulcers penetrate through the epithelial and muscle layers of the stomach wall. Complications of the peptic ulcers include; hemorrhage, perforation, pyloric stenosis and the development of malignant tumors. Poor digestion and elimination, improper metabolism, mental and physical stress, and difficult to digest food enhance the development of ulcer (Greber, 2018).

Ethnopharmacological approach: this involves the study of traditional knowledge and practices related to medicinal plants used by indigenous communities. Several studies have documented the use of medicinal plants for treating peptic ulcers in various traditional systems of medicine such as Ayurveda, Traditional Chinese Medicine (TCM), and Unani. Some commonly used plants in these systems include *Glycyrrhiza glabra* (licorice), *Aloe vera*, *Zingiber officinale* (ginger) and *Matricaria Chamomilla*. (Bouyahya et al., 2017).

Anti-ulcerogenic mechanisms of medicinal plants; these properties can be attributed to various mechanisms as reflected below;

Anti-secretory activity: some plants inhibit gastric acid secretion by blocking histamine H₂ receptors or inhibiting proton pumps. For example, *Glycyrrhiza glabra* has been shown to reduce gastric acid secretion in animal models. Cytoprotective activity where certain plants promote mucosal defense mechanisms by increasing mucus production and reduce gastric lesions in experimental studies. Anti-inflammatory activity where many medicinal plants exhibit anti-inflammatory properties which can help alleviate the inflammation associated with peptic ulcers. Antioxidant activity, oxidative stress plays a significant role in the pathogenesis of peptic ulcers, these plants with this activity can help neutralize free radicals and protect gastric mucosa from oxidative damage. Antimicrobial activity, some plants do have these properties that help combat *H. pylori* infection which is the major cause of peptic ulcers(Kapoor, 2017).

Plants have been a valuable source of new molecules and considered as an alternative strategy in search for new drugs. There is a rich abundance of plants used in traditional medicine known to possess anti-ulcer properties that may, after possible manipulations provide new and improved anti-ulcer drugs(Kuna et al., 2019).

The plant drugs which possess the active principles such as flavonoids, tannins, terpenoids, shows the anti-ulcer activity(Ndhlovu et al., 2021).

Some plant secondary metabolites such as alkaloids, phenols, tannins, glycosides, terpenoids, saponins, flavonoids and steroids have been implicated in their ability to inhibit the formation of pro-inflammatory signaling molecules such as prostaglandin or leukotrienes(Oyebode et al., 2016).

Ten percent of all vascular plants are used as medicinal plants(Ozioma & Chinwe, 2019).Since ancient times, plants have been used in medicine and are still being used today(Jamshidi-Kia, Lorigooini, & Amini-Khoei, 2017).

The use of phytoconstituents as drug therapy to treat major ailments has proved to be clinically effective and less relatively toxic than the existing drugs and also reduces the offensive factors serving as a tool in the prevention of peptic ulcers. In this modern era also 75-80% of the world populations still use herbal medicine mainly in developing countries for primary health care because of better cultural acceptability, better compatibility with human body and lesser side effects(Jamshidi-Kia et al., 2017). The chemical constituents present in the herbal medicine or plants are a part of physiological functions of living flora and hence they are believed to have better compatibility with the human body(AZEEZ, 2019).

Some of the medicinal plants for peptic ulcer treatment

Brassica oleraceae

It is commonly known as cabbage, belonging to family Brassicaceae. The aqueous extract of *Brassica oleracea* var. *capitata* plant was used in the gastric disorders like ulcer at a dose of 0.250, 0.50 and 1.0 mg/kg on Wistar rat. There is a chemical Lysophosphatidic acid (LPA), present in cabbage. It is a lipid mediator involved in a variety of physiological responses, like wound healing. This phospholipid shows an antiulcerogenic activity(Afroze, 2018).

Vaccinium oxycoccos

It is commonly known as Cranberry, belonging to family Ericaceae. Cranberry juice is effective in peptic ulcer. Several *H. pylori* bacteria shows antibiotic resistance but can be treated well by cranberry juice. Regular consumption of cranberry juice could suppress *H. pylori* infection in endemically afflicted populations. The possible mechanism behind the antiulcer activity may be that, it causes immobilization of *H. pylori* strains in human mucus, erythrocytes, and cultured gastric epithelial cells(Welz et al., 2018).

Solanum nigrum

It is commonly known as Potato, belonging to family Solanaceae. It has gastric antiulcerogenic effects. *Solanum nigrum* was found to possess antiulcerogenic as well as ulcer healing activities.

Antiulcer activity was by blocking acid secretion through inhibition of $H^+ K^+ ATPase$ and decreasing secretion of gastrin hormone(AZEEZ, 2019).

Ceratonia silique

It is commonly known as Carob, belonging to Fabaceae (Leguminosae) family. Carob has shown to reduce the effect of gastroesophageal reflux and vomiting in infants. It works by several activities of its constituents mainly the Flavonoid content. It possesses demulcent property and the flavonoid content imparts gastroprotective and antioxidant properties, which together lend the drug to exhibit antiulcerogenic potential (AZEEZ, 2019).

CHAPTER 3.0; METHODOLOGY

3.1 Study area.

Nagongera Sub County is located in Tororo district in Eastern Uganda, about few km from Tororo Municipality. It is composed of many parishes like pokongo parish with villages like pokongo penji, North, pokongo penji south and pokongo bendo and pokongo west village and Maundo parish with villages like maundo east , maundo west , maundo south and maundo central village . The people in this area speak Dpopadhola language. The major economic activity is farming but mostly on small scale that is to say growing of maize, cassava, rice, sorghum, potatoes among others.

3.2 Target population and sample

The target population was the herbalists and community elders as the key respondents in Nagongera sub county, Tororo district.(Logiel, Jørs, Akugizibwe, & Ahnfeldt-Mollerup, 2021)

Villages was selected from the two parishes according to the position of the herbalists and the community elders who will also be gotten by using purposive and snowball sampling methods as adopted from(BUSARI, 2021).

The data was only gotten from those elderly people almost above 40years who have taken some years while using given medicinal plants for ulcer treatment unlike the people below 40 years who would give wrong information and would affect the validity of the data collected which in turn can affect the achievement of the set objectives of the study.

3.3 Design of the study

A cross sectional survey was done which involved meeting the local council representatives who was used in identifying the key respondents mainly the herbalists and community elders who were later selected using purposive and snowball sampling method as adopted from, the respondents was selected from each parish and village on the basis of their reputation and ability to demonstrate good traditional herbal medicine knowledge. For each respondent, questions was asked about personal information like gender, age among others was recorded and also medicinal plants for ulcer treatment, plant part used, mode of preparation, administration mode, dosage among others was collected using interviews like semi-structured interviews, questionnaires among others as adopted from (Egbuna et al., 2020).

3.4 Data analysis

Data was entered in an excel sheet and frequencies and percentages was used to summarize the ethnobotanical data. Parameters like percentage respondent knowledge (PRK) were used in data analysis; it is also called percent use-value. The percentage of respondents who have knowledge (PRK) regarding the use of a species in the treatment of ulcer disease was estimated using the formula below;

$$\frac{\text{Number of people interviewed citing the plant}}{\text{Total number of respondents interviewed}} \times 100$$

The percent use-value index determines the relative importance of plant species as a medicinal plant. High PRK indicates high use reports for a plant implying its relative importance to the local community for health care needs as adopted from(S. Asimwe, Namukobe, Byamukama, & Imalingat, 2021) hence data was presented in form of tables, graphs and pie charts as adopted from(In & Lee, 2017).

3.5 Procedure for Data collection

Busitema university administration granted the permission to go ahead with data collection from the community of Nagongera Town Council by issuing me an introductory letter. The letter was then presented to the local chairperson visited so as to obtain permission to interact with the people of the target group. Before data collection, voluntary verbal prior informed consent of each of the informants was obtained since knowledge is a natural wealth of the local people, they were assured that the data was to be used only for academic purposes(Greber, 2018). After explaining the purpose of the study, for each respondent, personal information was recorded on gender, age, marital status, also information on the respondent's location, level of education and how they acquired knowledge about medicinal plants in order to eliminate secondary data. After wards information on medicinal plants, local name, how they are used in ulcer treatment which includes plant parts used, and mode of preparation, dosage, and administration methods was recorded. This ethnobotanical data was obtained by use of semi-structured interviews, open interviews, questionnaires based on standard ethnobotanical methods as adopted from(Kidane, Gebremedhin, & Beyene, 2018).the data was collected with ease and a total of 25 respondents were interviewed.

3.6 Plant identification and Nomenclature

The international plant index (www.ipni.org) and the Royal Botanic Garden Kew (www.theplantlist.org) will be used to validate plant scientific names, families and authorities. Voucher specimens will be identified by comparing with herbarium specimens at the National herbarium at Makerere University, Kampala, adopted from (Tolo, Kahwa, Nuwagira, Weisheit, & Ikiriza, 2023)

CHAPTER 4.0: PRESENTATION OF RESULTS AND DISCUSION.

The tables, pie charts and pictorials will be used in data collection.

Table 1. Social demographic factor of the respondents.

Variable	Categories	Count	Percentage
Gender2	Female	16	64
	Male	9	36
Age	20-29	1	4
	30-39	3	12
	>40	21	84
Marital status	Married	20	80
	Widow	2	8
	Single	1	4
	Divorced	2	8
Education	Tertiary	2	8
	Secondary	2	8
	Primary	20	80
	None	1	4

Out of 25 respondents interviewed in this study, 16(64%) of them were women and 9(36%) were men .most of the respondents had low levels of education, 1(4%) respondents had not attained any level of education, 20(80%) had attended primary level only and the rest had attained secondary and tertiary levels of education. the big percentage of the respondents got the knowledge of herbal plants from their parents, grandparents and fellow local herbalists. The majority (80%) of the respondents were above 40 years of age see (**Table 1**)above . and roughly eighty percent(80) of the respondents were married.

Table 2.

Details on the medicinal plants used in treatment of peptic ulcers by the people of Nagongera sub county ,Tororo district, their images , number of the people who cited the plant and biological form of the plant or growth habit.

S/N	Family, Scientific name and Local name	Image of the plant/plant part	Number of people who cited the plant	Biological forms/ Plant habit
01	Caricaceae <i>Carica papaya L</i> (Mapapali)		7	Tree
02	Musaceae <i>Musa acuminata</i> (Pendi)		4	Herb
03	Rubiaceae <i>Coffea canephora</i> Froehner		2	Tree
04	Solanaceae <i>Capsicum frutescens L</i> (Ngori)		1	Shrub
05	Asteraceae <i>Dahlia pinnata.</i>		2	Shrub
06	Menispermaceae <i>Tinospora cardifolia</i> (Lwiyo.)		3	Shrub

07	Ziniberaceae <i>Curcuma longa l</i> (Binzari.)		5	Herb
08	Myrtaceae <i>Psidium guajava L.</i> (Mapera)		8	Tree
09	Myrtaceae <i>Eucalyptus spp.</i> (Kalantus)		10	Tree
10	Alliaceae <i>Allium sativum L.</i> (Katunuluccumu)		5	Herb
11	Moraceae <i>Artocarpus heterophyllus Lam.</i> (Fene)		14	Tree
12	Lauraceae <i>Persea Americana Mill.</i> (Avocado)		5	Tree

13	Brassicaceae <i>Brassica oleracea.</i> (Kabeji)		3	Herb
14	Amaranthaceae <i>Amaranthus. spinosus</i> <i>L.</i> (Doodo)		2	Herb
15	Lamiaceae <i>Ocimum gratissum L.</i> (mujaja)		3	Shrub
16	Aloeceae <i>Aloe wollastoni Rendle.</i>		5	Herb
17	Anacardiaceae <i>Mangifera indica L.</i> (Mayembe)		6	Tree
18	Asteraceae <i>Bidens pilosa L.</i> (Sere)		15	Herb
19	Solanaceae <i>Solanum violaceum</i> (Kapanga)		2	Herb

20	Cucurbitaceae <i>Cucurbita maxima</i> (Nyarienga)		7	Creeper
21	Rutaceae <i>Citrus limon</i> (Nimo)		4	Tree
22	Lamiaceae <i>Leucas martinicensis</i> (jacq) R.Br (Kasusuni)		8	Herb

It was observed that many medicinal plants are used in the treatment of ulcer disease by the people of Nagongera sub county, Tororo district (Table2). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. It is also observed that most being used in the treatment of the ulcer disease are herbs (41%) of the plant species identified, followed by trees (36%) and the rest are shrubs (18%) and creepers (5%) as shown in the **table 2** above.

It was also observed that many plants being used in the treatment of ulcer disease by these people belongs to various families. Some of the plant were pointed at by many respondents like *Bidens pilosa*, *Brassica oleraceae*, and *Artocarpus heterophyllus Lam.*

Table 3

List of medicinal plants used by the people of Nagongera Sub County for ulcer disease treatment; plant part used, mode of preparation, dosage, mode of administration, duration of treatment and expected time of recovery.

S/N	Plant species	Plant part used	Mode of preparation	Dosage	Mode of administration	Duration of treatment and expected time recovery
01	<i>Carica papaya L</i>	Seeds	Infusion (powder placed in hot or warm water)	2 spoons in ½ cup 2 times a day	Oral	1 month
02	<i>Musa acuninata</i>	Banana peeling	Dry peelings, burn and obtain ash, add water and filter ;keep the filtrate to be added to any sauce	½ cup 2 times a day	Oral	2 weeks
03	<i>Coffea canephora Froeher</i>	Leaves	Boiled in water	¼ cup 3 times a day	Oral	1 week
04	<i>Capsicum frutescens L</i>	Seeds	Drying of seeds	½ spoon placed in any food or sauce	Oral	2 weeks
05	<i>Dahlia pinnata</i>	Leaves	Sap extracted from the leaves	1 cup 1 time a day	Oral	1 week
06	<i>Tinospora cardifolia</i>	Whole plant	Sap extracted	1 cup 3 times a day	Oral	2 weeks

07	<i>Curcuma longa l</i>	leaves	Sap extracted	1 cup 3 times a day	Oral	2 weeks
08	<i>Psidium guajava L.</i>	Leaves	Boiled in water	1 cup 2 times a day	Oral	3 weeks
09	<i>Eucalyptus spp.</i>	Leaves , bark	Infusion (powder placed in hot or warm water)	2 spoons placed in ½ cup 3 times a day	Oral	1 month
10	<i>Allium sativum</i>	Whole plant	Pound and dried to form powder then infusion or chewing	¼ cup 2 pieces 2 times a day	Oral	1 month
11	<i>Artocarpus heterophyllus Lam</i>	seeds	Infusion (powder placed in hot water)	1 cup 3 times a day	Oral	2 weeks
12	<i>Persea Americana Mill.</i>	Seeds Bark Leaves	Decoction Infusion	¼ cup 2 times a day	Oral	3 weeks
13	<i>Brassica oleracea</i>	Leaves	Chewing when cut into small pieces or juice making	½ cup of juice 2 spoons 3 times a day	Oral	3 weeks
14	<i>Amaranthus. spinosus L</i>	Leaves	Sap extracted	1 cup 2 times a day	Oral	3 weeks
15	<i>Ocimum gratissum L</i>	Roots	Pound to form powder ,then infusion	2 spoons in ½ cup 3 times a day	Oral	1 month
16	<i>Aloe wollastoni Rendle</i>	Leaves	Boiled in water mixed with honey	¼ cup 2 times a day	Oral	2 weeks

17	<i>Mangifera indica L</i>	Bark /young fruits	Decoction or infusion Young fruits	¼ cup 2 times a day	Oral	1 month
18	<i>Bidens pilosa L.</i>	Seeds	Seeds boiled in water	1 cup 2 times a day	Oral	1 week
19	<i>Solanum violaceum</i>	Seeds	Chewing	1 spoon 3 times a day	Oral	3 weeks
20	<i>Cucurbita maxima</i>	seeds	Infusion (powder placed in hot or warm water)	¼ cup 3 times a day	Oral	1 month
21	<i>Citrus lemon</i>	Leaves, fruits	Boiled in water for 20 minutes	1 cup 3 times a day	Oral	3 weeks
22	<i>Leucas martinicensis (jacq) R.Br</i>	Leaves	Boiled in water	¼ cup 2 times a day	Oral	1 month

From the **table 3**, it showed that medicinal plants are not used in the same way during the treatment of ulcer disease, therefore, the null hypothesis was rejected and the alternative hypothesis was accepted. This was evidenced with many forms of preparations of medicinal remedy to be used for ulcer treatment that is to say, infusion for *Cucurbita maxima*, Decoction for *Mangifera indica* among others.

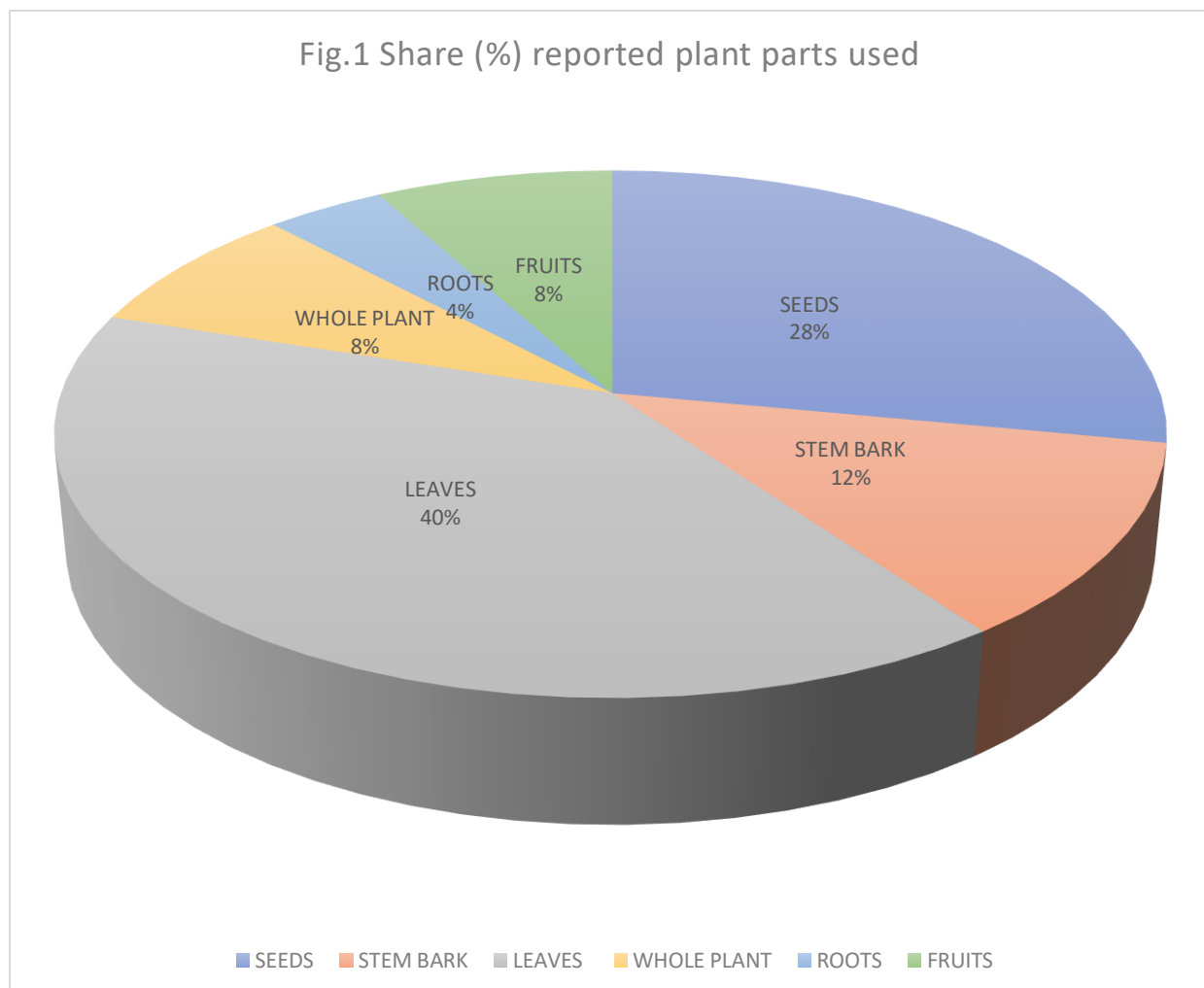
Many different plant parts were used in preparation of the remedy for the treatment of ulcer disease for example use of barks , seeds, leaves , whole plant ,sap use among others as seen in the **table 3** above

It was also observed that almost 100% of all the medicinal plants which were being used for ulcer treatment were administered orally for a given period of time according to **table 3**

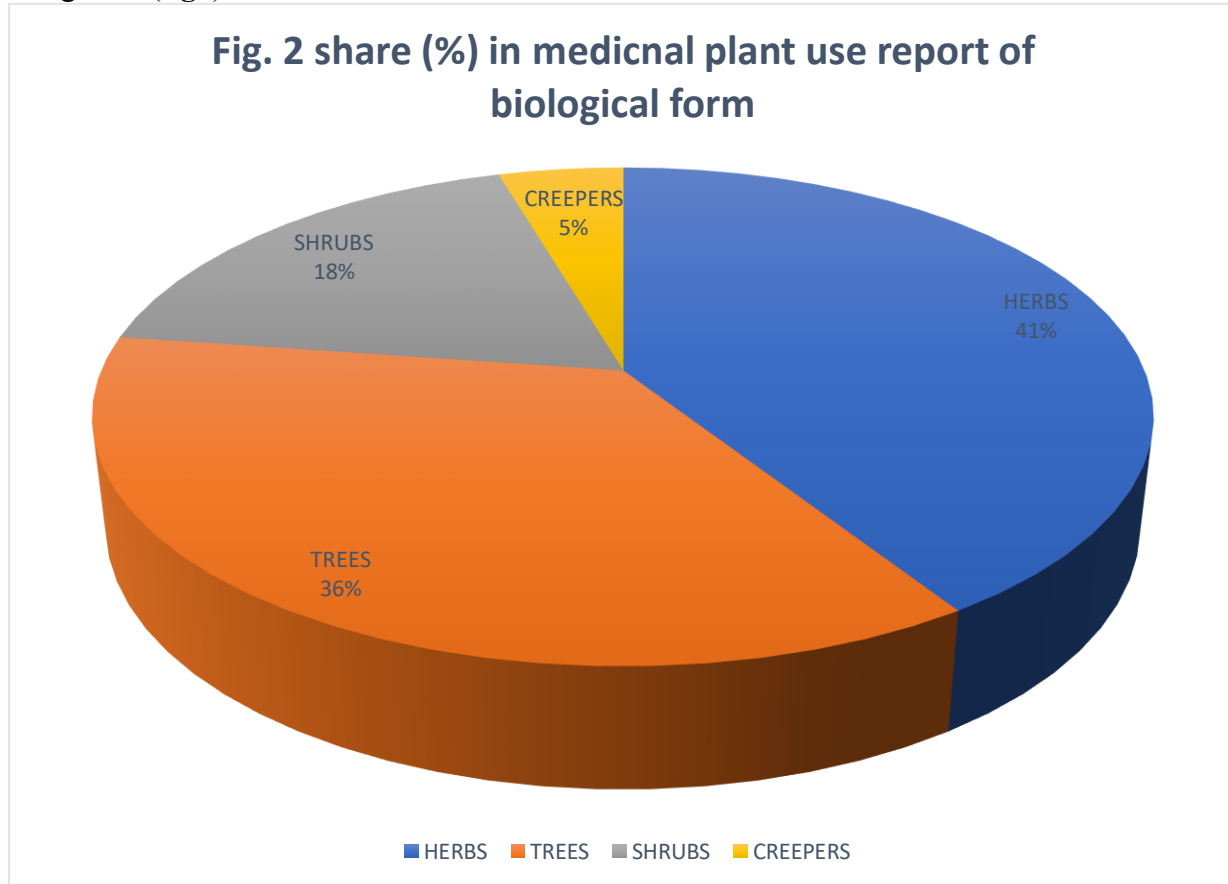
It was also observed that Dosage was varying from one plant to another and this created the aspect of effectiveness in relation to the time spent on treatment to be recovered. However, most of the treatment remedies were utilized in a measure of ½ cup mostly for three times a day.

A total of twenty two (22) medicinal plant species belonging to 22 families and many genera were reported to treat peptic ulcers by the people of Nagongera Sub County, Tororo district.

Different plant parts were used in the medicinal preparation of the remedies for the treatment of peptic ulcers (Table 3). Leaves contributed 40%, seeds contributed 28% as shown in the (fig. 1). However, in some plants more than one plant parts were used in the preparation of the remedies used in ulcer treatment for example in *Mangifera indica L*, *Eucalyptus spp*, *Citrus lemon*, among others .



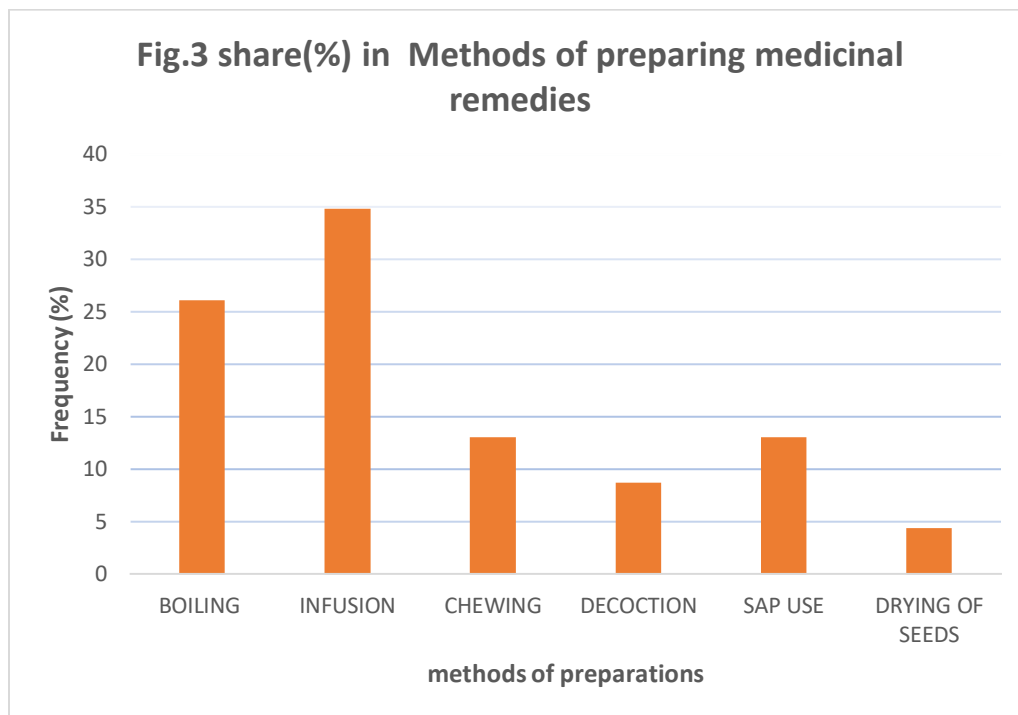
Many biological forms or plant habits were seen in most of the plants that were used to treat ulcers that is to say ;trees , Herbs ,Shrubs, creepers (**Table 2**) , the Herbs contributed the highest percentage of 41% followed by Trees of 36% then Shrubs of 18% and Creepers of 5% as showed in figure 2 (**fig2**)



Herbal remedy preparations

The most common methods of preparation of the herbal remedies were boiling (26%), Infusion (35%)

, decoction (9%), chewing (13%), sap use (13%) and drying of seeds (4%)



Percentage respondents' knowledge (percentage use-value).

Table 4 and figure 4 show plants that were cited many times contributing to their high frequency by the respondents. The highest percentage respondent knowledge towards ulcer treatment was calculated for *Bidens pilosa L.* with 60% of mention by the respondents, followed by *Artocarpus heterophyllus Lam* with 56%

Table 4:

List of plant species and the frequency in the number of times each plant is being cited for the disease and the percentage respondent knowledge for each plant species.

S/N	Plant species	Frequency	PRK (%)
1	<i>Carica papaya L</i>	7	28
2	<i>Musa acuninata</i>	4	16
3	<i>Coffea canephora</i> <i>Froeber</i>	2	8
4	<i>Capsicum frutescens L</i>	1	4
5	<i>Dahlia pinnata</i>	2	8
6	<i>Tinospora cardifolia</i>	3	12
7	<i>Curcuma longa l</i>	5	20
8	<i>Psidium guajava L.</i>	8	32
9	<i>Eucalyptus spp.</i>	10	40
10	<i>Allium sativum</i>	5	20
11	<i>Artocarpus heterophyllus Lam</i>	14	56
212	<i>Persea Americana Mill</i>	5	20
13	<i>Brassica oleracea</i>	3	12
14	<i>Amaranthus. spinosus L</i>	2	8
15	<i>Ocimum gratissum L</i>	3	12
16	<i>Aloe wollastoni Rendle</i>	5	20
17	<i>Mangifera indica L</i>	6	24
18	<i>Bidens pilosa L.</i>	15	60
19	<i>Solanum violaceum</i>	2	8
20	<i>Cucurbita maxima</i>	7	28
21	<i>Citrus lemon</i>	4	16
22	<i>Leucas martinicensis (jacq) R.Br</i>	8	32

4.1 DISCUSSION:

The use of medicinal plants in Nagongera sub county, Tororo district is similar to that of many parts of country. As seen in other communities, traditional healing by use of medicinal plants is practiced by both men and women (Aware et al., 2022). The transfer of knowledge of medicinal plants from one generation to another that was mentioned in this study had been noted also by other researchers (Aware et al., 2022). It is also a common practice for children and grandchildren to accompany their parents during the harvesting of medicinal plants and at the time of treating patients. This is how indigenous knowledge is acquired through time as it is handled from one generation to another through transfer from parents to children and friends as observed even with the study at hand.

The dominance of many medicinal plants of different biological forms and growth habits in Nagongera Sub County for ulcer treatment may be due to indigenous knowledge by old men, geographical and climatic conditions that favors such plants in that specific areas and many other factors can be available to elaborate on that.

The plants recorded in this study have been found to be used elsewhere in other studies for ulcer treatment or different ailments.

Most of the plants were harvested from the wild as observed in other studies where most of them were collected from low lands among other places and this puts the key plant species at a risk of disappearing since they are threatened by human activities like agriculture, settlements and seasonal variations.

The use of different plant parts like barks, leaves, roots, fruits seeds and whole plant for the herbal remedy preparation has been recorded by other researchers.

The predominance of using leaves and seeds, biological form (herb), mode of preparation (infusion) and administration (oral) methods have been observed in earlier ethnobotanical studies. The predominance in the use of leaves could be due to their faster regeneration to provide the bioactive components.

The use of plant mixtures for herbal remedy preparations was also reported in other studies and this could be due to the additive or synergistic effects of the combined plant compounds that act on different pathogens. The highest frequency of the mention of *Bidens pilosa L.* and *Artocarpus*

heterophyllus Lam for treating ulcer disease has also been reported elsewhere and this could be due to the numerous bioactive compounds and properties that those plants contain (Boakye-Yiadom et al., 2021).

Bidens pilosa L (60%) and *Artocarpus heterophyllus Lam* (56%) had the highest percentages of PRK and thus ranked highly in the treatment of ulcer disease by the of nagongera sub county, Tororo district Uganda, followed by *Eucalyptus spp.* (40%) and the potential of this plant to treat ulcer disease has been reported by other researchers. This was followed by *Psidium guajava L.* (32%) and *Leucas martinicensis (jacq) R.Br* (32%) and subsequent plants as shown in figure 4 below. This implies that the above mentioned plants with high PRK are more effective in ulcer disease treatment compared to the rest of the plants under the studied area.

CHAPTER 5.0: CONCLUSION AND RECOMMENDATIONS.

This chapter contains the conclusion and recommendations of the study concluded on the medicinal plants for treatment of peptic ulcer.

5.1 Conclusion

The people of Nagongera Sub County, Tororo district majorly use herbal plants to manage peptic ulcer disease and other human medicines. This shows that care should be given to the old people with indigenous knowledge about medicinal plants which are vital for suitable usage of medicinal plant resources. Therefore, this calls for a need for immediate conservation of the threatened and disappearing plant species to avoid their extinction from our surrounding environment.

Plants with high percentage respondent knowledge level values can be subjected to further Pharmacological studies to validate their traditional uses in peptic ulcer disease and this can lead to discovery of new bioactive molecules. However, the reported ethnobotanical studies by other researchers validate the use of the recorded plants in the treatment of peptic ulcer disease.

A total of 22 medicinal plants were recorded to be used in the treatment of peptic ulcer disease in Nagongera Sub County. Herbs as the major biological form, leaves as the major plant part used , infusion as the major method of preparation , and the information gotten from parents and grandparents hence medicinal plants still play a significant role in the treatment of the peptic ulcers in this area.

5.2 Recommendations.

The modern knowledge (Pharmacology) should work with the tradition people for the isolation and standardization of the active constituent, the combination of the modern and tradition knowledge will help to develop better anti-ulcer drugs.

The community leaders should put strict laws against over exploitation of the medicinal plants due to agriculture and settlement before they go to extinction.

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