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Research Article

Traditional Medicinal Plants Used for the Treatment of Peptic Ulcer in Dekina Local Government Area, Nigeria: an Ethnobotanical and Phytochemical Investigation

Momoh Theophilus Boniface[1*], Ikpaya David Ikpaya[2], Hassan Abdulrahman Ocholi[2], Acheneje Deborah Ojochide[1], Okpanachi Baba Clifford[3]

[1]Department of Plant Science and Biotechnology, Prince Abubakar Audu University, Anyigba, Nigeria.
[2]Department of Ground Station and Mission Control, National Space Research and Development Agency, Abuja, Nigeria.
[3]Department of Pure and Industrial Chemistry, Federal University of Applied Sciences, Kachia, Kaduna State, Nigeria.

***Correspondence**
Momoh Theophilus Boniface
Email: theophilusmomoh@rocketmail.com; ORCID ID: https://orcid.org/0009-0005-8754-2498

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Background: Peptic ulcer disease remains a major public health challenge worldwide, particularly in developing countries where traditional herbal medicine continues to serve as an important source of healthcare. This study was conducted to document the medicinal plants traditionally used for the treatment of peptic ulcer disease in Dekina Local Government Area of Kogi State, Nigeria, and to evaluate the phytochemical constituents of selected medicinal plants.

Methods: A descriptive cross-sectional ethnobotanical survey was adopted using purposive sampling to select ten experienced traditional herbal practitioners. Ethnobotanical data were collected through structured interviewer-administered questionnaires and field observations. Medicinal plants cited by the respondents were collected, authenticated at the Herbarium of the Department of Plant Science and Biotechnology, Prince Abubakar Audu University, Anyigba, and subjected to qualitative phytochemical screening using standard laboratory procedures.

Results: The study documented twenty-eight medicinal plant species belonging to twenty botanical families. The family Asteraceae was the most represented, followed by Apocynaceae, Meliaceae, and Rutaceae. Leaves were the most frequently utilized plant part, while trees constituted the dominant growth habit of the documented species. Decoction was the most common method of herbal preparation. Qualitative phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, saponins, and phenolic compounds in varying concentrations among the investigated medicinal plants. Species such as *Azadirachta indica*, *Aloe barbadensis*, *Bryophyllum pinnatum*, *Mangifera indica*, *Paullinia pinnata*, *Kigelia africana*, and *Zingiber officinale* exhibited relatively rich phytochemical profiles, suggesting significant therapeutic potential for the management of peptic ulcer disease.

Conclusion: The findings provide scientific evidence supporting the traditional use of medicinal plants in the treatment of peptic ulcer disease in Dekina Local Government Area and contribute to the preservation of indigenous ethnomedicinal knowledge. The documented medicinal plants represent promising sources of bioactive compounds that warrant further pharmacological, toxicological, and clinical investigations for the development of safe, effective, and affordable plant-derived anti-ulcer agents.

Keywords: *Ethnobotany, medicinal plants, peptic ulcer, phytochemical screening, traditional medicine*

Introduction

Peptic ulcer disease (PUD) remains one of the most prevalent gastrointestinal disorders worldwide and continues to constitute a major public health challenge because of its associated morbidity, mortality, and economic burden (Lau et al., 2011; Daniel et al., 2017). The disease is characterized by the erosion of the mucosal lining of the stomach, proximal duodenum, or, less commonly, the lower esophagus due to the digestive action of gastric acid and pepsin (Chan & Graham, 2004; Debjit et al., 2010). Depending on the anatomical location of the lesion, peptic ulcers are broadly classified as gastric ulcers and duodenal ulcers. Although these two forms share similar pathological mechanisms, they differ in their clinical manifestations, epidemiology, and response to food intake (Vyawahare et al., 2009).

The development of peptic ulcer disease results from an imbalance between aggressive factors, including gastric acid, pepsin, *Helicobacter pylori*, and reactive oxygen species, and the protective mechanisms of the gastric mucosa, such as mucus secretion, bicarbonate production, prostaglandins, nitric oxide, adequate mucosal blood flow, and continuous epithelial regeneration (Byrge et al., 2013; Ayantunde, 2014). Several risk factors have been implicated in the pathogenesis of the disease, including persistent *Helicobacter pylori* infection, prolonged use of non-steroidal anti-inflammatory drugs (NSAIDs), excessive alcohol consumption, cigarette smoking, psychological stress, unhealthy dietary habits, advancing age, and Zollinger–Ellison syndrome (Kumar et al., 2011; Teka et al., 2016; Lauret et al., 2015). The persistence of these factors compromises the integrity of the gastric mucosal barrier, thereby predisposing affected individuals to chronic ulceration and its associated complications.

Clinically, the manifestations of peptic ulcer disease vary according to the anatomical site and severity of the lesion. Gastric ulcers are frequently associated with epigastric pain that worsens during or shortly after meals and may be accompanied by nausea, vomiting, early satiety, and weight loss (Vyawahare et al., 2009). In contrast, duodenal ulcers commonly present with burning or gnawing epigastric pain that occurs during fasting or at night and is often relieved temporarily after food intake or antacid administration (Vimala & Shoba, 2014). If left untreated, peptic ulcers may progress to life-threatening complications, including gastrointestinal hemorrhage, perforation, gastric outlet obstruction, and peritonitis, all of which require urgent medical intervention (Rickard et al., 2016).

Despite considerable advances in diagnosis and treatment, peptic ulcer disease continues to affect millions of people globally. It is estimated that approximately 10–15% of the world's population will develop peptic ulcer disease during their lifetime, with *Helicobacter pylori* infection remaining one of the leading causative agents (Lau et al., 2011). The disease burden is particularly high in low- and middle-income countries, where limited access to healthcare services, poor sanitation, indiscriminate use of NSAIDs, and socioeconomic constraints contribute significantly to its persistence. Consequently, peptic ulcer disease remains an important clinical and public health concern that necessitates continuous research aimed at identifying safer, more affordable, and effective therapeutic alternatives.

The management of peptic ulcer disease has advanced considerably over the past few decades with the introduction of proton pump inhibitors (PPIs), histamine-2 (H_2) receptor antagonists, antacids, mucosal protective agents, and antibiotic regimens for the eradication of *Helicobacter pylori* infection (Jaff, 2011). These therapeutic agents primarily reduce gastric acid secretion, enhance mucosal defense mechanisms, inhibit gastric mucosal apoptosis, and promote tissue regeneration to facilitate ulcer healing (Debjit et al., 2010). Although these medications have significantly improved clinical outcomes, their long-term use has been associated with several drawbacks, including adverse drug reactions, treatment failure, recurrence of ulcers following discontinuation of therapy, antimicrobial resistance, drug interactions, and high treatment costs (Lauret et al., 2015; Toth-Manikowski & Grams, 2017). Such limitations have intensified the search for alternative therapeutic agents that are safer, more accessible, and economically affordable.

Recent advances in the understanding of peptic ulcer disease have led to significant improvements in therapeutic management through the use of proton pump inhibitors (PPIs), histamine-2 receptor antagonists, mucosal protective agents, and combination antibiotic therapy for the eradication of *Helicobacter pylori* infection (Malfertheiner et al., 2022; Sung et al., 2020). These therapeutic approaches promote ulcer healing by suppressing gastric acid secretion, strengthening mucosal defenses, enhancing epithelial regeneration, and reducing inflammation. Nevertheless, long-term administration of these medications has been associated with several limitations, including drug resistance, adverse effects, recurrence following treatment withdrawal, drug-drug interactions, and increased healthcare costs (Malfertheiner et al., 2022; Camilo et al., 2023). Consequently, there is growing interest in identifying alternative therapies that are effective, safe, affordable, and readily accessible, particularly in resource-limited settings.

Although several ethnobotanical surveys have documented medicinal plants used for gastrointestinal disorders in different regions of Nigeria, information specific to peptic ulcer management in Dekina Local Government Area of Kogi State remains scarce. This knowledge gap underscores the need for systematic documentation and scientific validation of

indigenous anti-ulcer medicinal plants within the study area. Therefore, this study aimed to document the medicinal plant species traditionally employed for the treatment of peptic ulcer disease in Dekina Local Government Area through an ethnobotanical survey and to investigate the phytochemical constituents of selected species. The findings are expected to preserve indigenous knowledge, provide baseline information for future pharmacological and toxicological studies, support biodiversity conservation, and facilitate the identification of promising plant-derived compounds that may serve as leads for the development of safer and more effective anti-ulcer therapeutics.

METHODOLOGY

Study Area

This study was conducted in Dekina Local Government Area (LGA), located in Kogi East Senatorial District of Kogi State, North-Central Nigeria. Dekina is one of the largest local government areas in the state and is predominantly inhabited by the Igala ethnic group, whose rich indigenous knowledge of medicinal plants has been preserved through generations. The area lies within the Guinea Savannah ecological zone and is characterized by considerable plant diversity, making it an important location for ethnobotanical investigations.

Dekina LGA was purposively selected for this study because of its rich floristic diversity, widespread reliance on traditional medicine, and the presence of experienced traditional herbal practitioners with extensive knowledge of medicinal plants used in the management of various ailments, including peptic ulcer disease. Despite the extensive use of herbal medicine within the area, scientific documentation of medicinal plant species employed in the treatment of peptic ulcer remains limited. Consequently, the study area provides an ideal setting for an ethnobotanical survey and phytochemical investigation aimed at documenting indigenous knowledge and identifying plants with potential anti-ulcer properties.

Research Design

This study employed a descriptive cross-sectional ethnobotanical survey design to document medicinal plants traditionally used for the management of peptic ulcer disease in Dekina Local Government Area of Kogi State, Nigeria. The descriptive survey approach was considered appropriate because it enables the systematic collection, documentation, and analysis of indigenous knowledge from traditional medicine practitioners and knowledgeable members of the community without manipulating the study variables. The research design focused on obtaining first-hand information regarding medicinal plant species used for ulcer treatment, including their local names, plant parts utilized, methods of preparation, routes of administration, dosage, and perceived therapeutic effectiveness. In addition, the study documented respondents' socio-demographic characteristics and indigenous knowledge associated with the conservation and utilization of medicinal plants.

Sample Collection and Sampling Technique

A purposive sampling technique was employed to select respondents for this study. This non-probability sampling method was considered appropriate because it enables the deliberate selection of individuals who possess extensive knowledge and practical experience in the traditional management of peptic ulcer disease. Specifically, ten (10) experienced traditional herbal practitioners were purposively selected from different communities within Dekina Local Government Area based on their reputation, years of practice, willingness to participate, and recognized expertise in the use of medicinal plants.

The sample size of ten respondents was considered adequate for this preliminary ethnobotanical investigation because the study targeted key informants with specialized indigenous knowledge rather than the general population. The selection was guided by the objectives of the study, availability of knowledgeable respondents, accessibility of the communities, time constraints, and available research resources. Similar purposive sampling approaches have been widely adopted in ethnobotanical studies to obtain reliable information from knowledgeable traditional healers and custodians of indigenous medicinal knowledge.

Instrument for Data Collection

Data for this study were collected using a structured interviewer-administered questionnaire designed specifically for ethnobotanical investigations. The interview approach was adopted because most of the traditional herbal practitioners in the study area possessed varying levels of formal education, making face-to-face interviews more effective for obtaining reliable and comprehensive information.

The use of interviewer-administered questionnaires also minimized misinterpretation of questions and enabled respondents to provide detailed explanations based on their indigenous knowledge. The questionnaire was developed following standard ethnobotanical survey guidelines and consisted of both open-ended and close-ended questions.

Ethnobotanical Data Collection Procedure

Ethnobotanical data were collected through field visits to selected communities in Dekina Local Government Area, Kogi State, Nigeria. The survey involved visits to traditional healing centres, herbal medicine practitioners, herb vendors, and other community members recognized for their extensive knowledge of medicinal plants. Local guides and community leaders facilitated access to respondents and assisted in establishing rapport with the participants. Before each interview, the objectives and significance of the study were clearly explained to the respondents, and informed verbal consent was obtained. Interviews were conducted in a respectful and culturally appropriate manner using the structured questionnaire. Where necessary, discussions were held in the Igala language to ensure effective communication and accurate documentation of indigenous knowledge. Information collected from each respondent included the local names of medicinal plants used for the treatment of peptic ulcer disease, plant habit, plant parts utilized, sources of plant materials, methods of preparation, dosage, route of administration, duration of treatment, mode of preservation, and any known contraindications or adverse effects. Additional information regarding the availability, harvesting period, and conservation status of the medicinal plants was also documented where applicable.

During the field survey, medicinal plant species cited by the respondents were observed and collected with the assistance of the herbal practitioners and knowledgeable local residents. Voucher specimens were prepared for plant species that could not be readily identified in the field. The collected specimens were authenticated at the Herbarium of the Department of Plant Science and Biotechnology, Prince Abubakar Audu University, Anyigba, using standard taxonomic keys, floras, and relevant botanical literature. The authenticated plant species were subsequently assigned to their respective families following accepted botanical classification systems. To enhance the credibility of the ethnobotanical information, responses obtained from different participants were compared for consistency. Information on the medicinal uses of the documented plant species was further corroborated through an extensive review of published ethnobotanical and pharmacological literature.

Preparation of Plant Extracts

Medicinal plant species identified during the ethnobotanical survey were collected from their natural habitats and authenticated at the Herbarium of the Department of Plant Science and Biotechnology, Prince Abubakar Audu University, Anyigba. The collected plant materials were thoroughly washed with clean water to remove adhering soil particles and other contaminants before being air-dried under shade at room temperature until a constant weight was attained. The dried plant materials were subsequently pulverized into fine powder using a clean laboratory grinder and stored in airtight containers until extraction.

Extraction of the powdered plant materials was carried out using extraction methods that reflected the traditional modes of preparation reported by the respondents. Depending on the plant part and customary method of use, cold maceration, decoction, or tincture extraction was employed. For aqueous extraction, 80 g of the powdered sample was weighed into a clean conical flask containing 1 L of distilled water and allowed to stand for an appropriate extraction period with intermittent agitation to facilitate the release of bioactive constituents.

At the completion of the extraction process, the extracts were filtered through Whatman No. 1 filter paper to remove plant residues and obtain clear filtrates. The filtrates were collected in sterile containers and used for subsequent qualitative phytochemical analysis. All reagents and chemicals used during the extraction procedures were of analytical grade and were obtained from the Central Research Laboratory, Prince Abubakar Audu University, Anyigba, Nigeria.

Preliminary Phytochemical Screening

Preliminary qualitative phytochemical screening was carried out on the prepared plant extracts to determine the presence or absence of major secondary metabolites that are commonly associated with the therapeutic activity of medicinal plants. The analyses were conducted at the Central Research Laboratory, Prince Abubakar Audu University, Anyigba, using analytical-grade reagents and standard laboratory procedures.

The plant extracts were screened for the presence of alkaloids, flavonoids, tannins, saponins, and phenolic compounds. Each phytochemical constituent was evaluated based on characteristic colour changes or precipitate formation following the addition of the appropriate reagents, and the reactions were interpreted according to the recommended procedures.

The qualitative results were recorded using a semi-quantitative scoring system to indicate the relative abundance of each phytochemical constituent. The symbols used for interpretation were: +++ = abundantly present, ++ = moderately present, + = slightly present, and − = absent. The results of the phytochemical screening were subsequently presented in tabular form to facilitate comparison among the investigated medicinal plant species.

Data Analysis

Data obtained from the ethnobotanical survey were entered into Microsoft Excel 2021, checked for completeness and consistency, and analyzed using descriptive statistics. The socio-demographic characteristics of the respondents and information relating to medicinal plant species, plant families, growth forms, plant parts used, methods of preparation, routes of administration, and sources of plant materials were summarized using frequencies, percentages, tables, and charts where appropriate. The ethnobotanical data were further analyzed using the Frequency of Citation (FC) and Use Value (UV) indices to determine the relative importance of each medicinal plant species.

Results

Diversity and Family Distribution of Anti-Ulcer Plants

A total of 28 plant species belonging to 21 families were documented as being used by traditional healers, herb sellers and elderly informants in Dekina Local Government Area (LGA) of Kogi State for the management of peptic ulcer (Table 1). This species richness is broadly comparable with related surveys in Nigeria, which have reported between 17 and 92 anti-ulcer plant species depending on the geographic scope and sampling intensity of the study (Abubakar et al., 2022; Oluranti et al., 2012; Akinwumi & Sonibare, 2019; Kayode et al., 2019).

Three families, Asteraceae, Apocynaceae and Rutaceae, were jointly dominant, each contributing 3 species (10.7% of the flora), followed by Meliaceae with 2 species (7.1%); the remaining 17 families were each represented by a single species (Figure 1). This pattern of family dominance is consistent with several Nigerian ethnobotanical surveys of anti-ulcer plants, in which Compositae/Asteraceae and Apocynaceae recur among the most frequently cited families (Akinwumi & Sonibare, 2019; Kayode et al., 2019), and mirrors the broader observation that Asteraceae and Apocynaceae are among the most prolific medicinal-plant families in Nigerian ethnopharmacopoeia generally (Rafiu et al., 2025). The prominence of Rutaceae (*Citrus* spp.) reflects the widespread household cultivation and easy accessibility of citrus fruit trees, which likely favours their frequent citation by informants regardless of pharmacological potency.

The lower species count recorded in the present study relative to the larger Southwestern surveys most likely reflects differences in sample size, number of informants and the more localized, single-LGA scope of the present investigation, rather than a genuine paucity of anti-ulcer flora in the Kogi/Middle-Belt region. Several species documented here including *Carica papaya, Musa paradisiaca, Zingiber officinale, Vernonia amygdalina, Azadirachta indica, Aloe barbadensis* and *Kigelia africana* recur as the most frequently cited anti-ulcer plants nationally, with *Carica papaya* and *Musa paradisiaca* reported as the single most cited species (use-mention values of ~40% each) in the Southwestern/North-Central survey of Kayode et al. (2019), and *Carica papaya* and *Vernonia amygdalina* ranking among the three most-cited medicinal plants in a nationwide bibliometric review of Nigerian ethnobotany (Rafiu et al., 2025). The consistent cross-regional citation of these species lends strong ethnopharmacological credibility to their traditional use and identifies them as priority candidates for bioassay-guided isolation of active anti-ulcer principles.

Conclusion

Table 1. Medicinal plant species and their families as used for the treatment of peptic ulcer in Dekina LGA, Kogi State

S/N	Plant species	Family
1	*Ageratum conyzoides*	Asteraceae
2	*Aloe barbadensis*	Liliaceae
3	*Alstonia boonei*	Apocynaceae
4	*Ananas comosus*	Bromeliaceae
5	*Aspilia africana*	Compositaceae
6	*Azadirachta indica*	Meliaceae
7	*Bryophyllum pinnatum*	Crassulaceae
8	*Calotropis procera*	Apocynaceae
9	*Carica papaya*	Caricaceae

10	*Ceiba pentandra*	Malvaceae
11	*Chromolaena odorata*	Asteraceae
12	*Citrus aurantifolia*	Rutaceae
13	*Citrus limon*	Rutaceae
14	*Citrus sinensis*	Rutaceae
15	*Cocos nucifera*	Arecaceae
16	*Ficus exasperate*	Moraceae
17	*Khaya ivorensis*	Meliaceae
18	*Kigelia africana*	Bignoniaceae
19	*Mangifera indica*	Anacardiaceae
20	*Musa paradisiaca*	Musaceae
21	*Paullinia pinnata*	Sapindaceae
22	*Rauvolfia vomitoria*	Apocynaceae
23	*Securidaca longipedunculata*	Polygalaceae
24	*Talinum triangulare*	Portulacaceae
25	*Terminalia superba*	Combretaceae
26	*Uvaria chamae*	Annonaceae
27	*Vernonia amygdalina*	Asteraceae
28	*Zingiber officinale*	Zingiberaceae

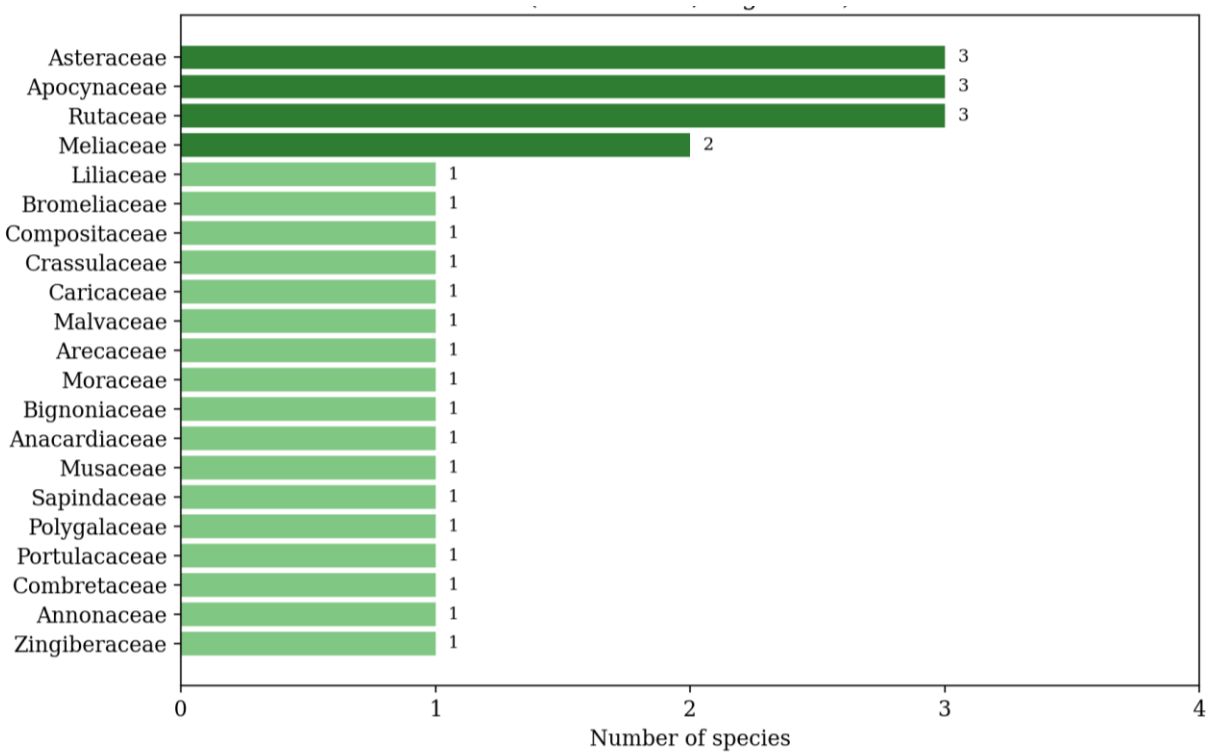


Figure 1. Distribution of anti-ulcer plant species by family (Dekina LGA, Kogi State)

Plant Parts Used and Growth Habit

Leaves were by far the most frequently exploited plant part, cited in 15 of the 28 species (53.6%), followed by roots (8 citations), stem/bark (6 citations), fruits (5 citations), whole plant (2 citations) and seeds (1 citation) (Figure 2). The predominance of leaves agrees closely with the findings of Akinwumi & Sonibare (2019) and Kayode et al. (2019), both of whom reported leaves as the most commonly harvested organ in Nigerian anti-ulcer ethnomedicine. From a conservation standpoint, this is favourable, since leaf harvesting is generally non-destructive and allows the parent plant to regenerate, unlike the harvesting of roots or bark, which was nonetheless still practiced for a sizeable minority of species (e.g. *Ficus exasperata*, *Uvaria chamae*, *Terminalia superba*).

With respect to growth habit, trees accounted for 13 of the 28 species (46.4%), followed by shrubs and herbs (5 species each, 17.9%), while sucker, liana and rhizome forms were each represented by a single species (Figure 3). The dominance of trees as a life-form source of anti-ulcer remedies has also been reported in comparable surveys (Akinwumi & Sonibare,

2019) and is generally attributed to the year-round availability and perennial nature of woody species in savanna and derived-savanna vegetation zones typical of Kogi State.

Table 2. Plant part(s), growth habit and mode of preparation of medicinal plants used for ulcer treatment in Dekina LGA

S/N	Plant species	Part(s) used	Habit	Mode of preparation
1	*Ageratum conyzoides*	Leaves	Herb	Decoction
2	*Aloe barbadensis*	Leaves	Fleshy herb	Decoction
3	*Alstonia boonei*	Whole plant	Tree	Decoction
4	*Ananas comosus*	Fruits	Herb	Decoction
5	*Aspilia africana*	Leaves	Herb	Infusion, Decoction
6	*Azadirachta indica*	Leaves	Tree	Decoction
7	*Bryophyllum pinnatum*	Leaves	Flesh herb	Decoction
8	*Calotropis procera*	Leaves	Shrub	Maceration
9	*Carica papaya*	Seeds, fruits	Tree	Decoction
10	*Ceiba pentandra*	Leaves	Tree	Decoction, Infusion, Maceration
11	*Chromolaena odorata*	Leaves	Herb	Decoction
12	*Citrus aurantifolia*	Leaves	Tree	Decoction
13	*Citrus limon*	Leaves, root	Tree	Decoction
14	*Citrus sinensis*	Leaves, root	Tree	Decoction
15	*Cocos nucifera*	Fruit	Tree	Chewing
16	*Ficus exasperate*	Root	Tree	Decoction
17	*Khaya ivorensis*	Stem, bark	Tree	Decoction, Tincture
18	*Kigelia africana*	Root, stem, bark, fruit	Tree	Decoction, Tincture
19	*Mangifera indica*	Leaves	Tree	Decoction
20	*Musa paradisiaca*	Fruits	Sucker	Decoction
21	*Paullinia pinnata*	Whole plant	Liana	Infusion
22	*Rauvolfia vomitoria*	Leaves, roots	Shrub	Maceration
23	*Securidaca longipedunculata*	Roots	Shrub	Infusion
24	*Talinum triangulare*	Leaves	Herb	Decoction
25	*Terminalia superba*	Stem, bark	Tree	Decoction, Maceration
26	*Uvaria chamae*	Roots	Shrub	Tincture
27	*Vernonia amygdalina*	Roots	Shrub	Decoction
28	*Zingiber officinale*	Leaves	Rhizome	Decoction

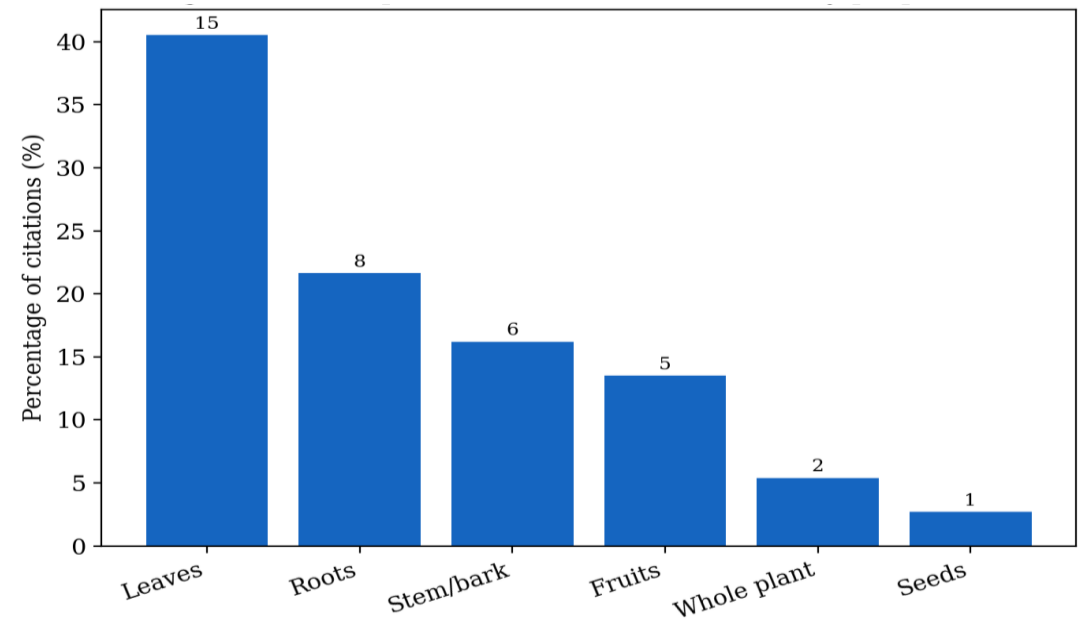


Figure 2. Plant parts used in the preparation of anti-ulcer remedies

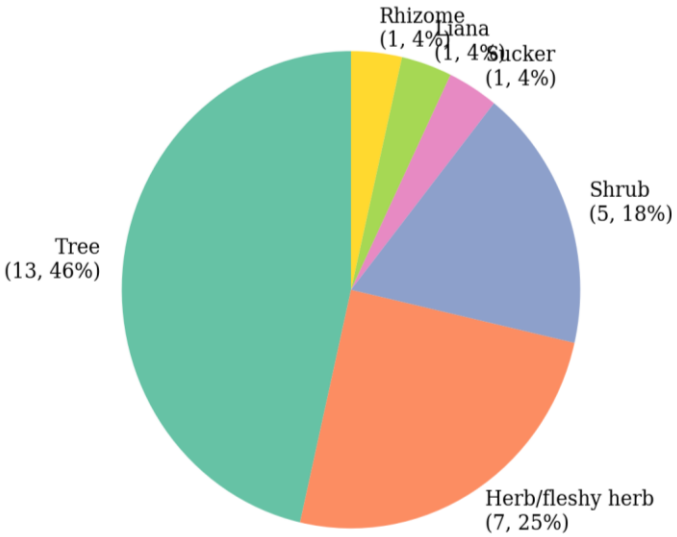


Figure 3. Growth -habit distribution of the anti-ulcer plants (n=28)

Mode of Herbal Preparation

Decoction (boiling plant material in water) was the overwhelmingly preferred method of preparation, accounting for 22 of the 34 preparation citations (64.7%), followed by infusion and maceration (4 citations each, 11.8%), tincture (3 citations, 8.8%) and chewing (1 citation, 2.9%) (Figure 4). This finding is consistent with virtually every ethnobotanical survey of anti-ulcer plants conducted in Nigeria to date, in which decoction is consistently reported as the dominant mode of administration (Oluranti et al., 2012; Akinwumi & Sonibare, 2019; Kayode et al., 2019; Abubakar et al., 2022).

The overwhelming reliance on decoction, and the corresponding predominance of leaves as the plant part of choice, mirrors the pattern reported in essentially every comparable Nigerian survey (Oluranti et al., 2012; Akinwumi & Sonibare, 2019; Kayode et al., 2019), and is pharmacologically sensible: aqueous heat extraction efficiently solubilizes the polar phenolic and flavonoid glycosides that dominate the phytochemical profile reported here, while sparing the plant of destructive whole-organ or root/bark harvesting for the majority of species. Nonetheless, the minority use of roots, stem bark and whole plants for species such as *Ficus exasperata*, *Securidaca longipedunculata*, *Terminalia superba* and *Kigelia africana* raises legitimate conservation concerns, echoing warnings raised elsewhere in the Nigerian literature about unsustainable wild-harvesting of medicinal plant populations (Akinwumi & Sonibare, 2019).

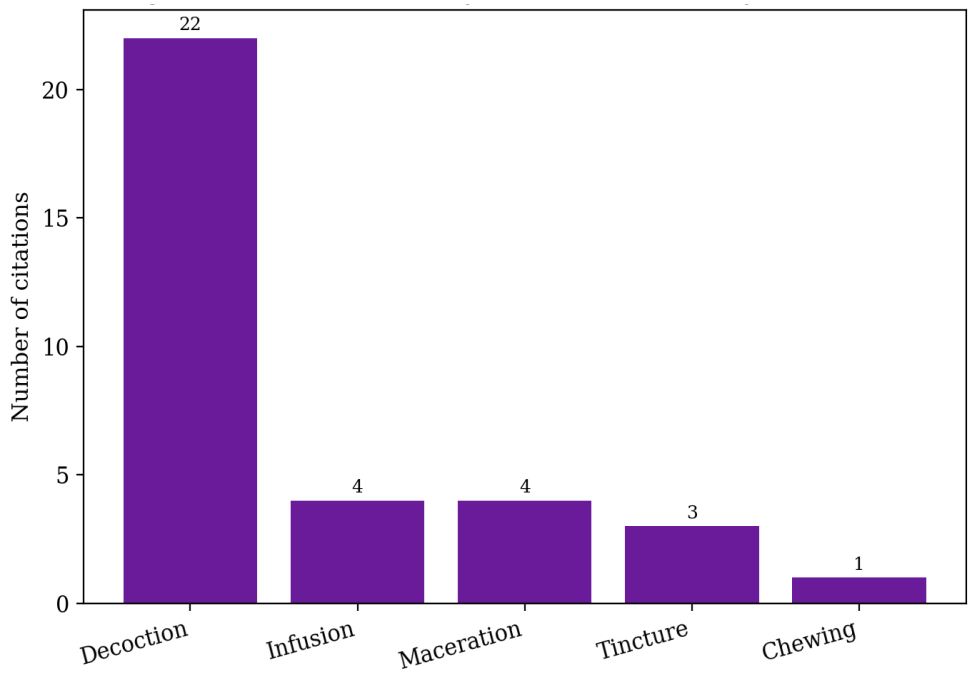


Figure 4. Modes of remedy preparation cited by respondents

Phytochemical Screening

Qualitative phytochemical screening was carried out on 27 of the 28 species (data for *Ananas comosus* were not available in the screening record and are reported as "ND" in Table 3). The results (Table 3, Figure 5) show that tannins, flavonoids and phenols were detected in all 27 plants screened (100%), making them the most ubiquitous phytoconstituents in the flora. Alkaloids were present in 24 plants (88.9%) and absent only in *Citrus sinensis*, *Cocos nucifera* and *Talinum triangulare*. Saponins were the least consistently detected class, present in 21 plants (77.8%) and absent in six species, including *Khaya ivorensis*, *Mangifera indica* and *Securidaca longipedunculata*.

When scored on a semi-quantitative intensity scale (absent = 0, + = 1, ++ = 2, +++ = 3), flavonoids recorded the highest mean intensity (2.07), followed closely by tannins and phenols (2.00 each), then alkaloids (1.70), with saponins showing both the lowest prevalence and the lowest mean intensity (1.22). This ranking is significant because flavonoids, tannins and phenolic compounds are the classes most consistently and mechanistically linked to gastroprotection in the pharmacological literature. The universal presence of tannins, flavonoids and phenolic compounds across the screened plants provides a coherent phytochemical rationale for their traditional anti-ulcer application. Tannins exert gastroprotection primarily through their astringent, protein-precipitating action: they form a tannin–protein complex over the ulcerated mucosa that acts as a physical barrier against further chemical and mechanical injury, while also exhibiting antioxidant, tissue-repair-promoting and anti-*Helicobacter pylori* activity (De Jesus et al., 2012). Flavonoids, the phytochemical class recording the highest mean intensity in the present study, are among the best-characterized gastroprotective agents, acting through antisecretory, cytoprotective and antioxidant mechanisms that include scavenging of reactive oxygen species, enhancement of mucosal prostaglandin and mucus production, and stimulation of gastric blood flow (Mota et al., 2009). Phenolic compounds more broadly contribute strong antioxidant activity that reduces lipid peroxidation and free-radical-mediated mucosal damage, reinforcing the protective action of the co-occurring flavonoids and tannins (Prayoga et al., 2024).

The near-universal presence of alkaloids (88.9% of species) is similarly consistent with the wider anti-ulcer literature, in which alkaloids have been shown to modulate gastric acid secretion, exert cytoprotective effects, and, in specific cases such as the isoquinoline alkaloids of *Enantia chlorantha*, accelerate ulcer healing and increase gastric mucus production (Falcão et al., 2008). Saponins, although the least prevalent class in this study, have nonetheless been documented to inhibit ethanol- and indomethacin-induced gastric mucosal injury and to modulate gastric acid output (Prayoga et al., 2024), so their absence in roughly a fifth of the screened species does not necessarily diminish the overall anti-ulcer potential of those plants, given the redundancy provided by the other four phytochemical classes.

Collectively, the phytochemical profile recovered from Dekina LGA plants dominated by tannins, flavonoids and phenolics, with substantial alkaloid and moderate saponin content aligns closely with the multi-target mechanistic model of plant-derived gastroprotection described in recent pharmacological reviews, in which these compound classes act in concert to reduce oxidative stress, enhance prostaglandin synthesis, regulate nitric oxide signaling and suppress pro-inflammatory cytokines implicated in ulcerogenesis (Prayoga et al., 2024). This convergence between local ethnomedical practice and established pharmacological mechanism strengthens the scientific rationale for prioritizing species such as *Azadirachta indica*, *Bryophyllum pinnatum*, *Carica papaya* and *Chromolaena odorata* each of which combined high alkaloid, flavonoid and phenol scores in the present screening for further *in-vivo* and *in-vitro* anti-ulcer bioassay.

Table 3. Phytochemical screening of medicinal plants used for ulcer treatment in Dekina LGA

S/N	Plant species	Alkaloids	Saponins	Tannins	Flavonoids	Phenols
1	*Ageratum conyzoides*	+	++	+	++	+
2	*Aloe barbadensis*	+++	++	++	+++	++
3	*Alstonia boonei*	++	+	+	+	+
4	*Ananas comosus*	ND	ND	ND	ND	ND
5	*Aspilia africana*	+	++	++	++	+
6	*Azadirachta indica*	+++	++	++	+++	+++
7	*Bryophyllum pinnatum*	++	+++	++	+++	++
8	*Calotropis procera*	+	++	+++	++	+++
9	*Carica papaya*	+++	+	++	+++	+++
10	*Ceiba pentandra*	+	+	++	++	++
11	*Chromolaena odorata*	++	++	++	++	+++
12	*Citrus aurantifolia*	+++	+	++	++	+++
13	*Citrus limon*	+++	+	++	+	+
14	*Citrus sinensis*	-	+	+	+++	+++
15	*Cocos nucifera*	-	+	+	+++	++

16	*Ficus exasperata*	++	+	+++	++	++
17	*Khaya ivorensis*	+	-	+++	+	+++
18	*Kigelia africana*	+	++	+	++	+
19	*Mangifera indica*	++	-	+++	++	++
20	*Musa paradisiaca*	+	++	++	++	+
21	*Paullinia pinnata*	+	-	+++	++	++
22	*Rauvolfia vomitoria*	+++	++	++	++	++
23	*Securidaca longipedunculata*	++	-	+++	+	+
24	*Talinum triangulare*	-	-	++	+++	+
25	*Terminalia superba*	++	++	+	+	+++
26	*Uvaria chamae*	++	+	++	++	++
27	*Vernonia amygdalina*	+++	+	++	++	+++
28	*Zingiber officinale*	+	-	++	++	+

(+ = present, ++ = moderately present, +++ = highly present, − = absent, ND = not determined)

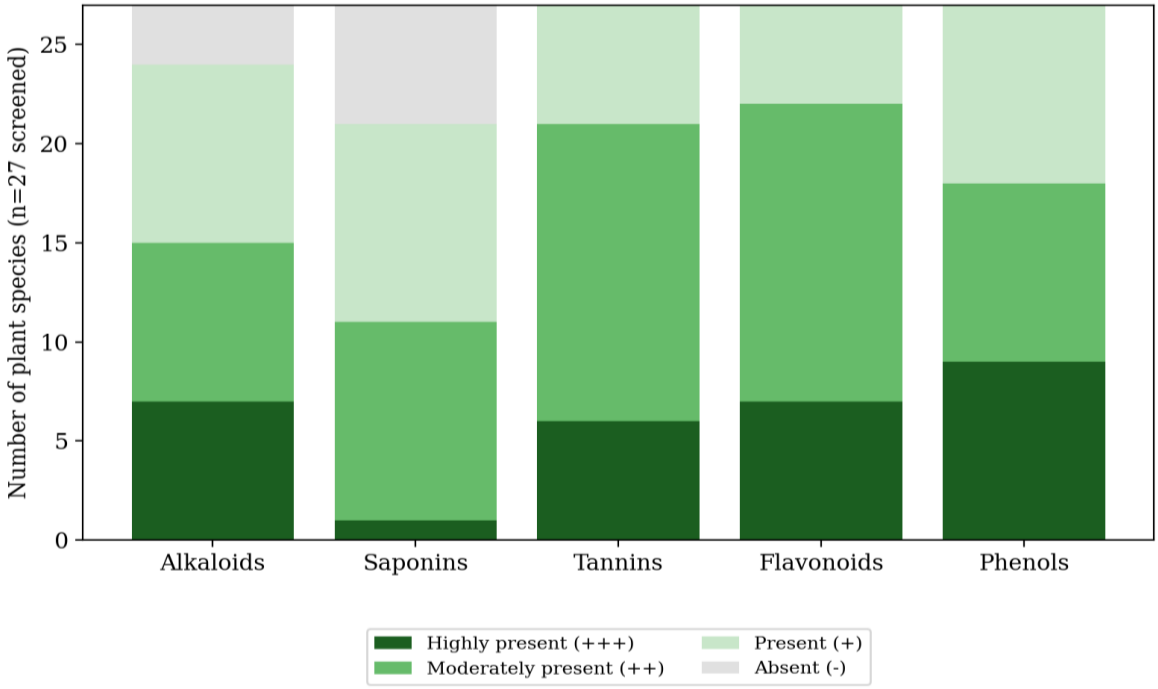


Figure 5. Phytochemical screening profile of the 27 plants tested

Conclusion

This study documented 28 plant species from 21 families used traditionally for the management of peptic ulcer disease in Dekina LGA, Kogi State, Nigeria. Asteraceae, Apocynaceae and Rutaceae were the dominant families; leaves were the most frequently harvested plant part; trees were the predominant growth habit; and decoction was the overwhelmingly preferred mode of preparation. Phytochemical screening revealed that tannins, flavonoids and phenolic compounds were universally present across the plants tested, with alkaloids widely present and saponins moderately represented. These findings are broadly consistent with comparable ethnobotanical surveys conducted elsewhere in Nigeria, and the recovered phytochemical profile provides a plausible pharmacological basis grounded in established antioxidant, cytoprotective and antisecretory mechanisms for the traditional anti-ulcer application of these plants. The study therefore validates, at a phytochemical level, the indigenous knowledge base of Dekina LGA and adds to the growing body of evidence supporting the rational exploration of Nigerian medicinal flora for anti-ulcer drug discovery.

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Author contributions

Concept and study design: Prof. Okpanachi Martin Abdubala.
Data collection: Dr. Momoh Theophilus Boniface, Zakari Adeiza David.
Manuscript drafting: Owemidu Idowu Olumorin, Dr. Momoh Theophilus Boniface.
Critical revision of manuscript: Prof. Okpanachi Martin Abdubala.
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The author declares no conflict of interest.

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The authors did not use any AI and related tools to write this manuscript.

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