

Research Paper

Survey of Indigenous Plants Used as Anthelmintic in Benue South Geopolitical Zone of Benue State, Nigeria

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Abstract— the traditional knowledge of medicinal plants is fast disappearing as a consequence of modernization. This survey aimed at documenting indigenous plants used for the treatment of anthelmintic infections in the Benue South geopolitical zone of Benue State, Nigeria. Plant samples were collected from the field from twenty different locations including Otobi, Allan, Otukpo town central, Adoka-icho, Ochobo, Agadagba, Onyangede, Atilo, Ugbokolo, Ichama, Eke, Okpoga, Igumale, Utonkon, Agila, Ulayi Odiapa, Orihi, Obarike-Ito, and Obeko. The survey was carried out with the use of well-thought-out questionnaires in order to gather records on the plants usage as anthelmintic from traditional healers, herbalists, elders, and indigenous people. Collected plant samples were appropriately identified following standard protocols. Eighteen (18) plant species were collected, of which *Carica papaya* and *Musa parasidiaca* had the highest occurrence of (9%) while *Albizia lebbbeck*, *Urtica dioca*, and *Ficus exasperata* had the least occurrence of (2.7%). Fabaceae and Rutaceae were the most represented plant families (11.1%). Among the different methods of preparation, Decoction (60%) had the highest occurrences whereas Squeezing (4%) had the least. On plant parts used, leaves (69.20 %) had the highest frequency of use while Fruits (7.7%) had the least. Based on findings from this study, Benue South geo-political zone has a great diversity of plants which are used for the management of Helminthic Infections. The study recommended that further research be carried out on the identified plant species to determine their efficacy and active biochemical compounds.

Keywords— Medicinal Plants, Anthelmintic, Infection, Helminths, Ethnobotany, Benue South

1. Introduction

Anthelmintics are antiparasitic medicines or plants which get rid of helminthic worms including gastrointestinal parasites from the human body. Some of the anthelmintics may sting or kill the helminths, but cause no harm to the host organism [1]. Infection with helminths is called helminthiasis. Therefore, anthelmintics are medicines given to persons with helminthiasis. These could also be used in the treatment of animals suffering from helminthiasis [2]. The use of medicinal plants and crops to fight parasitism and other human health challenges have been an age long practice among people globally. To this day, indigenous people of Nigeria still carry out this practice due to unavailability of standard healthcare services, especially in rural communities [3]. The World Health Organization (WHO) assessments show that approximately 78% of persons from unindustrialized nations depend on herbal medications gotten from plants to meet their basic healthcare requirements [4, 5].

Nigeria has many plants which are harvested and utilised by indigenous people for the treatment of various health challenges including helminthiasis, though many of these

herbal medications have not been authenticated by scientific research [6, 7]. There is the need for further research on herbs used for the treatment of helminthic infections in Africa, despite plethora of documentations on plants of medicinal importance. The most prevalent parasitic infection in the tropical and subtropical parts of the world is helminthiasis. [7, 8].

Though, significant consideration has not been given to helminthiasis since it is perceived to be asymptomatic in nature, and possibly of less medical importance than fungal, viral and bacterial diseases [9, 10]. However, these intestinal worms could cause obstruction of the ducts, sleeplessness, nausea, abdominal pains, and distress to the host individual [11].

Helminthiasis is considered a disease of the lowly, deprived and underprivileged people. It is believed to be a disease of persons who lack access to portable drinking water, quality healthcare services and poor educational status [12]. Furthermore, the increasing number of people with reported cases of misuse of antibiotics and chemotherapeutic drugs leading to drug resistance is now encouraging the use of

herbal medications in both developed plus developing climates. The sole purpose of this survey was to document plants used as medicines by the people of Benue South, Nigeria, to cure helminthic infections.

2. Related Work

Previously published works on ethnobotanical survey of plants with therapeutic properties gave quite several information on this subject matter across the globe. Abdallah *et al.* [13] in their study, “ethnobotanical knowledge of the most commonly used plants in the management of gastrointestinal ailments in Yobe State, Nigeria” reported that the family Fabaceae was the most dominant among the identified plants. Furthermore, [14] published a report on “the ethnobotanical study of plants used for treating intestinal worms in Ibadan, Nigeria” where they stated that 45 plants are used in the management of intestinal worms, the plants fit into 31 families with Apocynaceae and Euphorbiaceae being the most encountered families. In another study, “ethnobotanical survey of indigenous medicinal plants in Jos metropolis, Nigeria”, [15] reported that thirty-nine plant species, distributed in 33 families and 39 genera with Fabaceae having the highest record of representation then Eurphorbiaceae and Myrtaceae.

Another published report on “the inventory of medicinal plants used to treat gynaecological-obstetric-urino-genital disorders in South Nandi Sub County in Kenya” by [16] reported a total of 56 plants assembled into 30 families; the majority of the plant species fit into the families of Fabaceae, Apocynaceae, Euphorbiaceae, and Lamiaceae. Relatedly, [17] reported a study on “an ethnobotanical survey of local floras used for medicinal purposes among indigenous people in five areas in Lagos State, Nigeria”. The survey documented 183 plants from 61 families, 24 of these plants were Fabaceae. Additionally, [18] published a report on “medicinal plants use, conservation, and associated traditional knowledge in rural communities in Eastern Uganda” where they have identified 133 plant species, from 34 families and 125 genera.

3. Experimental Method

Study Area

The survey was carried out in Benue State, North Central, Nigeria. The state is located at longitude of 8°45'E and a latitude of 7°20'N. The study area has an annual rainfall of 100 to 200mm, lasting from April to October. The mean annual temperature ranges from 21 to 37°C. The state is home to a wide range of plants including herbs, shrubs, and trees. Benue is divided into three geopolitical zones these include the Benue North East, the Benue North West, and the Benue South. The Benue South Zone, where the Ethnobotanical survey was carried out, comprised 9 Local government areas, which include Otukpo, Ohimini, Okpokwu, Ado, Oju, Agatu, Apa, Ogbadibo, and Obi (Figure 1). The Zone is made up of ethnic groups such as Idoma, Igede, Akweya, Ufia, and Tiv [19].

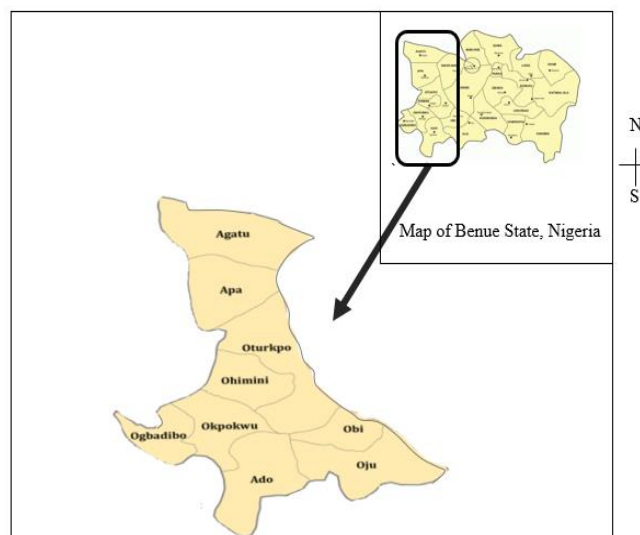


Figure 1: Map of Benue South Geopolitical Zone

Sample Collection

Plant samples were collected in twenty (20) different locations in five (5) Local Government Areas (LGAs) in Benue South geopolitical zone, the five local government areas include Otukpo, Ohimini, Okpokwu, Ado, and Obi Local Government areas. In each of the Local Government areas, four (4) Council Wards were surveyed. These wards include Otobi, Allan, Otukpo town central and Adoka-icho (Otukpo LGA); Ochobo, Agadagba, Onyangede and Atilo (Ohimini LGA); Ugbokolo, Ichama, Eke, and Okpoga (Okpokwu LGA); Igumale, Utonkon, Agila and Ulayi (Ado LGA); Odiapa, Orihi, Obarike-Ito, and Obeko (Obi LGA). The samples were collected from the local markets and in the wild. With the guidance of herbal medical practitioners, the plant species were identified, and the various plant parts were cut with a sharp knife and stored in a polythene bag. Initial identification of the plant samples by their common names was done, followed by confirmation by their scientific names at the Benue State University, Makurdi.

Ethnobotanical Survey (Interview with the Herbalists)

Information on plants used as anthelmintic were obtained through interviews with vendors of therapeutic plants, herbal practitioners, and folk healers using a semi-structured questionnaire. Information such as the local name/names, technique used in preparation, plant part used, and method of administration were documented. Information about the curative plants were gathered from the twenty district wards. Eighty-two (82) participants, including 54 males and 28 females, took part in the survey, many of whom were folk healers, herbalists, and aged persons.

Plant Identification

Plant samples collected from the field were conveyed to the Department of Biological Sciences, Benue State University, Makurdi for identification and validated by their scientific names using Flora of Tropical West Africa [20], Taxonomic Literature [21], Manual [22], Standard Taxonomic Keys [23], and Checklists [24].

Preparation of the Plant Specimen for the Herbarium

The plant specimens were prepared for preservation in the University herbarium using the procedure described by [25]. The freshly collected plants were carefully open out so as to extend their surface area on a wide sized paper. Paper containing the plant specimen was placed in a plant press to dry. The plant press was open after 48-72 hours. The finished specimen was fixed on herbarium sheets of standard size. The fixing was done using an adhesive. A label containing the collector's name, date and place of collection, vernacular/English name, plant family and authenticated botanical name was placed at the right hand corner below.

Use-Mention-Index (UMI)

Use-mention- index (UMI) which refers to the number of references for a particular plant (UM) for helminth cured, divided by the total number of participants interviewed for anthelmintic plants usage (nu). "UMI = UM/nu". Where "UM" represents the number of references (mentions) for a particular plant and "nu" is the entire number of participants in the survey.

Statistical Analysis

The demographic information of the respondents were analysed by descriptive statistics. Data on plant use were analysed by simple percentages. Quantitative indices such as Use Mention Index were determined.

4. Results and Discussion

Eighty-two (82) participants, 54 males and 28 females, took part in the survey, including folk healers, herbal practitioners, and elderly persons in the communities. The highest proportion of the participants were persons less than 50 years of age, while respondents of 51-60 years old and respondents older than 60 years old had lower percentages, as contained in Table 1.

Table 2 presented results of the survey of anthelmintic plants of the indigenous people of Benue South. Plant used in the treatment of helminthic infections are stated along with their botanical names, common names, family, plant parts used, method of preparation, and frequency of occurrence. The plant species with the most frequencies of citation and use of mention indices were *Carica papaya* and *Musa paradisiaca*, while *Albizia lebbek*, *Urtica dioica*, *Irvingia gabonensis*, and *Ficus exasperata* had the least frequencies of citation and use mention indices.

Table 3 contained the distribution of the plant families. Eighteen (18) plant species were distributed across sixteen (16) plant families of which Fabaceae and Rutaceae had the highest occurrence. Different plant parts, including leaves, stems, roots, and fruits, are used in the treatment of helminthic infections. Leaves are the plant part most used, while fruits are the least used plant part in the treatment of helminths (Figure 2).

Figure 3 presented several techniques of preparation of plants for the treatment of helminthic infection, including decoction,

infusion, topical, and squeezing. Decoction (60%) and infusion (24%) were the most mentioned means of preparation while topical (12%) and squeezing (4%) were the least recorded methods of preparation.

Table 1: Demographic Information of the Participants

Variables	Occurrence (n=82)	Percentage (%)
Sex		
Male	54	66
Female	28	34
Age		
Younger than 50	66	80
51-60	8	10
>60	8	10
Designation		
Folk healer	49	60
Herbalist	25	30
Rural Elder	8	10

Table 2: List of Plants used as Anthelmintic in Benue South-Nigeria

Botanical Name	Common Name	Family	Part used	Method of preparation	Frequency of citation (%) (n=188)	*UMI
<i>Jatropha curcas</i> L.	Barbados nut	Euphorbiaceae	Leaves	Decoction	10(5.3%)	0.13
<i>Ocimum gratissimum</i> L.	African basil	Lamiaceae	Leaves	Decoction, Infusion	11(5.9%)	0.13
<i>Parkia biglobosa</i> (Jacq.) R.Br. ex G. Don	Nere tree	Fabaceae	Leaves	Decoction	14 (7.5%)	0.17
<i>Albizia lebbek</i> (L.) Benth.	Lebbeck tree	Fabaceae	Leaves	Topical, decoction	5(2.7%)	0.06
<i>Vernonia amygdalinea</i> Delile	Bitter leaf	Asteraceae	Leaves	Decoction	13(6.9%)	0.16
<i>Carica papaya</i> L.	Pawpaw	Caricaceae	Leaves, stem	Decoction	17(9%)	0.21
<i>Musa paradisiaca</i> L.	Plantain	Musaceae	Leaves	Decoction	17(9%)	0.21
<i>Cymbopogon citratus</i> (DC.) Stapf	Lemon Grass	Poaceae	Leaves	Decoction	12(6.4%)	0.15
<i>Urtica dioica</i> L.	Common nettle	Urticaceae	Root, Leaves	Infusion, topical	5(2.7%)	0.06
<i>Azadirachta indica</i> A.Juss.	Neem	Meliaceae	Leaves	Decoction	15(8%)	0.18
<i>Nicotiana glauca</i> L.	Tobacco	Solanaceae	Leaves	Decoction	10(5.3%)	0.12
<i>Moringa oleifera</i> Lam.	Drumstick tree	Moringaceae	Leaves, fruit seeds.	Decoction, Infusion	10(5.3%)	0.12
<i>Irvingia gabonensis</i> (Aubry-Lecomte ex O'Rorke) Baill.	Wild Mango tree	Irvingiaceae	Leaves	Decoction	12(6.4%)	0.15
<i>Ficus exasperata</i> Vahl	Sandpaper tree	Moraceae	Leaves	Decoction	5(2.7%)	0.06
<i>Heliotropium indicum</i> L.	Indian heliotrope	Boraginaceae	Leaves, stem, root	Infusion, topical	6(3.2%)	0.07

<i>Spigelia anthelmia</i> L.	Pink root	Loganiaceae	Leaves, stem, root	Infusion	6 (3.2%)	0.07
<i>Citrus limon</i> (L.) Osbeck	Lemon	Rutaceae	Leaves, Fruit	Decoction, Infusion, squeezing	9 (4.8%)	0.11
<i>Citrus medica</i> L.	Citron	Rutaceae	Leaves	Decoction, Infusion	11(5.9%)	0.13

*UMI: Use Mention Index

Table 3: Distribution of Plant Families and their Percentage Occurrences

S/No	Family	Number of Plants Species	Occurrence (%)
1	Fabaceae	2	11.1
2	Rutaceae	2	11.1
3	Euphorbiaceae	1	5.6
4	Loganiaceae	1	5.6
5	Moringaceae	1	5.6
6	Boraginaceae	1	5.6
7	Irvingiaceae	1	5.6
8	Lamiaceae	1	5.6
9	Asteraceae	1	5.6
10	Caricaceae	1	5.6
11	Poaceae	1	5.6
12	Musaceae	1	5.6
13	Urticaceae	1	5.6
14	Meliaceae	1	5.6
15	Solanaceae	1	5.6
16	Moraceae	1	5.6

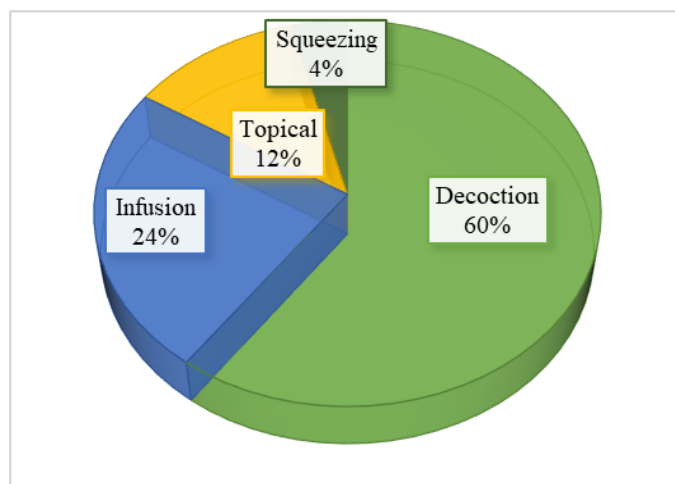


Figure 3: Preparation Methods for Treatment of Intestinal Worm Infection

Discussion

The present study carried out showed the diversity of plants used as anthelmintic, it indicates that in the Benue South Geo-Political Zone, the treatment of helminths using plants is widely accepted and has a long history. This conforms to the findings of [26], who reported that the majority of the people in this zone use plant remedies at one time or another. The accessible rich flora in the region may have contributed to this.

The demographic information has shown that a high number of respondents were younger than the age of fifty (50) years old, which reveals that the knowledge of herbal remedies is being passed onto the younger generation and is not yet endangered as previously posited. This agrees with the findings of [7], who reported that the use of herbal remedy is quite noticeable in Africa. This is may be due to ease of availability, tied to the irregular spread of trained health practitioners in rural communities in relation to the urban communities. Furthermore, the closeness to nature, and sound knowledge of the use of herbs as passed from parents to offspring may intensify the use of herbal remedies.

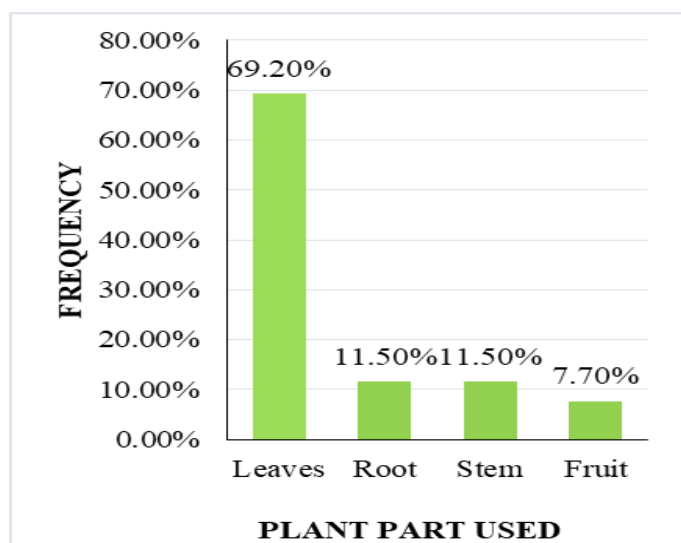


Figure 2: Occurrence of Plant Parts for Treatment of Helminthic Infections

This research recorded a relatively high percentage number of men that were knowledgeable in plant anthelmintic when compared to the few numbers of women that possessed the knowledge of anthelmintic plants. This agrees with the findings of [27], who reported a low number of women in Traditional medicine practice. This may be because women are less interested in being herbal practitioners and folk healers, or it may be because women are often perceived to have a low status in society; male parents would rather pass on the knowledge as a form of inheritance to their male children.

Findings from the study revealed that among the different methods of preparation of herbal medicine, decoction, and Infusion were the most preferred methods of preparation. This is in line with the findings of [14, 16], who reported that most traditional healers and practitioners choose the oral methods of administration such as decoction and infusion because it

offers a more active relief and cures in the treatment of diseases.

Among the different plant parts used in the treatment of helminthic infections, the results from the survey indicated that the most used plant part was the leaves, while other parts such as root, stem, and fruit were less used. According to [15, 18, 28], ethnobotanical studies around Africa and the World show that the used plant part was the leaves, and this corroborated the findings of the present survey.

Several plant families were represented in the survey data collected; among the plant families, Fabaceae and Rutaceae had the highest occurrences and used mention indices. This result agrees with the findings of [13, 16, 17, 18, 20], who revealed that plants of the family Fabaceae were one of the most dominant plant families in the region.

5. Conclusion and Future Scope

The ethnobotanical survey revealed that the Benue South Geo-Political Zone has a great biodiversity of plant species for treatment of helminthic infection. Many plant species were documented in this survey; this indicates the rich flora in the Zone, which serves as remedy for helminthic infections. The identified therapeutic plants in this survey were preserved; this is an attempt to conserve the indigenous uses of the plants. The preserved plant species could provide baseline information for further researches in the field of ethnobotany and other related disciplines.

Further research is needed on the identified plant species used as anthelmintic to determine their efficacy and active biochemical compounds.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

Funding Source

There is no funding source.

Author's Contributions

Apuu V.K. carried out conceptualization of the survey, Methodology, Sample collection, statistical analysis and pencil down the first draft of the manuscript. Igbo-Osagie, U. P performed plant species identification, preparation of herbarium specimens and reviewed the first draft of the manuscript. All the authors work together, read and confirm the final version of the manuscript.

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