

Ethnobotanical Study of Plants Used in the Management of Benign Prostate Hyperplasia in Ilorin, Nigeria

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract

Background: Benign Prostate Hyperplasia (BPH) is a prevalent illness in older men. It is a condition where the prostate becomes enlarged and blocks the ease of urine passage out of the bladder. Around 50% of the male population develops symptoms of BPH around 51- 60 years of age. Current therapeutic management options come with undesirable side effects like weight gain, dizziness, and impotence, hence, the need to source for safer alternatives initiated by the acquisition, recording, and preservation of traditional knowledge of medicinal plants.

Objective: This study aims to preserve indigenous knowledge by documenting medicinal herbs in use as therapy for BPH.

Materials & method: Ethnobotanical survey was carried out in the study areas through interviews using a semi-structured questionnaire. Respondents included elderly members of the communities, herbalists, and practitioners of traditional medicine. Quantitative ethnobotany index (Use value index) and descriptive statistics were used to analyse data.

Results: 50 respondents were interviewed, 64% were Herb sellers, 22% TMPs, Others 14%. 37 plants belonging to 24 plant families were mentioned in the survey. Methods of preparation of recipes mentioned includes: maceration (37%), decoctions (52%), juice (7%), infusions and paste/powder (4%). Method of administration were majorly oral route. The plant family Fabaceae (19%) had the highest representation. This was followed by the families Annonaceae (8%), Euphorbiaceae (6%), Curcubitaceae, Menispermaceae, Combretaceae, Apocynaceae and Rutaceae with 5% each. Other plant families represented 42% of the total number of plants mentioned.

Conclusion: The study areas are endowed with abundant flora which serves as a repository for researchers in the quest to develop less toxic drugs with little or no side-effect for the management of BPH

Keywords: Benign Prostate Hyperplasia, Ilorin, medicinal plant, ethnobotanical study

INTRODUCTION

Up to 80% of people, particularly those in the underdeveloped and developing World, utilize medicinal plants as their main and first source of healthcare (Oguntibeju, 2019). The usage of medicinal plants has grown in popularity over the years due to the notion that they are a safer (with fewer or no side effects) and less expensive alternative to conventional treatment (Ullah *et al.*, 2021). Ajibade *et al.*, (2005) conducted a study on the ethnomedicine and primary healthcare in Ilorin, Kwara State, Nigeria, and reported that the health-seeking behaviour of people in Kwara state is influenced by the urban areas' socioeconomic situation and cultural values of those in the rural areas. Their behavioural pattern is defined by a low level of adherence to conventional medical care, as well as a search for alternatives in traditional and herbal medicine. BPH (Benign Prostate Hyperplasia) is the formation of a benign tumour in the prostate gland of an adult male, usually between the ages of 40 and 45 (Sundaram *et al.*, 2017). This enlargement is caused by factors that can be hormonal, age, and disease conditions like obesity and hereditary factor (Salvador *et al.*, 2013). As a result of the hypertrophy of the prostate gland, urine passage out of the bladder is obstructed, resulting in BPH-related Lower Urinary Tract Symptoms (LUTS) (Kong *et al.*, 2019). Symptoms of BPH include: nocturia, urinary intermittency, difficulty starting and maintaining a steady urine stream, urinary urgency etc. (Vasanwala *et al.*, 2017).

According to An *et al.*, (2020), the prevalence of LUTS in the general population rises as people get older. Sundaram *et al.*, (2017) reported in his work that only about 8% of the male population develops pathological symptoms of BPH around the age of 40, with 50% of the male population getting pathological symptoms of BPH between the ages of 51 and 60. According to Yap *et al.*, (2021), men in their 70s and 80s are also more likely to seek medical attention for

BPH than men in their 40s and 49s. BPH has been managed with different orthodox drugs over the years, however, they come with unpleasant side-effects like decreased libido, impotence, nausea, headache, and dizziness, among others, (Ückert *et al.*, 2020) hence the need to source for a safer treatment option. Incidentally, more people are looking towards medicinal plants owing to their wide acceptance/use and reported therapeutic activities. Madersbacher *et al.*, (2007), in their work, emphasized the relevance and benefits of medicinal plants in BPH therapy.

When BPH progresses to an advanced stage, surgical procedures may be required, which causes some level of apprehension for many. Furthermore, the majority of Nigeria's basic healthcare centres are dilapidated and inoperable (Adekannbi, 2018). Other considerations, such as stigmatization, ego, cultural, and religious orientation influence their decision to seek traditional medical care. As a result, it became critical to document as a starting point, and provide a repository for researchers to study the safety profiles of these medicinal plants, as there is no literature documentation of plants utilized locally in the management/treatment of BPH in Nigeria's Northcentral region.

The information on the use of the plant was passed down verbally from one generation to the next without any published records (Oliver-Bever, 1960), as a result, significant information about medicinal plants and their benefits is gradually lost. The importance of ethnobotanical research in appropriate recording that leads to purposeful scientific validation of medicinal plants with well-known therapeutic benefits is thus crucial. This research was done in Ilorin, Kwara State, Nigeria, to preserve indigenous knowledge by documenting, analysing, and presenting a list of plant recipes that can serve as a template for the production of safe medications with low adverse effects in the management/treatment of BPH from flora.

METHODOLOGY

Study area

The study areas are Ilorin East and Ilorin West Local Government Areas (LGA) of Kwara State, Nigeria as seen in Figure 1. Ilorin East LGA is located at a longitude of 4°5'E and latitude of 8°35'N. It is bounded by Moro LGA to the North, Ifelodun and Ilorin South LGAs to the south, and Ilorin West. As per the 2006 census, it had 204,310 residents and a 486 sq. km size. The local government has its headquarters in Oke-Oyi (Alada *et al.*, 2018). Ilorin West LGA is located at

80.3°N and longitude 40.35°N. The Local Government shares boundaries with Ilorin East, Asa, and Ilorin South LGAs. At the time of the 2006 Census, it had a population of 364,666 as well as a 105 sq. km area. It has an annual rainfall of 1.30 mm, a wet season that starts from March – October, and a dry season spanning from November – February with savannah vegetation. Ilorin West LGA has its headquarters in Wara-Osin/ Egbajila. The major tribes in these two LGAs are the Yoruba people of Nigeria (Alada *et al.*, 2018). The language spoken by the people of the two LGAs is the Yoruba language.

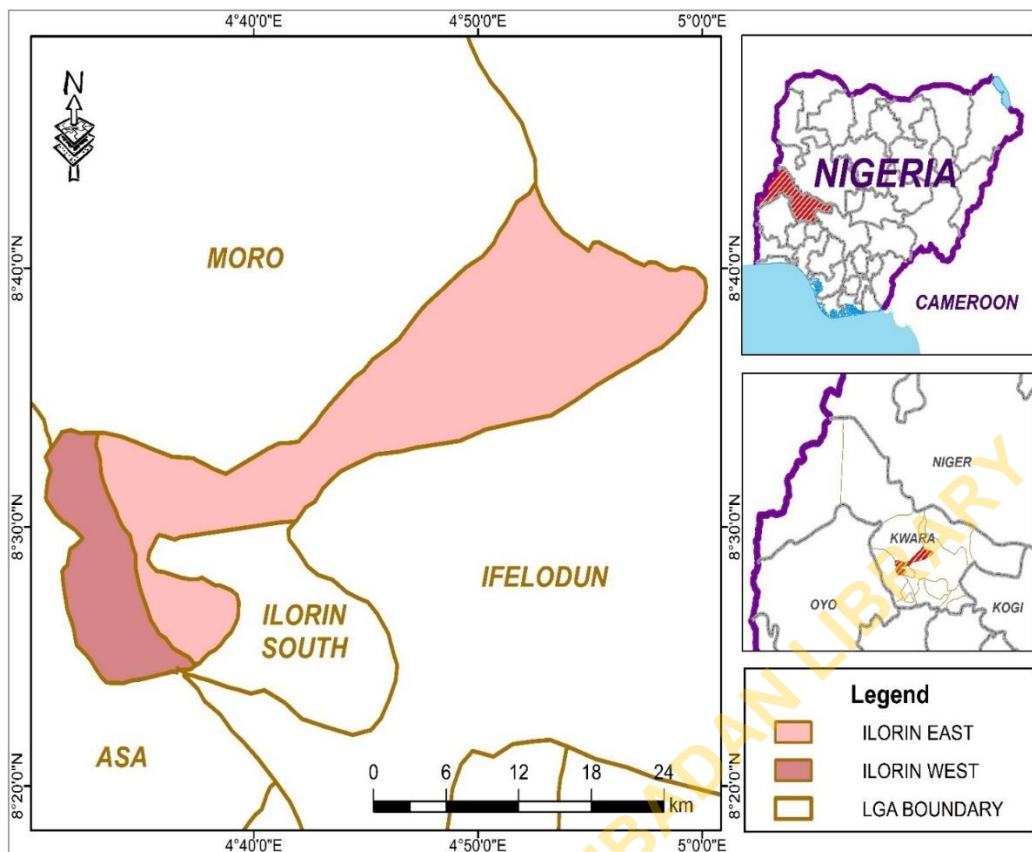


Figure 1: Map showing the ethnobotanical survey areas; Ilorin East and Ilorin West Local Government Area of Kwara State, Nigeria

Ethnobotanical survey data collection

The survey was done between July – August 2017 in two LGAs of Ilorin, Kwara State, Nigeria; Ilorin East (Rural settlement) and Ilorin West (Urban settlement) putting into consideration the report of Ajibade *et al.*, (2005) to obtain information about herbal remedies for BPH treatment and management. The information gathered was based on a semi-structured questionnaire as described by Klotóé *et al.*, (2013), which was followed by a brief interview according to the method of Huntington (2000). Basic information about plants was collected; local/vernacular name, part used, method of preparation, the frequently/most used amongst the plant species in the recipe mentioned, methods of administration, and possible side effects. Fifty respondents were selected among Herb sellers, Traditional Medicine Practitioners (TMPs), and the elderly in the community who gave consent to participate after the scope of the study was made clear to them in their indigenous language (Yoruba) before administering the questionnaire and beginning the interview. The respondents who agreed to take part in the study after filling out the consent form were

interviewed in the local language (Yoruba) for clarity and a better understanding of the information needed. The questions were divided into 2 parts: one part focused on information about medicinal plants used in the management/treatment of BPH, whereas the other covered demographic data such as sex, age, practice duration, and educational level. The voucher specimen collected during the survey were compared with the type specimen available at the University of Ibadan, Department of Pharmacognosy Herbarium (DPHUI) for proper identification.

Data analysis

The obtained data were input into an Excel 2016 spreadsheet. The data were analysed using quantitative descriptive statistics. Ethnobotanical index; Use Value Index (UVI) was calculated to measure the validity of each plant species mentioned and their extent of utilization. The UVI is defined as the ratio of the number of times (**n**) a particular plant species was mentioned to the total number (**N**) of respondents that took part in the survey, $UVI = n/N$ (Tardío and Pardo-de-Santayana, 2008).

RESULTS

Ethnobotanical Data

The ethnobotanical data gathered from the study afforded us a list of the plants used, the plant family, the plant parts used, habits, the mode of preparation of recipes, administration/dosage of the recipes, and the UVI of the plant species mentioned in the survey.

Thirty-seven (37) plants belonging to twenty-four (24) families were mentioned in the survey. The mentioned plant species with respective local names, UVI, scientific names, families, and habits are shown in Table 1

Table 1: Plants mentioned for the Management of Benign Prostate Hyperplasia in Ilorin West and Ilorin East Local Government Areas of Kwara State, Nigeria

S/N	Scientific Name	Local Name (Y)	Family	Habit	UVI
1.	<i>Amaranthus indica</i> Mill.	Tete adayeba	Amaranthaceae	Herb	0.02
2.	<i>Chenopodium ambrosioides</i> (L.) Mosyakin & Cle.	Arunpale	Amaranthaceae	Herb	0.02
3.	<i>Crinum jagus</i> (J. Thomps.) Dandy	Ogede odo	Amaryllidaceae	Herb	0.02
4.	<i>Allium ascalonicum</i> L.	Alubosa elewe	Amaryllidaceae	Bulb	0.08
5.	<i>Lannea welwitschii</i> (Hiern) Engl.	Opon	Anacardiaceae	Tree	0.02
6.	<i>Uvaria chamae</i> P. Beauv	Eruju	Annonaceae	Shrub	0.04
7.	<i>Uvaria afzeli</i> G.F.Scott- Elliot	Gbogbonise	Annonaceae	Shrub	0.10
8.	<i>Xylopia aethiopica</i> (Dunal) A. Rich.	Eru Alamo	Annonaceae	Tree	0.06
9.	<i>Calotropis procera</i> (Aiton) Dryand.	Bomu-bomu	Apocynaceae	Shrub	0.02
10.	<i>Rauvolfia vomitoria</i> Afzel.	Asofeyeje	Apocynaceae	Shrub	0.02
11.	<i>Parquetina nigrescens</i> (Afzel.) Bullock	Ogbo	Apocynaceae	Shrub	0.06
12.	<i>Parinari</i> spp.	Abeere	Chrysobalanaceae	Tree	0.12
13.	<i>Terminalia macroptera</i> Guill. & Perr.	Idi	Combretaceae	Tree	0.02
14.	<i>Combretum ghasalense</i> Engl. & Diels	Opa aro	Combretaceae	Tree	0.02
15.	<i>Anogeissus leiocarpus</i> (DC.) Guill. & Perr.	Ayin	Combretaceae	Tree	0.02
16.	<i>Ageratum conyzoides</i> (L.) L.	Imi esu	Compositae	Herb	0.02
17.	<i>Citrullus mucosopermus</i> (Fursa) Fursa	Bara	Cucurbitaceae	Climber	0.40
18.	<i>Adenopus breviflorus</i> Benth.	Tagiri	Cucurbitaceae	Shrub	0.02
19.	<i>Croton lobatus</i> L.	Eru opiye	Euphorbiaceae	Herb	0.02
20.	<i>Jatropha curcas</i> L.	Botuje	Euphorbiaceae	Shrub	0.06
21.	<i>Cassia fistula</i> L.	Aidantoro	Fabaceae	Tree	0.06
22.	<i>Senna obtusifolia</i> (L.) H.S Irwin & Barneby	Epaakun	Fabaceae	Shrub	0.40
23.	<i>Tamarindus indica</i> L.	Ajagbon	Fabaceae	Tree	0.24
24.	<i>Senna podocarpa</i> (Guill. & Perr.) Lock	Ajarere	Fabaceae	Shrub	0.36
25.	<i>Tetrapleura tetraptera</i> (Schumm. & Thonn) Taub.	Aidan	Fabaceae	Tree	0.10
26.	<i>Anthocleista djalonensis</i> A. Chev.	Sapo	Gentianaceae	Tree	0.06
27.	<i>Chasmanthera dependens</i> Hochst.	Atoo	Menispermaceae	Shrub	0.06
28.	<i>Sphenocentrum jollyanum</i> Pierre	Akerejupon	Menispermaceae	Shrub	0.02
29.	<i>Treulia africana</i> Decne. ex Trécul	Ifon	Moraceae	Tree	0.04
30.	<i>Ceratotheca sesamoides</i> Endl.	Eku ile	Pedaliaceae	Herb	0.02
31.	<i>Phyllanthus reticulatus</i> Poir.	Iranje	Phyllanthaceae	Shrub	0.02
32.	<i>Piper guineense</i> Schumach.	Iyere	Piperaceae	Herb	0.04
33.	<i>Securidaca longipedunculata</i> Fresen.	Ipeta	Polygalaceae	Shrub	0.22
34.	<i>Harrisonia abyssinica</i> Oliv.	Arujeran	Rutaceae	Shrub	0.02
35.	<i>Citrus medica</i> var. <i>acida</i> Brandis	Osan wewe	Rutaceae	Shrub	0.10
36.	<i>Chrysophyllum albidum</i> G. don	Agbalumo	Sapotaceae	Tree	0.44
37.	<i>Aframomum melegueta</i> K. Schum.	Ataare	Zingiberaceae	Herb	0.02

The plant family with the highest mention is the family Fabaceae with 19% followed by the families Annonaceae (8%), Euphorbiaceae (6%), Cucurbitaceae, Menispermaceae, Combretaceae, Apocynaceae, and Rutaceae with 5% each. Others

represent 42% of mentions as shown in **Figure 2.0**. The medicinal plant *Chrysophyllum albidum* had the highest UVI (0.44), which was followed by *Citrullus mucospermus* and *Senna obtusifolia* (0.40). *Senna podocarpa* had 0.36 and *Tamarindus indica* with 0.24 amongst others

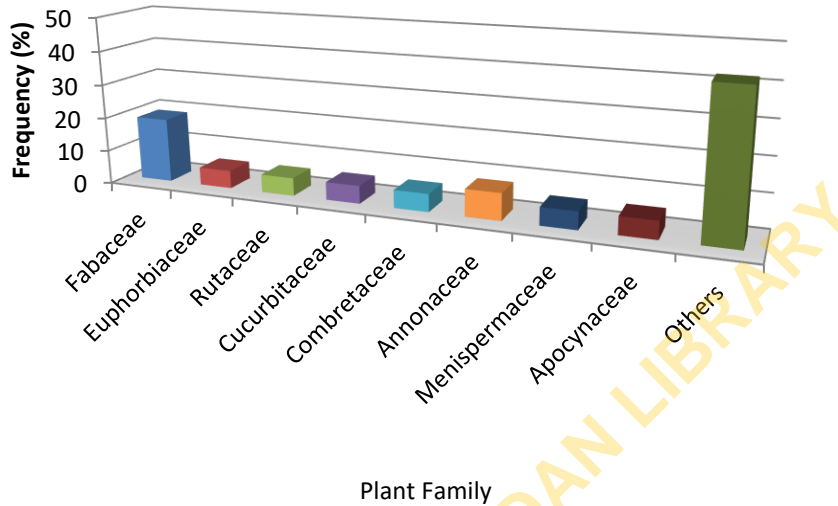
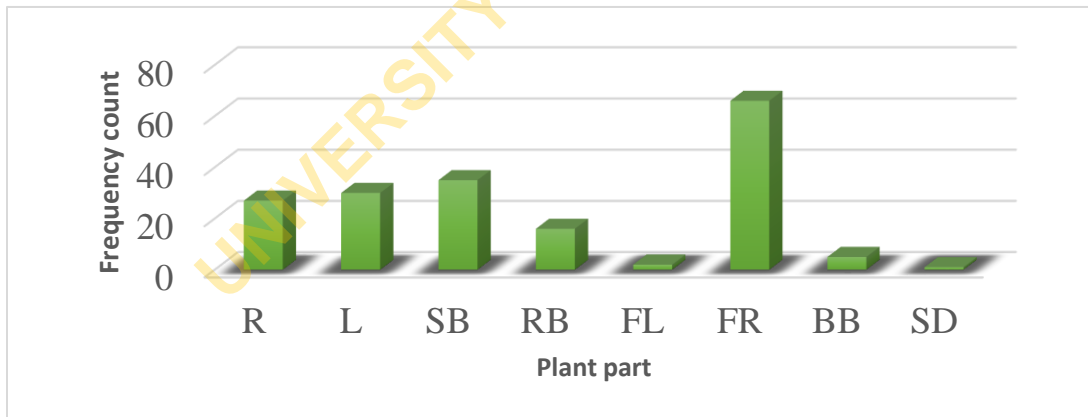


Figure 2: Showing plant families of various plants mentioned in the ethnobotanical survey (%)

The commonly used plant part is the fruit. Others in order of their utilization are the stem bark, leaves, root, root bark, bulb, flower, and seed as shown in Figure 3.

The habits of most of the plants used in the preparation of the recipes mentioned are shrubs followed by trees, herbs, and bulbs as in Figure 4.



Key: R- Root L- Leaves SB – Stem bark RB- Root bark FL- FlowerFR- Fruit BB- Bulb SD- Seed

Figure 3: Showing the frequency of the different plant parts used in recipe as mentioned in the ethnobotanical survey

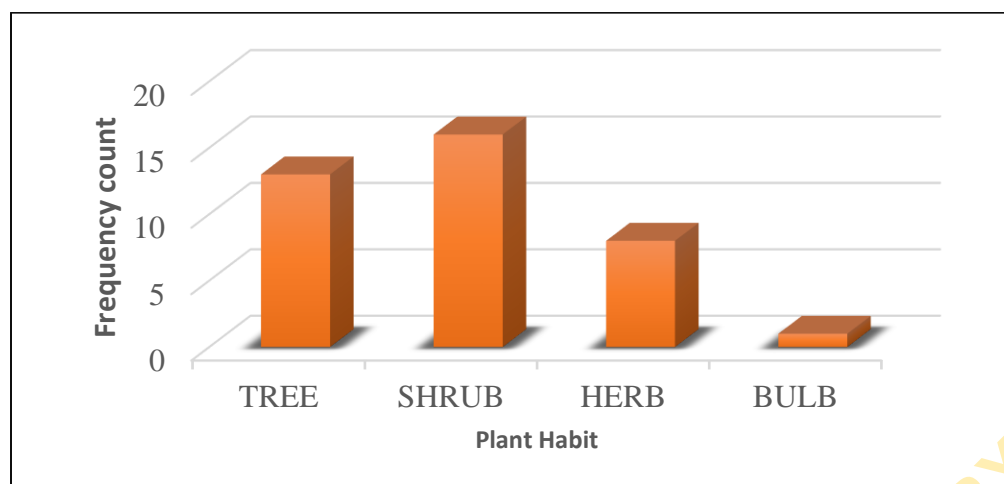


Figure 4: Showing frequency of the habit (Plant life form) of the different plants mentioned in the ethnobotanical survey

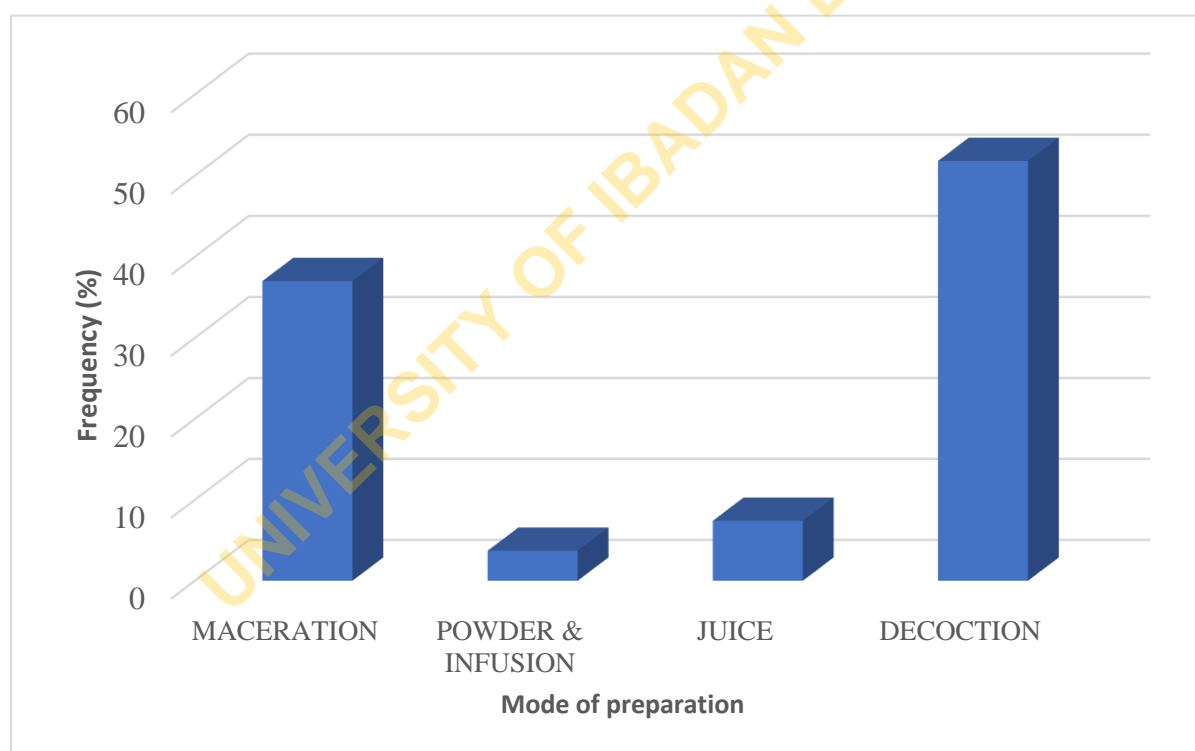


Figure 5: Showing the frequency (in percentage) of the different methods of preparation of plant recipes mentioned in the ethnobotanical survey

Figure 5 shows that the mode of preparation of most of the plant recipes mentioned were decoctions. Others

are maceration, powder/infusion, and juice. All the recipes mentioned are administered orally mostly twice daily as seen in Table 2.

Table 2: Method of Preparation and Administration of Benign Prostate Hyperplasia Plant recipes mentioned in the ethnobotanical survey of Ilorin West and Ilorin East Local Government Areas of Kwara State, Nigeria.

S/N	Recipe and Plant part used	Preparation /Administration	Dosage
1.	<i>Adenopus breviflorus</i> (Fruit), <i>Citrus medica</i> var. <i>acida</i> (Fruit), <i>Chenopodium ambrosioides</i> (Root), <i>Citrullus mucospermus</i> (Fruit)	Maceration, Oral	Twice daily
2.	<i>Aframomum melegueta</i> (Seed)	Powder, Oral	Once daily
3.	<i>Ageratum conyzoides</i> (Leaves), <i>Ceratotheca sesamoides</i>	Juice, Oral	Twice daily with Milk
4.	<i>Allium ascalonicum</i> (Bulb), <i>Tamarindus indica</i> (Fruit), <i>Chrysophyllum albidum</i> (Fruit)	Maceration, Oral	Twice daily
5.	<i>Senna obtusifolia</i> (Root bark), <i>Securidaca longipedunculata</i> (Root bark), <i>Tetrapleura tetraptera</i> (Stem bark)	Decoction, Oral	Thrice daily
6.	<i>Senna obtusifolia</i> (Root), <i>Chrysophyllum albidum</i> (Fruit)	Maceration, Oral	Twice daily
7.	<i>Senna obtusifolia</i> (Root), <i>Senna podocarpa</i> (Root), <i>Tamarindus indica</i> (Fruit), <i>Citrullus mucospermus</i> (Fruit)	Decoction, Oral	Twice daily
8.	<i>Senna obtusifolia</i> (Root), <i>Tamarindus indica</i> (Fruit), <i>Chasmanthera dependens</i> (Root), <i>Treulia africana</i> (Root)	Decoction, Oral	Once daily
9.	<i>Senna obtusifolia</i> (Stem bark), <i>Anthocleista djalonensis</i> (Stem bark), <i>Chrysophyllum albidum</i> (Fruit), <i>Tamarindus indica</i> (Fruit), <i>Senna podocarpa</i> (Stem bark)	Decoction, Oral	Twice daily
10.	<i>Senna obtusifolia</i> (Stem bark), <i>Citrullus mucospermus</i> (Fruit), <i>Anthocleista djalonensis</i> (Stem bark), <i>Senna podocarpa</i> (Stem bark)	Decoction, Oral	Twice daily
11.	<i>Chrysophyllum albidum</i> (Fruit), <i>Calotropis procera</i> (Leaf)	Decoction, Oral	Once daily at night before sleep
12.	<i>Chrysophyllum albidum</i> (Fruit), <i>Senna podocarpa</i> (Leaves, Fruit and Stem bark), <i>Chrysophyllum albidum</i> (Stem bark)	Maceration, Oral	Twice or Thrice daily
13.	<i>Chrysophyllum albidum</i> (Fruit), <i>Tamarindus indica</i> (Fruit), <i>Anthocleista djalonensis</i> (Bark)	Decoction, Oral	Twice or Thrice daily
14.	<i>Citrullus mucospermus</i> (Fruit), <i>Senna obtusifolia</i> (Root), <i>Chrysophyllum albidum</i> (Root), <i>Citrus medica</i> var. <i>acida</i> , <i>Senna podocarpa</i> (Root)	Maceration, Oral	Once
15.	<i>Citrullus mucospermus</i> (Fruit), <i>Tamarindus indica</i> (Fruit), <i>Senna obtusifolia</i> (Leaves)	Maceration, Oral	Twice daily
16.	<i>Citrullus mucospermus</i> (Fruit), <i>Tetrapleura tetraptera</i> (Fruit), <i>Piper guinense</i> (Fruit)	Decoction, Oral	Once or Twice daily
17.	<i>Citrullus mucospermus</i> (Fruit), <i>Senna obtusifolia</i> (Root bark), <i>Chrysophyllum albidum</i> (Fruit), <i>Tamarindus indica</i> (Fruit), <i>Anthocleista djalonensis</i> (Root bark).	Maceration, Oral	Twice daily before eating
18.	<i>Citrullus mucospermus</i> (Fruits), <i>Chrysophyllum albidum</i> (Fruit), <i>Senna obtusifolia</i> (Root), <i>Senna podocarpa</i> (Flower), <i>Tamarindus indica</i> (Fruit)	Maceration / Decoction, Oral	Once or twice daily
19.	<i>Citrus medica</i> var. <i>acida</i> (Fruit), <i>Citrullus mucospermus</i> (Fruit), <i>Chrysophyllum albidum</i> (Fruit)	Maceration / Decoction, Oral	Thrice daily
20.	<i>Combretum ghasalense</i> (Stem bark), <i>Parinari</i> spp. (Fruit)	Infusion, Oral	Once daily
21.	<i>Harrisonia abyssinica</i> (Leaves), <i>Parquentina nigrescens</i> (Leaves)	Juice, Oral	Twice daily
22.	<i>Jatropha curcas</i> (Leaves), <i>Securidaca longipedunculata</i> (Root bark), <i>Anthocleista djalonensis</i> (Root)	Maceration, Oral	Twice daily
23.	<i>Jatropha curcas</i> (Leaves), <i>Parinari</i> spp. (Fruits), <i>Citrullus mucospermus</i> (Fruits)	Decoction, Oral	Twice or thrice daily
24.	<i>Jatropha curcas</i> (Leaves), <i>Securidaca longipedunculata</i> (Root bark), <i>Crinum jagus</i> (Fruit), <i>Senna obtusifolia</i> (Fruit), <i>Cassia fistula</i>	Juice, Oral	Once daily before eating
25.	<i>Parinari</i> spp. (Fruit), <i>Allium ascalonicum</i> (Bulb), <i>Senna obtusifolia</i> (Stem bark), <i>Citrullus mucospermus</i> (Fruit)	Decoction, Oral	Twice daily

26.	<i>Parinari</i> spp. (Fruit), <i>Senna podocarpa</i> (Stem bark), <i>Citrullus mucosopermus</i> (Fruit), <i>Chrysophyllum albidum</i> (Fruit)	Decoction, Oral	Twice daily
27.	<i>Parinari</i> spp. (Leaves), <i>Chrysophyllum albidum</i> (Leaves)	Maceration / Decoction, Oral	Twice daily
28.	<i>Parinari</i> spp., (Fruit) <i>Chrysophyllum albidum</i> (Leaves), <i>Croton lobatus</i> , <i>Allium ascalonicum</i> , <i>Amaranthus indica</i> , <i>Citrus medica</i> var. <i>acida</i>	Powdered and Macerated, Oral	To be taken before or after food twice daily
29.	<i>Parquetina nigrescens</i> (Leaves)	Infusion, Oral	Twice daily
30.	<i>Parquetina nigrescens</i> (Leaves), <i>Phyllanthus reticulatus</i> (Leaves)	Juice, Oral	Once daily
31.	<i>Rauvolfia vomitoria</i> (Root bark), <i>Lannea welwitschii</i> (Root bark), <i>Senna podocarpa</i> (Root bark), <i>Sphenocentrum jollyanum</i> (Root bark)	Maceration, Oral	Twice daily
32.	<i>Securidaca longipedunculata</i> (Root bark), <i>Anthocleista djalonensis</i> (Leaves), <i>Anogeisus leiocarpus</i> (Leaves)	Decoction, Oral	Twice daily`
33.	<i>Securidaca longipedunculata</i> (Root bark), <i>Citrus medica</i> var. <i>acida</i>	Maceration, Oral	Once or Twice daily
34.	<i>Securidaca longipedunculata</i> (Root bark), <i>Senna podocarpa</i> (Leaves), <i>Xylopi aethiopica</i>	Maceration / Decoction, Oral	Twice or Thrice daily
35.	<i>Securidaca longipedunculata</i> (Root bark), <i>Tamarindus indica</i> (Fruit), <i>Senna obtusifolia</i> (Stem bark)	Maceration, Oral	Once daily
36.	<i>Securidaca longipedunculata</i> (Stem bark and Leaves), <i>Tetrapleura tetraptera</i> , <i>Uvaria afzeli</i> (Stem bark)	Decoction, Oral	Twice daily
37.	<i>Senna podocarpa</i> (Leaves and Fruit), <i>Chrysophyllum albidum</i> (Stem bark), <i>Citrullus mucosopermus</i> (Fruit)	Maceration / Decoction, Oral	Twice daily
38.	<i>Senna podocarpa</i> (Leaves and root), <i>Citrullus mucosopermus</i> (Fruit), <i>Senna obtusifolia</i> (Root), <i>Tamarindus indica</i> (Fruit), <i>Securidaca longipedunculata</i> (Root bark), <i>Tetrapleura tetraptera</i> (Stem bark), <i>Chasmanthera dependens</i> (Root), <i>Treculia africana</i> (Root)	Decoction, Oral	Once daily
39.	<i>Senna podocarpa</i> (Leaves and Stem bark), <i>Uvaria chamae</i> (Root), <i>Uvaria afzeli</i> (Root bark), <i>Securidaca longipedunculata</i> (Root bark), <i>Tetrapleura tetraptera</i>	Decoction, Oral	Twice daily
40.	<i>Senna podocarpa</i> (Leaves), <i>Securidaca longipedunculata</i> (Root bark), <i>Tetrapleura tetraptera</i>	Decoction, Oral	Twice daily
41.	<i>Senna podocarpa</i> (Leaves), <i>Tamarindus indica</i> (Leaves), <i>Senna obtusifolia</i> (Root), <i>Allium ascalonicum</i>	Maceration, Oral	Twice or Thrice daily
42.	<i>Senna podocarpa</i> (Stem bark and Leaves), <i>Chrysophyllum albidum</i> (Stem bark), <i>Citrullus mucosopermus</i> (Fruit)	Decoction, Oral	Twice daily
43.	<i>Senna podocarpa</i> (Stem bark), <i>Senna obtusifolia</i> (Stem bark), <i>Citrullus mucosopermus</i> (Fruit)	Decoction, Oral	Once or twice daily
44.	<i>Senna podocarpa</i> (Stem bark, leaves and fruit), <i>Anogeisus leiocarpus</i> (Stem bark), <i>Terminalia macroptera</i> (Stem bark)	Decoction, Oral	Twice daily
45.	<i>Sphenocentrum jollyanum</i> (Leaves), <i>Senna podocarpa</i> (Stem bark), <i>Senna obtusifolia</i> (Stem bark)	Decoction / Maceration, Oral	Twice daily
46.	<i>Tetrapleura tetraptera</i> (Fruit), <i>Piper guinense</i> (Fruit), <i>Senna obtusifolia</i> (Fruit)	Decoction, Oral	Twice or Thrice daily
47.	<i>Treculia africana</i> (Root), <i>Chasmanthera dependens</i> (Root)	Maceration, Oral	Once daily
48.	<i>Uvaria afzeli</i> (Root bark), <i>Chrysophyllum albidum</i> (Fruit), <i>Citrullus mucosopermus</i> (Fruit), <i>Senna obtusifolia</i> (Fruit)	Decoction, Oral	Twice daily
49.	<i>Uvaria afzeli</i> (Stem bark), <i>Senna podocarpa</i> (Leaves and Stem bark)	Maceration, Oral	Twice daily
50.	<i>Uvaria chamae</i> (Stem bark), <i>Uvaria afzeli</i> (Stem bark)	Decoction, Oral	Twice daily

Socio-demographic characteristics of respondents

Eighteen male (36%) and thirty-two female (64%) respondents totalling fifty took part in the survey. The age distribution of most respondents is between 60 years and above (40%) with those between 41-59 years of age having a 38% representation. The

demographic data gathered as shown in Table 3 revealed that 10% of the respondents were illiterate. 40% of the respondents completed primary education, some (36%) had secondary education while a few others (14%) had tertiary education.

Table 3: Demography of Respondents

Parameters	Specification	Number of respondents	%
Sex	Male	18	36
	Female	32	64
Age distribution	15- 20	0	0
	21- 30	1	2
	31- 40	10	20
	41- 59	19	38
	60 and above	20	40
Educational level	Primary	20	40
	Secondary	18	36
	Tertiary	7	14
	Others	5	10
Occupation / Practice	Herb Seller	32	64
	Traditional medicine practitioner	11	22
	Herbalist	3	6
	Elderly	4	8

DISCUSSION

According to the information acquired, Ilorin, Nigeria, has a very rich and diversified flora that is used for a variety of therapeutic purposes, which is in line with a previous study by Abubakar *et al.*, (2020). Soladoye *et al.*, (2018), however, reported the Annonaceae, Caesalpiniaceae, Euphorbiaceae, Moraceae, and Poaceae plant families are the most utilized in the management of BPH in Ogun, Nigeria which is in contrast to our finding where the most utilised plant family is the Fabaceae.

All the plants mentioned in this study were used in combination with a claim of high therapeutic effect. We observed that the different plants that make up the recipes mentioned by the respondents have been reported for use in treating other conditions related to the incidence of BPH (Basha *et al.*, 2021). The combination of different plants for better therapeutic effects may also be a result of synergism between their phytoconstituents. Respondents also claimed a lack of side effects in the recipes mentioned.

It is worthy of note to mention the established relationship between a complication (urinary tract infections) stemming from the incidence of BPH and sexually transmitted diseases (STDs) (Kamarkhani *et al.*, 2021), because more often than not, medicinal plants used in the treatment of Sexually Transmitted

Infections (STIs) have been utilized in the management of BPH. These medicinal plants have been reported to contain phytohormones and other pharmacologically active constituents that have ameliorated the incidence of BPH (Chen *et al.*, 2017). A report by Adaramoye *et al.*, (2017) and Basha *et al.*, (2021) also evidenced the positive effect of Methyl jasmonate (a phytohormone) and Cucurbitacin E from *Citrullus colocynthis* respectively, where the incidence of BPH in a rat model testosterone-induced BPH was ameliorated. These demonstrate the vital role that medicinal herbs play in the management/treatment of BPH.

Senna podocarpa, one of the most utilized species was also reported in the work of Soladoye *et al.*, (2018) as the most utilized species. Some of the mentioned plants with high UVI have been previously reported in literature (Agnes *et al.*, 2021; Basha *et al.*, 2021) to possess anti-BPH activity while others have been used in the treatment of physiological disorders that come with BPH. *Chrysophyllum albidum*, *Securidaca longipedunculata*, *Senna obtusifolia* among others have been reported to have antioxidant and anti-inflammatory activities (Adebayo *et al.*, 2011; Vadivel *et al.*, 2012). Amdii and Al'Shukri (2018) reported that β - sitosterol which is one of the major active

compounds implicated in the anti-BPH activity of Permixon® (an anti-BPH remedy from *Serenoa repens*) is abundantly present in the root of *Securidaca longipedunculata*. The root bark of *S. longipedunculata* also contains quercetin: a plant phytoconstituent reported as an antioxidant, anti-inflammatory, and anti-cancer agent which also inhibits the production of dihydrotestosterone (DHT) (Ullah *et al.*, 2021). DHT production is one of the major factors promoting prostate growth in the pathophysiology of BPH. This may justify the therapeutic effect and ethnomedicinal utilization of *S. longipedunculata* as an anti-BPH. It is impossible to overstate the relevance of anti-oxidants and anti-inflammatory phytoconstituents in the reduction of BPH, as several studies have demonstrated, plants having these properties have proven to be effective as anti-BPH agents (Choi *et al.*, 2021).

Some of the sufferers of BPH and traditional healers believe that the development of BPH is a result of an untreated STI which influences their choice to seek traditional medical care because men in general and in this case, men in Ilorin, are reluctant in discussing issues related to their genitals (Kamatnesi-Mugisha *et al.*, 2008).

The stem bark and leaves were found to be the most utilized plant parts after the fruits. This may be due to their all-year-round availability and because they contain some essential secondary metabolites responsible for their various therapeutic activities as also alluded to by Agbodjento *et al.*, (2020). Previous studies have also shown that the leaves and fruits are the most used by traditional healers and the choice of plant part used is believed to have little or no negative

CONCLUSION

This work presents an inaugural report on the documentation of ethnomedicine for BPH management in Ilorin, Kwara State, Northcentral region of Nigeria. Given the increasing global prevalence of the early onset of BPH among men and its resultant complications, there is a need to step up research efforts tailored toward the discovery of safer, effective, affordable, and readily accessible BPH medicines. The documentation of indigenous knowledge represents the first step, after which

ACKNOWLEDGEMENTS

The authors wish to acknowledge and thank all members of the communities that participated in this survey for their cooperation as well as the Department of Pharmacognosy, University of Ibadan, Ibadan,

impact on sustainability and conservation as those plant parts used can easily be regenerated and are usually available all year round (Assogba *et al.*, 2021). The habits of the plant species that are mostly used are shrubs and trees likely because of their all-year-round availability. This is typical of ethnobotanical exploitation and utilization of medicinal plant species as also reported by Omara *et al.*, (2020). Most of the recipes are prepared in form of decoctions or maceration which are majorly administered orally.

A good number of the respondents were herb sellers (mostly female) and are concentrated in the urban area probably because the area afforded them a ready market for their herbal products. The majority of the respondents are elderly, aged between 60 years and above representing 40% with others aged between 41-59 representing 38% of the respondents who participated in the study. It is generally held in Africa that elderly people hold knowledge of medicinal plants as ethno-therapeutic agents (Assogba *et al.*, 2021) hence a larger percentage of respondents are elders. Medicinal knowledge of plants represents ancestral knowledge transferred from generation to generation. The majority of the younger generation is not showing interest in the knowledge and practice of traditional medicine (Adekannbi, 2018), this justifies the reason why there are more older people in the practice of traditional medicine as compared to those between the age brackets of 21-30 and 31-40 as shown in **Table 3**. The level of education of the respondents suggests that many of them are school dropouts who seek a modest economic escape route as Africa and Nigeria still battle a high unemployment rate.

researchers now have access to a repository of studies such as which will consequently come in handy in investigating their therapeutic efficacy, isolating their bioactive phytoconstituents, studying their toxicities and pharmacological profiles, and ultimately developing safe doses that could serve as templates for new drug development. The possible conservation concerns of the plants used by the local communities should also be addressed.

Nigeria, for providing the resources in the departmental herbarium (DPHUI) for voucher specimens.

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Conflict of Interest: None declared
Received: February 23, 2023
Accepted: June 14, 2023