

Anti-anaemic, haemostatic and other medicinal plants used in Tiv traditional medicine

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Abstract: An ethnobotanical survey of plants used in treating anaemia, haemostasis and other diseases in Tiv traditional medicine was carried out. Seventy-six traditional medicine practitioners in Gboko, Konshisha and Ushongo Local Government Areas of Benue State, Nigeria were interviewed using a structured questionnaire. Fifty-six plant species belonging to twenty-nine families were reported as being used in treating the ailments identified. Ethnobotanical indices such as Informant Consensus Factor, Use Value and Fidelity Level were used to analyze the data. The results showed that *Jatropha tanjorensis*, *Vernonia amygdalina*, *Telfairia occidentalis*, and *Mucuna pruriens* were most used for the treatment of anaemia. The plant with the highest prescription was *Carica papaya* for the treatment of malaria.

Keywords: Ethnobotany, Anti-anaemic, Haemostasis, Malaria, Tiv, Traditional medicine, Nigeria.

INTRODUCTION

The practice of traditional medicine depends majorly on the use of plants to treat diseases. The use of plants as medicine especially among rural-dwelling, low-income earners has continued to increase because plant materials are affordable and readily available. About 80% of African and Asian population are reported to be dependent on traditional medicine (Oyebode *et al.*, 2016). For low-income earners, traditional medicine provides a convenient alternative to orthodox medicine which in some cases is either not affordable or not readily available (Igoli *et al.*, 2011; Ladele & Bisi-Amosun, 2014; Ichoron *et al.*, 2019). Knowledge of traditional medicine and the plants used is usually transferred from the traditional medicine practitioners to their successors by word of mouth and vital information could be lost in the process (Alyegba *et al.*, 2013). Ethnobotanical surveys thus present an opportunity to gather and document information on medicinal plants and how they are used by indigenous people. Such surveys also motivate the scientific investigation of plants with acclaimed medicinal activities. Ethnobotanical studies have proven to be the most viable way of identifying novel medicinal plants (Igoli *et al.*, 2005; Awai & Igoli, 2015; Nande & Igoli, 2017; Ichoron *et al.*, 2019). Anaemia is a global health problem affecting both developing and developed countries with consequences for human health and socio-economic development. About 1.62 billion people are affected globally, corresponding to 24.8% of the world's population (WHO, 2008). Plant-based traditional medicine plays an essential role in health care and drug discovery and medicinal folklore over the years has guided research that culminated into the discovery of several drugs (Cordell, 2000; Ghorbani, 2006).

There is evidence from oral tradition that the Tiv people of Nigeria have found ways to treat anaemia, induce haemostasis and treat several other ailments using medicinal plants. The efficacious and frequently prescribed plants may contain compounds that are potential drug candidates and could rightly be recommended for further examination. Gboko, Konshisha and Ushongo Local Government Areas where the study was conducted are in the Tiv speaking area of Benue State. They cover an area of about 4,581 km² with an estimated population of 1.025 million people (National Population Commission, 2010; City Population, 2016). Orthodox medical care is not sufficiently available in these areas and in some cases, not affordable. There are only 113 public primary health facilities and two secondary health facilities in these local government areas (Ujoh & Kwaghsende, 2014). The communities are agrarian and the population is rural. The vegetation is of the Guinea Savanna type with open grassland, scattered trees and shrubs. The climate is tropical, with dry and wet seasons. Wet seasons last from April to October while dry seasons last from November to March annually (Tyowua *et al.*, 2013). The people rely largely on traditional medicine for their primary health care. The traditional medicine practitioners have assistants who usually take over from them in the event of death or old age. The assistants are usually family members. Knowledge is transferred from the masters to their assistants through apprenticeship. There are no published records of their methods. This study reports on the medicinal plants used for the

treatment of anaemia, control of bleeding from cuts and wounds, and other diseases in these Tiv speaking areas of Benue State, Nigeria.

MATERIALS AND METHODS

Data collection

Data was collected through the administration of a structured questionnaire and oral interview of herbalists (traditional medicine practitioners) living and working in the areas. Information on local names of plants, parts of the plants used, method of preparation, route of administration and ailments treated were obtained from the respondents.

Data analysis

Following ethnobotanical Indices were employed to analyze the data,

Use Value (UV)

The relevance of a plant species in the traditional medicine system of the study area was determined by a quantitative method called Use Value (UV). The UV was calculated using the formula,

$$UV = \frac{\sum Ui}{N}$$

Where, U_i is the total number of informants that cited a given species, N is the total number of informants. High Use Value for a species indicates that the plant is highly used by the informants, which implies that the species is important in the traditional medicine practice of the study area (Ichoron *et al.*, 2019).

Fidelity Level (FL)

Fidelity Level quantifies the importance of a species for the treatment of a given ailment. In this study, FL was used to identify the most preferred species by the herbalists for the treatments in the study area. FL was calculated using following formula,

$$FL = \frac{I_p}{I_u} \times 100$$

Where, I_p is the number of informants, who cited the species for the treatment of a particular ailment, I_u is the total number of informants who mentioned the species for any use at all. The FL values range from $0 < FL \leq 100$. High FL values for a plant species indicate that it is frequently used or efficacious for the treatment of that specific ailment. On the other hand, low FL values indicate the low frequency of use or less effectiveness of the species in treating the ailment (Ouelbani *et al.*, 2016).

Informant Consensus Factor (ICF)

ICF shows the extent of agreement among the informants on the plants used for the treatment of a specific ailment. In this study, it was calculated to determine the extent of agreement among the informants on the plants used in the study area. It was calculated using the formula,

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where, N_{ur} refers to the number of informants using the plant to treat a particular disease and N_t refers to the number of species used for the treatment of that particular disease by all informants. ICF values range from 0 to 1. When plants are chosen randomly or there is no exchange of information on plant use among informants, the ICF approaches zero. If the value approaches 1, then there is a well-defined selection criterion or information is exchanged between informants (Ichoron *et al.*, 2019).

RESULTS

Table 1. Plant species identified and their use.

S.N.	Scientific Name	Local Name (Tiv)	Use Value	Part Used	Method of Preparation	Route of Application	Ailment Treated
Amaranthaceae							
1	<i>Amaranthus hybridus</i> L.	Aleofu	0.68	Leaves	Leaves are eaten raw or cooked as food	Oral	Anaemia
Anacardiaceae							
2	<i>Mangifera indica</i> L.	Mangoo	0.83	Stem bark	Stem bark is boiled to obtain aqueous extract	Oral	Anaemia
3	<i>Spondias mombin</i> L.	Konkuaa	0.80	Stem bark	Bark of plant is peeled off, washed and then boiled in clean water to obtain extract	Oral	Catarrh, Cold
4	<i>Spondias mombin</i> L.	Konkuaa	0.80	fruits	The mesocarp is eaten raw from the whole fruit	Oral	Scurvy

Apocynaceae							
5	<i>Landolphia owariensis</i> P. Beauy	<i>Pungwa</i>	0.71	Roots	Roots are washed, boiled in clean water to obtain extract	Oral	Gonorrhoea
Arecaceae							
6	<i>Elaies guineensis</i> Jacq.	<i>Ivile/Ikye</i>	0.52	sap	A hole is bored into the trunk of the palm tree to tap sap and drank	Oral	Measles
Aspaeagaceae							
7	<i>Dracaena fragrans</i> (L.) Ker Gawl.	<i>Chilakem</i>	0.82	Leaves, stem bark	Leaves are boiled with the tender twigs of <i>Vitex doniana</i> Sweet	Oral	Menorrhagia (prolonged/ heavy menstrual bleeding)
Asteraceae							
8	<i>Aspilia Africana</i> (Pers.) C.D.Adams	<i>Oso-Oso</i>	0.57	Roots	Leaves are washed in clean water and then boiled to obtain extract	Oral	Amoebic dysentery
9	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	<i>Bokpai</i>	0.87	Leaves	Fresh leaves from tender twigs are squeezed to obtain juice which is then applied on the wound to stop bleeding	Topical	Hemorrhage
10	<i>Tridax procumbens</i> (L.) L.	-	0.88	Leaves	Leaves and stems are collected and squeezed to obtain extract	Oral	Anaemia
11	<i>Vernonia amygdalina</i> Delile	<i>Ityuna</i>	0.98	Leaves	Leaves are crushed and macerated to obtain aqueous extract at room temperature	Oral	Anaemia
Bignoniaceae							
12	<i>Kigelia africana</i> (Lam.) Benth.	<i>Ityember</i>	0.53	Leaves and stem bark	Stem bark and leaves are boiled to obtain aqueous extract	Oral	Filariasis, Anaemia
13	<i>Newbouldia laevis</i> (P. Beauv.) Seem.	<i>Agereshi</i>	0.83	Leaves and stem bark	Stem bark and leaves are boiled to obtain aqueous extract	Oral	Typhoid fever, Anaemia, convulsion
14	<i>Stereospermum kunthianum</i> Cham.	<i>Umanatumba</i>	0.72	Stem and leaves	Stem and leaves are boiled in water to obtain extract	Oral	Typhoid fever
Caricaceae							
15	<i>Carica papaya</i> L.	<i>Mbue</i>	0.99	Leaves	Leaves are macerated at room temperature to obtain aqueous extract	Oral	Malaria
Caesalpiniaceae							
16	<i>Parkia biglobosa</i> (Jacq.) G.Don	<i>Nune</i>	0.89	Stem bark	Stem bark is dried and pulverized into a fine Powder	Topical	Wound
17	<i>Piliostigma thomingii</i> (Schum.) Milne-Redh.	<i>Nyihar</i>	0.66	Leaves	Leaves are boiled in water to obtain aqueous extract	Oral	Jaundice
Ceasalpinioidae							
18	<i>Burkea Africana</i> Hook	<i>Gbagbongom</i>	0.49	Stem bark	Stem bark is removed and boiled in clean water to obtain extract	Oral	Tooth infection
Cochlospermaceae							
19	<i>Cochlospermum planchonii</i> Hook.f. ex Planch.	<i>Kpavande</i>	0.93	Roots	Fresh roots are boiled to obtain aqueous extract	Oral	Hemorrhage
Combretaceae							
20	<i>Terminalia schimperiana</i> Hochst. ex Deile	<i>Kuegh</i>	0.67	Roots, stem bark and leaves	Boiled in to obtain aqueous extract	Oral	Gonorrhoea
Convolvulaceae							
21	<i>Ipomoea batatas</i> (L.) Lam.	<i>Atsaka</i>	0.63	Leaves	Fresh leaves from young twigs are cooked in water for about 30 minutes	Oral	Hemorrhage

Cucurbitaceae							
22	<i>Telfairia occidentalis</i> Hook f.	<i>Ugwu</i>	0.80	Leaves	Aqueous leaf extract is obtained by at room temperature	Oral	Anaemia
Cyperaceae							
23	<i>Scleria latifolia</i> Sw.	<i>Suswam</i>	0.43	Leaves	Aqueous leaf extract is obtained by maceration at room temperature	Oral	Hemorrhage
Euphorbiaceae							
24	<i>Alchornea cordifolia</i> (Schumach. & Thonn.) Mull.Arg.	<i>Ahina</i>	0.97	Leaves	Leaves are boiled to obtain aqueous extracted	Oral	Anaemia
25	<i>Antidesma venosum</i> E.Mey. ex Tul.	<i>Baverakpua</i>	0.55	Stem bark	Fresh stem bark is grounded together with pepper into a fine paste and eaten	Oral	Intestinal pains
26	<i>Bridelia ferruginea</i> Benth	<i>Ikpine</i>	0.80	Roots	Roots are boiled in water to obtain aqueous extract	Oral	Cholera
27	<i>Euphorbia hirta</i> L.	<i>Gbatsombu</i>	0.27	Whole plant	Boiled in a concoction with other plants	Oral	Hemorrhage
28	<i>Jatropha curcas</i> L.	<i>Igedam</i>	0.70	Stem	Stems are cut into pieces, washed and boiled to obtain extract	Oral	Stomach pains in children
29	<i>Jatropha tanjorensis</i> J.L. Ellis & Saroja	<i>Kon-Awambe</i>	0.98	Leaves	Fresh leaves are washed in clean water and squeezed to obtain aqueous extract	Oral	Anaemia
30	<i>Manihot esculenta</i> Crantz.	<i>Logo</i>	0.50	Shoot	Leaves from tender twigs are boiled for about 15 minutes and eaten whole	Oral	Hemorrhage
Leguminosae							
31	<i>Cassia occidentalis</i>	<i>Tsetsa</i>	0.66	Whole plant	Boiled in water to obtain extract	Oral	Stomach pains
32	<i>Daniellia oliveri</i> (Rolfe) Hutch. & Dalziel	<i>Chiha/Chaha</i>	0.43	Tender twigs	Tender twigs are washed in clean water and boiled to obtain extract	Oral	Conjunctivitis
33	<i>Erythrophleum suaveolens</i> (Guill. & Perr. Brenan)	<i>Kor</i>	0.59	Roots	Roots are boiled to obtain aqueous extract	Oral	Amoebic dysentery
34	<i>Mucuna pruriens</i> (L.) DC.	<i>Imon Awambe</i>	0.83	Leaves	Maceration	Oral	Anaemia
35	<i>Mucuna sloanei</i> Fawc. & Rendle.	<i>Kor</i>	0.77	Leaves	Leaves	Leaves are boiled to extract juice	Anaemia
36	<i>Tephrosia vogelii</i> Hook.f.	<i>Kuhwa</i>	0.44	Leaves	Leaves are washed and squeezed to obtain juice	Oral	Dermatitis
Lamiaceae							
37	<i>Gmelina arborea</i> Roxb.	<i>Malina</i>	0.80	Stem bark, leaves	Decoction or Maceration	Oral, Inhaling vapour from boiling decoction	Anaemia, Fever, Malaria, Catarrh Hemorrhage
38	<i>Ocimum gratissimum</i> L.	<i>Kungureku-Tamen</i>	0.98	Leaves	Leaves are crushed and squeezed to obtain juice	Oral	
39	<i>Ocimum gratissimum</i> L.	<i>Kunguraku-Tamen</i>	0.67	Leaves	Boiled in water to obtain aqueous extract	Oral	Typhoid fever
Malvaceae							
40	<i>Hibiscus sabdariffa</i> L.	<i>Ashwe-U-Nyian</i>	0.70	Fruit and calyx	Decoction	Oral	Anaemia
41	<i>Sterculia setigera</i> Delile	<i>Kumenduur</i>	0.56	Stem bark	Bark is removed, washed and boiled in clean water to obtain extract	Oral	Toothache
Meliaceae							
42	<i>Azadirachta indica</i> L.	<i>Neem</i>	0.88	Heartwood, stem bark and leaves	The branches are cut into small pieces and mixed with its leaves and	Oral	Typhoid fever
Moraceae							
43	<i>Ficus thonningii</i> Blume.	<i>Akinde</i>	0.30	Tender twigs	The tender twigs are cooked and eaten whole	Oral	Hemorrhage
44	<i>Ficus sycomorus</i> L.	<i>Tur</i>	0.30	Leaves from tender twigs	Boiled for about 15 minutes and eaten whole	Oral	Hemorrhage

Moringaceae							
45	<i>Moringa oleifera</i> Lam.	<i>Jegeregede</i>	0.81	Leaves	Leaves are squeezed to obtain juice	Drops in the eye	Conjunctivitis
Musaceae							
46	<i>Musa sapientum</i> L.	<i>Ayaba</i>	0.35	Stems and leaves	Stems and leaves are macerated in cold water and taken orally	Oral	Hypertension
Poaceae							
47	<i>Cymbopogon citratus</i> (DC.) Stapf	<i>Tohogile</i>	0.36	Leaves	Leaves and stems are washed, boiled in clean water to obtain an extract	Oral	Typhoid fever
48	<i>Imperata cylindrica</i> (L.) Trin	<i>Ihira</i>	0.43	Leaves	Leaves are crushed and macerated to obtain aqueous extract at room temperature	Oral	Hemorrhage
49	<i>Pennisetum pedicellatum</i> Moench	<i>Alufu</i>	0.67	Leaves	Leaves are boiled in water to obtain aqueous extract	Oral	Hemorrhage
50	<i>Sorghum bicolor</i> (L.) Moench	<i>Wua</i>	0.33	Root, stem and Leaves	Roots, stem and leaves are boiled in water for 1-2 hours to obtain extract	Oral	Typhoid fever
Rubiaceae							
51	<i>Borreria ocymoides</i> (Burm.f.) DC.	<i>Ateiwa</i>	0.87	Leaves	Fresh leaves are squeezed to extract juice	Topical	Eczema
52	<i>Nauclea latifolia</i> Sm.	<i>Ikura-Ukase</i>	0.92	Roots and Leaves	Roots and Leaves are crushed and extracted in cold water	Oral	Measles
53	<i>Sarcocephalus latifolius</i> (Sm.) E.A.Bruce	<i>Horkura</i>	0.45	Stem bark	Stem bark is boiled to obtain aqueous extract	Oral	Stomach pains
Rutaceae							
54	<i>Citrus aurantifolia</i> Pers	<i>Agbenge-Alum</i>	0.65	Fruit	Fruits are sliced and squeezed to extract juice	Oral	Amoebic dysentery
Sapotaceae							
55	<i>Vitellaria paradoxa</i> Gaeertn	<i>Chamegh</i>	0.44	Stem bark	Bark is removed, dried and ground into powder	Oral; powder is licked	Stomach pains
Zingiberaceae							
56	<i>Zingiber officinale</i> Roscoe	<i>Seta</i>	0.82	Rhizome	The outer covering of the rhizome is scrapped off	Rhizome is chewed	Cough and catarrh

Fifty-six plant species belonging to twenty-nine families were identified as being used in the study area by traditional medicine practitioners. Table 1 summarizes the plant name, family, local name, ailment treated and Use Value; Table 2 shows Fidelity Level and Informant Consensus Factor. Prescriptions for treatment of twenty-one ailments were recorded. The most frequently mentioned ailments were anaemia, hemorrhage and typhoid fever. The majority of remedies were administered orally, leaves were used the most and boiling in water to obtain aqueous extracts or decoction was the most frequently preferred mode of the formulation.

Table 2. Informant Consensus Factors (ICF) and Fidelity Level (FL) for diseases treated with medicinal plants in the study area.

S.N.	Ailment	ICF	Preferred Species	Part Used	Method of Preparation	Route of Administration	FL (%)
1	Anaemia	1.0	<i>Jatropha tanjorensis</i> J.L. Ellis & Saroja	leaves	Fresh leaves are washed in clean water and squeezed to obtain aqueous extract	Oral	98.00
2	Cold and catarrh	0.98	<i>Zingiber officinale</i> Roscoe	Rhizome	Rhizome is washed with clean water, blended and made into an aqueous solution	Oral	93.00
3	Scurvy	0.86	<i>Spondias mombin</i> Linn.	fruit	The mesocarp is eaten raw from the whole plant	Oral	79.00
4	Gonorrhea	0.66	<i>Landolphia owariensis</i> P. Beauy	Roots	Roots are washed, boiled in clean water to obtain aqueous extract	Oral	55.00
5	Measles	0.57	<i>Elaies guineensis</i> Jacq.	Sap	Bored a hole in the growing part of stem and pipes are inserted to collect sap	Sap is drank and used for bath	55.00
6	Stomach pains	0.68	<i>Jatropha curcas</i> L.	Stem	Stems are cut into pieces, washed and boiled to obtain aqueous extract	Oral	64.00

7	Hemorrhage	0.98	<i>Ocimum gratissimum</i> L.	leaves	Leaves are washed and squeezed to obtain juice	Juice is applied topically on bleeding site	43.00
8	Amoebic dysentery	0.58	<i>Citrus aurantifolia</i> Pers	fruit	Fruits are sliced and squeezed to extract juice	Oral	72.00
9	Typhoid fever	0.76	<i>Sorghum bicolor</i> (L.) Moench	Root, stem and leaves	Leaves, stems and roots are boiled together to obtain aqueous extract	Oral	77.00
10	Convulsion	0.72	<i>Newbouldia laevis laevis</i> (P. Beauv.) Seeman ex Bureau.	Leaves and stem bark	Stem bark and leave are boiled aqueous extract	Oral	66.00
11	Malaria	0.23	<i>Gmelina arborea</i> Roxb.	Stem bark, leaves	Decoction	Inhaling vapour from boiling decoction	34.00
12	Jaundice	0.34	<i>Piliostigma thonningii</i> (Schum.) Milne-Redh.	Leaves	Leaves are boiled in clean water to obtain aqueous extract	Oral	43.00
13	External wound	0.56	<i>Parkia biglobosa</i> (Jacq.) G.Don	Stem bark	Stem bark is dried and blended into powder.	Topical on the wound	84.00
14	Toothache	0.49	<i>Burkea Africana</i> Hook	Stem bark	Fresh stem bark is boiled in water to obtain aqueous extract	Oral	65.00
15	Cholera	0.66	<i>Bridelia ferruginea</i> Benth	Roots	Fresh roots are boiled in water to obtain aqueous extract	Oral	71.00
16	Conjunctivitis	0.81	<i>Moringa oleifera</i> Lam.	Leaves	Leaves are squeezed to obtain juice	Juices is applied directly into the eye	92.00
17	Dermatitis	0.67	<i>Tephrosia vogelii</i> Hook.f.	Leaves	Leaves are washed and squeeze to obtain juice	Topical	76.00
18	Intestinal worms	0.79	<i>Antides mavenusum</i>	Stem bark	Fresh stem bark is blended together with fresh pepper into a fine paste and eaten	Oral	84.00
19	Hypertension	0.88	<i>Musa sapientum</i> L.	Stems and leaves	Stems and leaves are macerated in water at room temperature and taken orally	Oral	91.00
20	Menorrhagia	0.85	<i>Dracaena fragrans</i> (L.) Ker Gawl.	Leaves	Leaves are boiled together with leaves from tender twigs of <i>Vitex doniana</i>	Oral	86.00
21	Infertility	0.92	<i>Vitex doniana</i> Sweet	Fruits	Mesocarp of fruit is eaten raw	Oral	87.00

DISCUSSION AND CONCLUSION

This study confirmed that plants are very important and used extensively in traditional medicine within the Tiv speaking area of Benue State (Awai & Igoli 2015; Ichoron *et al.*, 2019). The plants most frequently prescribed from this study were *Jatropha tanjorensis* J.L. Ellis & Saroja, *Vernonia amygdalina* Delile, *Telfairia occidentalis* Hook. f., and *Mucuna pruriens* (L.) DC. These plants are efficacious for the treatment of anaemia as there is uniformity among the informants about their use. *Ocimum gratissimum* L., *Cochlospermum planchonii* Hook. f. ex Planch., *Tridax procumbens* (L.) L. were the most used for haemostasis. These findings show that traditional medicine has knowledge about plants and their potentials as medicines. These plants can be investigated for drug leads in the continued search for new drugs for anaemia and other ailments.

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