



Annual Research & Review in Biology
4(24): 4344-4360, 2014

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Ethnomedical Survey of Adavi and Ajaokuta Local Government Areas of Ebiraland, Kogi State, Nigeria

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Authors' contributions

Author SEOA conceived the study, designed the instrument used, provided the general guide and refined the final manuscript, Author MAO and IO conducted the field survey, while author ODO performed most of the literature search and wrote the initial draft of the manuscript. All authors read and approved the final manuscript.

Original Research Article

Received 24th December 2013
Accepted 4th April 2014
Published 10th August 2014

ABSTRACT

With the wide application of traditional medicine in primary health care around the world, there is need to explore and document medicinal plants used in many cultures. A mini-survey of medicinal plants used to treat different ailments in two local government areas, Adavi and Ajaokuta in Ebiraland of Kogi State, Nigeria was undertaken and the plants gathered include *Ocimum canum* (Labiatae), *Heliotropium indicum* (Boraginaceae), *Anisopus mannii* (Asclepidiceae), *Senna alata* (Caesalpiniaceae), *Abrus precatorius* (Papilionaceae), *Desmodium velutinum* (Papilionaceae), *Caesalpinia bunduc* (Caesalpiniaceae) and *Ageratum conyzoides* (Compositae). Others are *Argemone mexicana* (Papaveracea), *Phyllanthus amarus* (Euphorbiaceae), *Cassytha filiformis* (Lauraceae), *Spilanthes filicaulis* (Compositae), *Chenopodium ambrosioides* (Chenopodiaceae), *Edipta alba* (Compositae), *Dennetia tripentala* (Annonaceae) and *Newbouldia laevis* (Bignoniaceae). The rationales behind the use of these plants for different ailments are discussed against the background of their reported phytochemical constituents and medicinal uses in Nigerian and other cultures. However, there is need to scientifically evaluate these plants to confirm their therapeutic efficacy against diseases indicated and to validate their use in the traditional medical practice of the Ebira people of Kogi State.

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Keywords: Ethnomedical survey; medicinal plant; Ebiraland; Kogi State; Nigeria.

1. INTRODUCTION

Higher plants as source of medicinal compounds have continued to play a dominant role in the maintenance of human health since antiquity. The popularity of medical herbalism stems from the advantages of medicinal plants over orthodox medicine, including affordability, relative availability, ease of preparation and low deleterious effects [1]. According to a survey by the World Health Organization (WHO) in Asia in 1993, the traditional medical practitioners are patronized by about 80, 85 and 90% of patients in India, Burma and Bangladesh, respectively [2]. Worldwide, about 80% of the world population relies on traditional medical practitioners for their primary health care needs [3].

Medicinal plants are the mainstay of traditional medical practice, and the indigenous knowledge required for effective medical practice differs between cultures. Unfortunately, studies indicate that traditional healers in different societies are dwindling in number and there are a real danger of traditional knowledge disappearing soon since the younger generations, especially in Africa are not interested in carrying on the tradition. It thus becomes necessary to acquire and preserve the traditional system of medicine by proper documentation and identification of specimens [4]. Therefore, in line with our previous efforts to document the indigenous knowledge system as it affect the treatment of different diseases, including trypanosomiasis [5] and malaria [6, 7] in various Nigerian cultures, we carried out a mini-ethnomedical survey in two Local Government Areas (LGA) within the Ebira speaking area of Kogi State, Nigeria.

2. MATERIAL AND METHODS

2.1 Study Area

The Ebira who constitute the focus of this study coincide with the people of the area popularly referred to in Nigeria as Kogi Central District. This area consist of Okene, Okehi, Adavi and Ajaokuta Local Government Areas of Kogi State (Fig. 1) with Okene, the traditional headquarters of this ethnic group being located on latitude 7°33'N and longitude 6°14'E. The word "Ebira" refers to the people themselves, their language, culture and their geographical location. They occupy the hilly stretch of land with metaphoric rocks and undulating plains which rises to a peak of about 2000 feet, located southwest of the Niger-Benue confluence area and share boundaries with the Yoruba-speaking people of Akoko, Owe, and Ijumu to the west, Lokoja, the State capital to the north and the River Niger to the East [8].

2.2 Method of Data Collection

The interview method adopted is basically as described by Atawodi and co-workers [5]. This adapted instrument used is attached as Appendix 1. Interview and detailed discussions were conducted with local herbalists that have vast experience in treating wide range of diseases with herbal preparations. Each plant recorded was mentioned by at least, two respondents from among a total of fifteen that were interviewed. Plants were collected with the aid of these respondents and the botanical identities were confirmed at the Herbarium Section of the Department of Biological Sciences, Ahmadu Bello University, Zaria, Nigeria where voucher specimens were deposited.



Fig. 1. Map of Kogi State Nigeria showing the Ebra Speaking Area (Kogi Central District)

3. RESULTS

Sixteen (16) plants were documented for treating a wide range of diseases such as diabetes, high blood pressure, dysentery, diarrhea, menstrual problems, skin diseases and haemorrhage, among others. The plants include *Occimum canum*, *Heliotropium indicum*, *Anisopus manni*, *Senna alata*, *Abrus preatorius*, *Desmodium velutinum*, *Caesalpinia bunduc* and *Ageratum conyzoides*. Others are *Argemone mexicana*, *Phyllanthus amarus*, *Cassythia filiformis*, *Spilanthes filicaulis*, *Chenopodium ambrosiodes*, *Eclipta alba*, *Dennetia tripentala* and *Newbouldia laevis*. The methods of preparation ranged from infusion to decoction to produce extracts which are given in different dosages. In some cases, plant parts are pounded into paste for topical application or mixed with soap for bathing (Table 1).

Table 1. Medicinal plants used in the treatment of some diseases in Ebiraland of Kogi State, Nigeria

S/N	Botanical name	Family	Voucher No	Vernacular name	Type	Part used	Disease(s) used for	Preparation
1	<i>Occimum canum</i> L	Labiatae	1875	Ireru eva (E) Efinrin(Y) Daidoya ta gida (H) Nchonwu(I)	Shrub	Leaves, stem	Diabetes, general body vitality	A decoction of plant parts in water/alcohol mixture
2	<i>Heliotropium indicum</i> L	Boraginaceae	630	Orukonkono (E) Agogo igun(Y) Kalkashin korama(H)	Herb	Leaves, stem, flower	Dysentery, diarrhea, stomach upset, worms, convulsion	Infusion taken orally to treat dysentery, diarrhea and convulsion in children. Decoction taken orally as worm expellant.
3	<i>Anisopus mannii</i>	Asclepidiceae	217	Omuaruta (E) Kafi suga (H)	Shrub	Leaves with flower	High blood pressure, jaundice in infants	A decoction of plant parts with water/alcohol mixture
4	<i>Senna alata</i> (L) Roxb	Caesalpiniaceae	2421	Adedenguhi obanyi (E) Asunwon(Y) Nelki(I)	Shrub	Leaves with flowers	General body vitality, stomach upset, pile	Dried plant part is ground into powder and taken with pap. Decoction is taken orally
5	<i>Abrus precatorius</i> L	Papilionaceae	932	Ohinehine (E) Oju ologbo (Y), Idon zakara (H), Otoberebere (I)	Climber	Leaves	Cough, ore throat, cuts/ wounds, calming the brain	Ground dried leaf mixed with honey or juice from macerated leaf is drunk for cough & sore throat or drunk at bedtime for insomnia. Ground seeds are applied on cuts/ wounds
6	<i>Desmodium velutinum</i> (Willd) DC	Papilionaceae	1734	Emaa (E) Dankadafi(H) Patanmo(Y)	Shrub	Leaves with flower	Infertility, irregular menstruation, general body vitality	Decoction with potash and taken twice daily
7	<i>Caesalpinia bunduc</i> (L) Roxb	Caesalpiniaceae	9001	Avi igori (E)	Tree	Leaves	Hallucination, improve vigor	Infuse in cold water for 3hr and drink <i>ad lib</i>
8	<i>Ageratum conizoides</i> Linn	Compositae	232	Avihupahupa(E) Imi-esu(Y), Akwokwo-nwaosi nake(I)	Herb	Leaves, stem	High blood pressure, diabetes	Decoction of plant part taken orally

S/N	Botanical name	Family	Voucher No	Vernacular name	Type	Part used	Disease(s) used for	Preparation
9	<i>Argemone mexicana</i> L	Papaveraceae	2439	Irarezu (E) Kwarkoro(H) Egun arigbo(Y)	Herb	Leaves	General body vitality, control ageing	Decoction is drank <i>ad lib</i> , or taken bath with
10	<i>Phyllanthus amarus</i> Sclichem & Thorn	Euphorbiaceae	1022	Ogerema (E) Majiryankurmi(H), lyin olobe(Y)	Herb	Leaves, stem	To treat poison, abdominal pain	Infusion is drank, Ground dried plant part taken with porridge
11	<i>Cassytha filiformis</i> Linn	Lauraceae	841	Irrmanyahou (E) Runfagada(H), Aca-agadi(I), Ominiginigini(Y)	Herb	Leaves stem	Afterbirth ejection during childbirth ; for healthy smooth skin	Drink hot decoction while in labor; Bath with decoction of plant parts; pound plant part with bathing soap
12	<i>Spilanthes filicaulis</i> Schumach & Thorn	Compositae	534	Osote (E)	Herb	Leaves stem	Antidote for poisons, anti venom	Macerate plant part in water and drink <i>ad lib</i> , wash affected body part with extract
13	<i>Chenopodium ambrosiodes</i>	Chenopodiaceae	1921	Aviagu (E)	Herb	Leaves stem	Skin diseases e.g eczema, lesion	Crush the plant part and apply the juice to the body part
14	<i>Eclipta alba</i> L	Compositae	289	Andoji (E)	Herb	Leaves	Irregular menstruation, bleeding	Cook with liver and eat <i>ad lib</i>
15	<i>Dennetia tripentala</i> G. Baker	Annonaceae	2737	Oguro (E) Mmimi (I)	Herb	Leaves stem	Rheumatism, waist, ankle and wrist pains	Wash affected body parts with decoction of plant parts. Immerse the aching part in a bowl of hot extract
16	<i>Newbouldia laevis</i> P. Beauv, Seemanex Bureau	Bignoniaceae	2881	Ogishi (I) Aduruku (H) Akoro (Y) Ogirisi (E)	Tree	Stem bark	Stomach upset, indigestion, flatulence	Decoction of plant part is drank <i>ad lib</i>

Names: (E) = Epira, (H) = Hausa, (Y) = Yoruba, (I) = Igala

4. DISCUSSION

Nature has been a source of medicinal treatments for thousands of years and plant-based systems continue to play an essential role in primary health care. It is estimated that 25 to 50% of all current pharmaceuticals are derived from plants, and recent reports suggested that plant-based systems contribute to 90% of newly discovered pharmaceuticals [9]. Collection of information and documentation of traditional knowledge plays an important role in scientific research on drug development [10]. The mini-ethnomedical survey carried out revealed a number of plants used to treat a wide range of diseases by the Ebira people of Kogi State. Sixteen plant species belonging to twelve families with Compositae having three species and Caesalpiniaceae and Papilionaceae having two species each were collected. Among them are eight herbs, four shrubs, three trees and one climber. This list has added our previous efforts [5-7] to document the indigenous knowledge systems among different cultures in Nigeria for treatment of different diseases.

The plants gathered in this mini-survey also possess other documented medicinal uses because of the diverse secondary metabolites they contain. *Ocimum canum*, for example, is grown for its medicinal and culinary value and it is highly useful in treating several diseases like diabetes, colds, fevers, headache, dysentery and inflammation of joints [11,12], and also as an anti-parasitic agent and as insect-repellent in homes and stored grains to reduce post-harvest loss. The leaves are used to treat gastrointestinal problems and are known to have high concentrations of flavonoids, saponins and tannins but low in phenolics and alkaloids [13]. *Ocimum canum* is also reported to have antibacterial, antifungal and antiviral, as well as analgesic and rubefacient properties. The essential oil, of which linalool is a component, is used as a flavoring agent in food industries such as manufacture of chewing gums, sweets, teas and energy drinks. *Ocimum canum* contains such chemical constituents as flavonoids, alkaloids, ascorbic acid, terpenoids, tannins, saponins, glycosides and phenolic compounds. Dashputre and Naikwade [14] reported that the leaves contain two major flavones aglycones identified as salvigenin and nevadensin, which may also contribute to its efficacy in the diseases for which the parts are traditionally prescribed for in Ebira medical herbalism. *Ocimum basilicum* also used for the same folk medicinal application as *O. canum* has been reported to possess antibacterial activity against Gram-positive and Gram-negative bacteria [15,16]. It also has hepatoprotective activity [17]. Gas chromatographic and gas chromatographic-mass spectrometric analyses of *O. basilicum* reveal the presence of oxygenated monoterpenes, principally linalool, 1,8-cineole, borneol, eugenol and caryophyllene in the leaves and fruits [16]. The methanolic fraction of the crude extract of *Ocimum gratissimum* contain phenolic compounds associated with antioxidant properties [18] while a six-month feeding of *O. gratissimum* supplemented diet to male rats enhanced biochemical parameters such as the activities of superoxide dismutase, alanine transaminase, aspartate transaminase and alkaline phosphatase [19].

In Mali, *Heliotropium indicum* is used against vomiting, amenorrhoea, baby thinness, ocular infection and high blood pressure. Across different West African countries, decoction of the leaf is used to bath new-born babies, to treat gum ulcers and cure eye infections. It is also used to treat dermatitis, suppurating eczema and *impertigo* in children. In the Ivory Coast, the dried leaf is inhaled as decongestant for management of cold, catarrh and sinusitis, while topical application of 10% w/v of *Heliotropium indicum* increased the percentage of wound contraction, with complete wound healing being experienced within 14 to 23 days, suggesting its role in rapid epithelization and collagenization [20]. In Nigeria and Ghana the leaf infusion is used to treat sores, stings, pimples, and the sap is used to clean ulcers, applied to eyes for ophthalmia. The sap is also mixed with castor oil to treat stings and

poisonous bites. It is also used to treat umbilical hernia. While the ethanolic extract contains saponins and tannins, alkaloids are found in the aqueous extract, and they possess antifungal property against *Candida* species [21]. The use of *H. indicum* to treat ulcer has been verified by Adelaja et al. [22], that the aqueous extract of dried leaves possess dose-dependant histo-gastroprotective effect in Wistar rats. The leaves of *H. indicum* are used to treat tuberculosis and its median lethal dose LD₅₀ has been determined to be 7g/Kg body weight [23]. Other studies demonstrated that the N-oxide of the alkaloid indicine from *Heliotropium indicum* possess significant anti-tumour activity in different leukemia and melanoma tumour systems [20], as well as its antimicrobial properties [24]. The aerial parts of *Heliotropium indicum* contains alkaloids, saponins, tannins, glycosides and flavonoids, while fractionation of the methanolic extract afforded white crystalline solids characterized by infra red spectroscopy and gas chromatography mass spectroscopy to be indicum 1, 2, 3 and 4 [24]. These phytochemicals could be responsible for its reported medicinal properties.

The crude aqueous stem extract of *Anisopus mannii* contains pharmacologically active compounds like saponins, flavonoids, alkaloids, glycosides, xanthenes, tannins, terpenes and steroids [25], to which the numerous medicinal activities may be ascribed. It is reported to possess antibacterial activity, stimulate red blood cells production and hypoglycaemic properties, thus affirming its folkloric oral use as anti-hyperglycaemic plant [25,26]. The aqueous extract of *A. mannii* is relatively safe, having a median lethal dose LD₅₀ of 3000 mg/kg in rats. It also has a stimulatory effect on red blood cell production [27]. The crude methanolic extract and its n-butanol and ethylacetate fractions, in an *in vitro* antioxidant assay with 1,1-dinitrophenyl hydrazine (DPPH) exhibited potent free radical scavenging activity [28]. The partially purified saponin from the aerial parts of the plant was potent in inhibiting the growth of *Escherichia coli* and *Klebsiella pneumonia* [29] while its aqueous extract displayed significant hypoglycaemic activity [30]. The analgesic and anti-inflammatory properties of the methanolic extract of *A. mannii* have also been verified [31]. In Northern Nigeria, *A. mannii* is used either alone or in combination with other herbs for the treatment of gastrointestinal disorders and diabetes, which are diseases that have biological oxidation as a major etiological factor. However, other studies provide that the plant did not display a very potent antioxidant activity, suggesting that its medicinal efficacy, must be mediated mainly by other mechanisms other than scavenging of free radicals [32].

Senna alata is an ornamental shrub that is reported to contain saponins, alkaloids, steroids, flavonoids, tannins, phenols and carbohydrates [33]. These natural products may be responsible for the folk medicinal use of the plant. The stem bark of *Senna alata* is effective in the treatment of fungal infections such as ringworm, and hence it is commonly used as ingredient in the manufacture of medicated soaps, shampoos and lotions for management of dermatophytes, *Microsporum canis*, *Trichophyton verrucosum*, *Trichophyton mentagrophytes* and *Epidermophyton floccosum*, *Trichophyton verrucosum* and *Epidermophyton floccosum* [34]. *Senna alata* is used to treat skin diseases, haemorrhoids, constipation, inguinal hernia, intestinal parasites, syphilis and diabetes. The leaf is also applied in treating convulsion, onchocerciasis and heart failure. [35]. The methanolic and ethanolic extracts possess higher antibacterial and antifungal activities than the petroleum ether fraction [36], while the ethanolic and aqueous extracts exhibited more antifungal than antibacterial properties [37]. The concentration of bioactive compounds is higher in ethanolic extract than in aqueous [38].

Abrus precatorius is a slender perennial climber known for its seeds which are used as beads and in percussion instruments. The juice from macerated leaves is taken to treat cough, sore throat, cuts and is drunk at bedtime for insomnia. The seeds are milled and

applied on wounds [39]. A tea made from the leaves is used in treating fevers, coughs and colds, while in India, the root is used for the treatment of fever, skin diseases, nervous disorders, tuberculosis, throat pain, bronchitis, hepatitis [40] and eye diseases of cattle. In Siddha medicine, the oil from the white variety of the plant is used as an aphrodisiac. The presence of phytochemicals such as Abrin and abric acid in the plant [39] could be responsible for its therapeutic efficacies. A study by Adedapo and co-workers (2007) to determine the toxic effect of the aqueous leaf extract showed an increase in total serum protein, albumin and total bilirubin concentrations and the activities of alanine transaminase, aspartate transaminase and alkaline phosphatase in rats, This showed that the aqueous extract of the leaf is toxic and caution should be exercised in its use for medicinal purpose [41]. The trypanocidal activity of the methanol seed extract and its fractions have been confirmed and alkaloids are thought to be responsible [42] while the chloroform-methanolic extract of the seed show anti-diabetic properties similar to that of chlopropamide in their similar percentage reduction of blood glucose level [43].

Desmodium velutinum is traditionally used in India to treat stomatitis and diarrhea [40]. The root of the plant is used in Ayurvedic medicine as a good cardiogenic and nerve tonic. It is also used as a diuretic and laxative, as well as for the cure of fever, cough, breathing difficulties and burning sensation [44]. It is used among the Hausa-Fulani people of Northern Nigeria to treat different types of cancer [45]. *Desmodium velutinum* contains high quantities of tannins and less of resins, glycosides, saponins and flavonoids [46], that could be responsible for its applications in traditional medicine. Ezike et al. [47] evaluated the gastrointestinal and antibacterial properties of the methanolic leaf extract and its fractions and showed that it has gastrointestinal antimitility and antispasmodic effects.

In all areas where *Caesalpinia bunduc* is distributed in Africa, its leaves, bark and root are used in the treatment of fever, headache, chest pain and as an anthelmintic. In West Africa, it is also used as a rubefacient and as a tonic in the treatment of jaundice, diarrhea and skin eruptions. At the Kenyan coast, the seed and decoctions of the leaves and roots are taken to treat asthma and complications during menstruation, to avoid miscarriage and as eye drops to treat internal blood clots in the eye. In Tanzania, the powdered kernel of the seed is taken with water to treat diabetes mellitus, while in Somalia and India, the oil and the bitter extract from the seeds, known as "poor man's quinine" are used in the treatment of rheumatism and malaria, respectively [48], while the fruits are used as aphrodisiac, anthelmintic, pile remedy, wound healing and as cure for urino-genital discharges. Phytochemicals like alkaloids, glycosides and terpenoids have been found in the seed kernel, while the bark contains flavonoids, and the leaves some fatty acids and alcohols [49], which could be responsible for its medicinal effects. The antioxidant property of the ethanolic extract of the young twigs and leaves has been studied with results showing increased catalase and peroxidase activities and decreased concentration of thiobarbituric acid reactive substances (TBARS) in the extract-tested rats in comparison with normal control, vitamin C and amodiaquine treated rats [50].

Ageratum conyzoides is used in Central Africa to treat pneumonia, wounds and burns. In India, this plant is used as an antibiotic, anti-dysenteric and antilithic, while in Cameroon and Congo, the aqueous extract of the leaf or whole plant it is used in the treatment of fever, rheumatism, headache, diarrhoea, spasms, and as a tonic [51]. Pharmacological investigations showed analgesic effect of the aqueous extract of the leaf [52], while the aqueous extract of the whole plant also demonstrated muscle relaxing activities, confirming its popular use as an antispasmodic agent [53]. Among the secondary metabolites identified in *Ageratum conyzoides* are flavonoids, alkaloids, coumarins and tannins, many of which

have been proven to be pharmacologically active [51]. The cytotoxic effect of ethylacetate extract the plant on cancer cell lines as well as its radical scavenging activity have been studied [54] while the antibiotic, anti-inflammatory and analgesic properties of the ethanolic leaf extract have been verified [55]. The characterization of the essential oil of *A. conyzoides* flower using GC and GC-MS revealed the predominance of demethoxyageratochromane. Other constituents are β -caryophyllene, β -cubebene, germacrene, α -caryophyllene and trans- β -farnesene [56].

The whole plant of *Argemone mexicana* is used in Ayurvedic medicine against guinea worm infestation, skin diseases, itching and inflammation, as well as in the treatment of all types of poisoning, constipation, vesicular calculus, colic, malaria fever and flatulence, while in Mali, traditional healers use the plant to treat malaria, seed oil dropsy, jaundice, skin diseases, sore eyes, red eyes, ophthalmia and body sores [40]. In Mexico the seed is used as an antidote to snake venom, while the fresh yellow milky seed extract contains protein-dissolving substances that are considered effective in the treatment of warts, cold sores, cutaneous infections, skin diseases, itches, dropsy and jaundice [57]. The seeds contain 22-36% of a pale yellow non-edible oil called argemone or kalkar which contains the toxic alkaloids, sanguinarine and dihydro sanguinarine. Four quaternary isoquinoline alkaloids, namely, dehydrocorydalmine, jatrorrhizine, columbamine and oxyberberine have been isolated from the whole plant of *Argemone mexicana* [58] and are possibly responsible for its medicinal properties. The seeds are used to treat gum troubles by applying powdered dried seeds on gums once a day [59].

Phyllanthus amarus is used for the treatment of gall stones, kidney stones, pile, sores and skin diseases, while other reports suggest that the plant is also used for treating diabetes in other regions of the world [60-64], while a decoction of *Phyllanthus amarus* with the fruits of *Tamarindus indica* is often orally taken to treat fever [39]. Other workers have revealed the chemical constituents of the plant that are responsible for these effects to be phyllantin, hypophyllantin, inulin, saponins and flavones [65]. Acute toxicity study of the methanolic extract of *P. amarus* gave median lethal dose LD₅₀ greater than 5000 mg/Kg and it has a dose-dependent hypoglycaemic activity in normoglycaemic and alloxan-induced diabetic rats, comparable to the standard drug, glibenclamide [66]. *Phyllanthus amarus* also inhibits the growth of Gram-positive and Gram-negative bacteria [67].

A decoction of the flower of *Spilanthes filicaulis* mixed with the stem bark and trunk of *Nuxia floribunda* is used for the treatment of impotence in Uganda, while a decoction of the leaf is used for treating rheumatism in Central Africa by washing the affected body part with it. A decoction of the young leaves is used against snake venom in Zaire, tooth ache, stomachache, gastritis and malaria in the Cameroons, while in Nigeria, the mixture of the flower with the seeds of alligator pepper, *Aframomum melegueta* in dry gin is a traditional treatment for sore throat and sore gum. Diarrhoea is treated in East Africa by chewing the roots and or drinking the extract obtained from the maceration of the plant (Prelude Medicinal Plant Database). In a study to provide scientific proof for the use of *Spilanthes filicaulis* in conditions associated with pains and infections, Ekor and coworkers [68] reported that the aqueous extract possesses a dose-dependent analgesic activity (100-400 mg/Kg), and also inhibited the growth of *Escherichia coli* and *Klebsiella pneumonia* but not *Bacillus subtilis* and *Staphylococcus aureus* at this dose range, *Spilanthes filicaulis* is used to treat. The flowers of the plant have been reported to contain spilanthol, a local anaesthetic [69]. It could be used to treat sixteen ailments which would respond to antimicrobial, analgesic and antitumour activities of plants. Therapeutically, *Spilanthes filicaulis* could be combined with

honey and other plants like *Allium sativum*, *Kigelia africana*, *Euphorbia hirta* and *Hoslundia opposita* [70].

Cassytha filiformis is a parasitic plant that infests a wide variety of plants in many tropical regions of the world that is used to treat jellyfish stings in Fiji, trypanosomiasis in parts of Nigeria [5, 71] and purportedly used by different Polynesian cultures to treat cancer. To ease labour pains, quicken labour time and lubricate the birth canal, the drinking of the juice made from crushed vines for four weeks before the expected date of birth is prescribed by traditional midwives. In Palau, a combination of the juice from the bark of *Terminalia cata*, *Cassytha filiformis* and copra is a treatment for gonorrhoea. Phytochemical analysis revealed the presence of ocotein, an alpha 1-adrenoceptor blocking agent in rat thoracic aorta, with wide ranging application in humans, including inhibiting certain carcinogenesis such as prostate cancer, and anti-platelet aggregation activity [72]. The aqueous and methanolic extracts of the aerial parts of the plant are active against Gram-negative bacteria and the activity could be attributed to the phytochemicals contained- alkaloids, flavonoids, triterpenoids and steroids [73].

Chenopodium ambrosioides is an annual, short-living perennial herb that has been used for centuries as condiment, traditional purgative, dewormer and other medicinal purposes, including as traditional treatment for pains, inflammation and diabetes [74]. A study of the hypoglycaemic effect of the leaf extract on streptozotocin-induced diabetic mice showed that the methanol extract significantly ($p < 0.05$) lowered the blood sugar level [75]. The extracts of the plant have also been shown to have therapeutic effects against viruses, bacteria, fungi, nematodes and insects, while phytochemical screening of the plant revealed the presence of alkaloids, flavonoids, terpenoids and volatile oils [75] as the principal natural products exerting the various medicinal actions. The compound hexadec-12-enoic acid extracted from *Chenopodium ambrosioides* possesses antipyretic, hypothermic and anti-inflammatory activities [76].

The leaf extract of *Eclipta alba* is considered a powerful liver tonic as well as uses for external uses such as hair tonic, treatment of athlete foot, eczema and dermatitis, and as antidote against scorpion stings and snake venom in China and Brazil [77]. The herb is reported to contain a number of coumestans, including wedelolactone and demethylwedelolactone which are known to possess antibacterial and estrogenic activities as well as strong therapeutic activity against hepatitis, livers cirrhosis and haemorrhages. Other phytochemical constituents found in *Eclipta alba* polypeptides, polyacetylenes, thiophene-derivatives, steroids, triterpenes and flavonoids [77].

Among the Igbo ethnic group of Nigeria, the leaves and fruits of *Dennetia tripetala* are used for the treatment of fungal infections, cough and enhancement of appetite, while the fruits and seeds are offered as signs of hospitality for visitors [78]. The peppery fruits of *Dennetia tripetala* are included in the diet of pregnant women postpartum women to aid uterine contraction [79]. Among the phytochemicals of *Dennetia tripetala* are phenolic acids, alcohols, alkaloids, esters, flavonoids, tannins and glycosides [78].

Newbouldia laevis is traditionally used in the treatment of stomach discomfort, diarrhea, dysentery, elephantiasis, rheumatic swellings, constipation and pile, as well as a remedy for wound healing, earache, chest pain, epilepsy and convulsion in children [80]. Recent phytochemical studies of the root, bark and stem revealed the presence of alkaloids, quinoid and phenylpropanoid among others [80] which could endow it with the blood-sugar lowering activity it is used for in the Ebira traditional medicine. The anti-diabetic activities of the

ethanolic extract of the leaf [81] and flower [82] as well as the antinociceptive and anti-inflammatory properties of the flower [83] have been reported.

5. CONCLUSION

Considered together, this survey has revealed that the Ebira people of Kogi State use their vegetation for treating a wide range of diseases from historical time. Though the traditional medical practitioners in this culture may be ignorant of the bioactive constituents of various plants they prescribe, scientific evidence from literature suggests that these herbal prescriptions may actually be effective against the diseases indicated. However, in addition to this documentation of the indigenous knowledge of the Ebira people, there is further need to validate the therapeutic efficacy of these plants for the practical management of the diseases for which they are claimed useful.

ACKNOWLEDGEMENTS

The authors appreciate the efforts and assistance of Mrs Onyionogidi, Mr. A. Samuel and Mr. Yusuf Onsachi and other respondents in identifying and collecting the plant materials. We also thank Musa Mohammed of the Herbarium Section of the Department of Biological Sciences for botanical classification of the plants. The map of the study area was produced by Mr Ilemona Solomon Atawodi.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Questionnaire for Ethnomedical Survey

- 1 Name of respondent
- 2 Occupation
- 3 Address
- 4 Name of disease (English)
- 5 Clinical signs
- 6 How often do you experience the disease?
- 7 Local name of the disease
- 8 What period of the year is the disease prevalent?
9. Local product used for treatment
10. How is the product used for treatment?
- 11 What are the ingredients used?
12. How are the ingredients mixed?
13. If plant, what part of the plant is used
14. What is local name of the plant? (Specify language)
15. How is the plant prepared for use?
16. How is it administered?
17. For how long is it administered?
18. Do you consider it effective?
19. What side effects are common with this treatment?
20. What other diseases can this plant be used for?
21. Any other relevant information?

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