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Qualitative Phytochemical Analysis of Active Constituents of Some Ethnomedicinal Plants in Ofutop Clan in Ikom Local Government Area of Cross River State, Nigeria

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***Abstract* - Qualitative phytochemical analysis of ten plants of ethnomedicinal importance in Ofutop clan of Ikom Local Government Area of Cross River State, Nigeria was carried out to ascertain the active constituents present in these medicinal plants. The plants studied were *Cha-smantheradependensJustica carnea, Asystacia gangetic, Starchytarphetacayenensis Eremomastax polysperma, Senna alata, Costus afer, Vernonis amygdalina Lasienthera africana and Bryophyllum pinnatum*. Ethanolic extracts of leaves of these different plant species were screened to ascertain the presence of alkaloid, tannin, saponin, cardiac glycoside, flavonoid, phlobatannin, phenol, anthraquinon, terpeniod and steroid. The qualitative study indicated that alkaloid was present in all the plants while saponin was absent in *Justica carnea* and *Asystacia gangetica* but present in others. Also, tannin was absent in *Asystaciagangetica, Costusafer, Senna alata* and *Vernonia amygdalina* but was presence in others. The study showed that flavonoid was present in all the plant extracts while cardiac glycoside was absent in Justica, but present in others. Steroid was present in eight plants but absent in Abystacia and Vernonia. The extract also showed the presence of eight phytochemicals in Bryophyllum and the absence of phlobatannin and anthraquinon. The different phytochemicals in those plants are said to perform different biological and medicinal activities in humans, which when extracted in large quantity and commercially could be used to synthesize exotic bioactive drugs. It was therefore recommended that, further screening be done on quantitative analysis of the extract in order to give an insight to the pharmaceutical industries for the manufacturing of drugs for the cure and prevention of many diseases of human.**

Keywords: Ethnomedicine Medicine, Medicinal plantsand Phytochemical.

1. Introduction

Plants provide a conducive condition and environment for the inhabitant of animals including humans. Humans have over the years used plants as food, for the construction of shelter and for the management of many ailments affecting humanity. Naturally, the oxygen taken by humans is provided by plants, and many of these plant parts such as leaves, roots, barks and fruit contain phytochemical substances, which when consumed, purify the blood, boost the immune system, detoxify body organs and kill dangerous pathogenic organisms. Their ability to combat diseases is based on the active ingredients such as tannins, alkaloids, Saponins, Phenols and other substances [8]. [9], posit that many plants' active ingredients like those extracted from *Eromomastaxspeciosa* and *Eromomastax polysperma* help to cure pain, sickle disease and anaemia. Ethnomedicinal plants' parts ranging from roots to fruits are used for the curation of many commonest ailments such as malaria, typhoid, cholera etc.

[16], reports that across the world, rural people rely on traditional local knowledge of medicinal plants for primary healthcare. As reported by [2] and [7], rural communities use *Berberisaristata, Zanthoxylumartmatum, Ogmum sanctum, Cynodondactylon, FicusauriculataCanibissativum* etc. For the effective treatment of different types of human diseases. It has been reported that 80% of the rural population in the developing communities relies on traditional medicines for primary healthcare. These traditional plants are safe, cheap and easily and readily available in the surroundings (Fabricant and Farnsworth, 2010). Many of the herbs and plants species used by humans to season food and yield many medicine compounds. They also have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions. [2] and [7] asserted that, rural communities in developing countries use plant species as

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traditional medicine, which provide a good alternative to exotic medicine and healthcare system. Medicinal plants applied in traditional healing rites have been known to yield active constituents that have aided the production of modern therapeutics. Many common plants around the home and in the wild are important medicinal products spices, foods, preservatives and repellants. Most of these plants have been used extensively for the prevention and cure of diverse diseases of humans and other animals kept or reared by humans. Medicinal plants provide a traditional primary healthcare in both the rural and urban population in the world over.

Chasmanthera dependens (hairy twinners) is a species belonging to the family Meinspermaceae. It is a dependent hairy plant that twines on other plants or nearby object. The leaves are broad while the climbing stem has brown hair or trichomes. The leaf sap is used as a first aid to stop bleeding, as an embrocation to treat pain, stiffness, arthritis and rheumatism. It cures sprain, bruise and dressing of fracture [12].

Justica carnea (shrimb plant) is folkly known as "blood of Jesus" "hospital not too far". Due to its flora structural known as shrimb but water willow is also used based on the redness of the water when it is cooked. It belong to the family Acanthaceae and has reddish crowded flower at the top of the plants. Leaves are cooked and taken as tea, which helps to build the blood, used by pregnant women as blood tonic to ameliorate anaemic condition. It cures inflammation gastrointestinal disorder, diarrhea, liver disease, rheumatism, arthritis etc.

Asystacia gangetica (Weak plant or primerose) is a species of plant in the family Acanthaceae. It is also known as creeping foxglove and it's slightly erected with tiny weak hairs and stem. The leaves of the plant wither easily when it is cut. Medically, *Asystacia gangetica's* leaf decoction is used as analgesic and to treat epilepsy and urethral discharge. It is used for the treatment of asthma and rheumatism. The leaves are also crushed, boiled in water and the decoction taken for the treatment of intestinal worm (antihelminuthes) [4].

Stachytarpheta caynnmensis (rooter comb) is a species of plant in the family Verbenaceae. The plant is a perennial flowering plant (herb) with an upright branching stem and known by the Efiks as "aranumon". The plant has medicinal value in many parts of the world. It is used to treat malaria, fever, dysentery, diabetes, pains, liver disorder etc., particularly when the leaves are boiled and taken as tea. It has anti-inflammatory properties,[6], [12].

Eremomastex polysperma (purple leaf) is a species of plant that belongs to the family Acantheceae. It is locally known by the Efiks (of Cross River State) as "edemididuot". They are branched erected plant with purple colour on the underleaf. They are grown in the yard of most rural dwellers for medicinal purpose. The leaves of *E polysperma* contain alkaloid, tannin, saponin, terpene, flavonoid, anthraquinone, phenol, and cardiac glycoside which induce the treatment of infertility, internal heat, and proper functioning of the ovaries [9], [10].

Senna alata (ringworm bush) is a species of plant that belongs to the family Fabaceae. The leaves are compound which close in the evening and open the next morning. The flowers consist of inflorescence which produces a candle flame appearance. The plant's height is about three meters tall with multibranches which produce flowers and seed pods towards the dry season. Medicinally, *sennaalata's*leaves are used for the treatment of eczema, ringworm and other skin diseases. The leaves are made into tea for the treatment of after-birth problem, fever, cough, cold, headache, kidney disorder and hemorrhage,[7].

Costus afer (Bush cane) is a tall unbranched plant species belonging to the family Zingiberaceae. It is a rhizomatous herb commonly known as ginger lily or bush cane. Every part of the plant is endowed with medicinal potentials in diseases such as malaria, measles, diabetes mellitus, arthritis and stomach disorder. The succulent stem is used to treat cough while the leaves are prepared as tea to combat malaria and other ailments,[2].

Vernonia amygdalina (Bitter Leaf) is a plant basically domesticated in Africa and other regions. It belongs to the family Asteraceae and grows to a height of about three meters. It is a valuable medicinal plant. The leaves are used as active anticancer, anti-malarial and antiparastic agent. The leaves and roots are used to treat fever, hiccups, kidney and stomach problems [13], it is a culinary and nutritive herb because it is used for cooking due to its flavor. It is among the bitter herbs because of the presences of phenols, phenol glycoside, alkaloid and saponin. It is bitterness makes it to be known by the Efiks as "etidot".

Lasienthera africanum (Bush Bitter) is a common plant traditionally known as "editan" in Efik. It belongs to this family Icacinaceae. The plant has dark-green leaves which are both culinary, nutritional and medicinal important. It is bitter and hence, it is a bitter herb due to the presence of phenols. When consumed, it has cooling effects on the body, purifies the body system and prevents internal bleeding. It is also anti-mirobial and anti-inflammatory, [1].

Bryophyllum Pinnatum (Catheral bell) is a herbaceous plant with thick leaves that can remain alive for weeks. The leaves are lobbed and somewhat serrated. It grows up to

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120cm with succulent stem and leaves which are capable of producing new plant vegetatively.

It belongs to the family Crassulaceae. Bryophylluim is a valuable medicinal plant commonly known as "ndodop" in Efik, because of the heaviness and thickness of the leaves. It is popularly known as life plant, micracle plant, air plant or never die and is used for the treatment of diarrhea, diuresis, respiratory tract infections, liver problem etc. The leaves could be chewed raw or processed as tea while the fresh one could be used on boil and wound. It is anti-inflammatory, anti-tumur, anti-viral and anti-bacterial, [10].

The plant species used in this study are used in the treatment of several diseases of humans in Ofutop Clan in Ikom Local Government Area of Cross River State Nigeria. Therefore, this research work was carried out to analyze the active phytochemical constituents of the plants under study that make them to be effective in the treatment various ailments of humans. The results of this research work shall be beneficial to the inhabitants of Ofutop Clan as it would encourage the continuous use of these plant for the prevention and curation of many diseases. It would be of immense benefits to the pharmaceutical industries that may undertake further research in order to extract the phytochemical constituents for the manufacturing of drugs.

2. Materials and Methods

Collections and identification of plant materials

Fleshy plant specimens of ten medical plants were collected in various locations of Ofutop Clan in Ikom Local Government Area of Cross River State, using the method of [14], [15] which involves applying informal consultations and discussions with herbalist, village elders and users of medicinal plants as well as vendors. The plant specimens were taxonomically identified and authenticated by Botanists in Cross River State University of Technology (UNICROSS). The plants were *Chasmanthera dependens, Justica carnea, Asystacia gangetica, Stachytarpheta cayennensis, Eremonastax*plysperma, *Senna alata, Costus afer, Vernonia amygdalnia, Lasienthera africanum*, and *Bryophyllum pinnatum*. The plants leaves were shade-dried for two weeks using herbarium until the water molecules evaporated while the leaves become well dried. After drying, the plant specimens were ground into powder using mechanical means (mortar pounding), and transferred into air tight bottles with roper labeling for use. Table 1: The ethnomedicinal uses and different biological activities of the plant investigated.

Table 1: Ethnomedicinal Uses and Different Biological Activities of the Plant Materials Investigated

Table 1: Ethnomedicinal Uses and Different Biological Activities of the Plant Materials Investigated.

PLANT SPECIES	BIOLOGICAL ACTIVITIES	Source
Chasmanthera dependens	Stoppage of bleeding, pains, stiffness, sprain, bruise, arthritis, rheumatism	[1]
Justica Carnea	Build blood, inflammation, gastro intestinal disorder, rheumatism urethral discharge, rheumatism, epilepsy.	[3]
Azystacia gangetica	Arthritics, asthma, anti-helminthes urethral discharge, epilepsy rheumatism.	[11]
Stachytarpheta cayennensis	Cures malaria, fever, dysentery, diabetes, pain liver disorder, anti-inflammatory	[12]
Eremomastax polysperma	Proper functioning of the ovaries, treatment of infertility, internal heat, low sperm count and proper functioning of the male reproductive organs.	[9]. [10]
Senna alata	Treatment of eczema, ringworm, kidney disorder, after birth problem, fever, headache, cough, cold, hemorrhage.	[7]
Costus afer	Treatment of malaria, measles, diabetes, arthritis, stomach disorder, cough .	[2]
Vernonia amygdalina	Anti-helminthes, treatment of fever, hiccups, kidney, stomach problem, anti-parasitic, anti-cancer, anti-bacteria.	[13
Lasienthera africanum	Cooling effect on the body, purifier, anti-helminthes, and treatment of internal bleeding, malaria, anti-inflammatory, anti-microbial.	[1]
Bryophyllum Pinnatum	Treatment of cough, diarrhea, diuresis, respiratory tract infection, anti-tumor, anti-virus and anti-bacteria.	[8]

Phytochemical screening of active constituents of the plants investigated.

Preparation of plant extracts

Plants materials for phytochemical screening test were extracted using standard methods to identifying the constituents, applying [14] and [15] methods. Twenty kilogram (20kg) of each dry plant part was macerated with ethanol for 24hours. The extract was filtered using whatman filter paper No.42 with enough cotton wool. The extracts were evaporated into dryness using a hot water bath for 72hours and stored in the refrigerator for future use.

Qualitative Phytochemical Analysis

The ethanolic extracts were tested for the presence of alkaloid, tannin, saponin cardiac glycocide, phenol, anthraquinon, phlobatannin flavonoid, terpenoid and steroid as follows:

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Screen for Alkaloids (Mayer's Test)

5mls of each extract was measured into a water glass and stirred with 5mls of 1% aqueous Hcl on a steam bath. 1mls of the filtrate was treated with few drop of Mayer's reagent. A creamy or white precipitate indicated the presence of alkaloid.

Screening for Training

5mls of each extract was stirred with 2mls of distilled water. This was then filtered, 1mls of the solution was put in the test tube with 3 drops of ferric chloride solutions. A deep greenish-black coloration or blue green precipitate was an evidence of tannin.

Screening for Saponin

5mls of each plant extract was shaken vigorously with water in a test-tube. Frothing which persisted on warming showed the presence or saponin

Screening for Cardiac Glycosides (Salkowski's Test)

5mls of each plant extract was mixed with 2mls of chloroform, then, 2mls of concentrated H_2SO_4 was added carefully and shaken to form a lower layer. A redish-brown colour at the interphase indicated the presence of steroidal ring which is a glycone portion of a cardiac glycoside.

Screening for Phenol

About 2mls of ferric chloride solution was added to 5mls of the extract in a watch glass. Bluish or blue-green colour observed, indicated the presence of phenol.

Screening for Anthraquinon

Few drops of magnesium acalate solution were added to 2mls of the extract. The formation of pink colour showed the presence of anthraquinon.

Screening for Phlobatannin

5mls of each extract was boiled with 1% aqeous hydrogen chloride. Deposition of red precipitate observed, indicated the presence of phlabotannin.

Screening for Flavonoid (Treases And Evans, 1989)

5mls of each plant extract was added to 5mls of diluted ammonia solution, followed by the addition of 5mls of concentrated sulphuric acid. A yellow coloration indicated the presence of flavonoid.

Screening for Terpenoid

Each extract of 5mls was mixed with 2mls of chloroform and 3mls of concentrated sulpuric acid were carefully added to form layers. Redish-brown colorations of the interphase formed, indicating the presence of terpenoid.

Screening for Steroid

Exactly 2mls of acetic anhydride was added to 5mls of the extract with 2mls of H2SO4. The colour changed from violet to blue indicating the presence of steroid.

3. Results and Discussion

The phytochemical constituents of the plants were investigated using ten medicinal plants. The plants sampled revealed the presence of medicinally active constituents as summarized in table 2.

Table 2: Qualitative Phytochemical Screening of the Plant Species studied using Ethanolic Extract

S/N	PLANT	extract	A	T	S	Cg	F	P	Ph.	An	Te	St
1	*Chasmanthera dependens*	Ethanol	-	+	+	-	+	-	+	+	-	+
2	*Justica carnea*	"	+	+	-	-	+	+	+	+	+	+
3	*Asystacia gangetica*	"	+	-	-	+	+	+	-	-	-	-
4	*Stachytarpheta cayennesis*	"	+	+	+	+	+	-	+	+	+	+
5	*Eremomastax polysperma*	"	+	+	+	+	+	+	+	+	+	+
6	*Senna alata*	"	+	-	+	+	+	-	+	+	+	+
7	*Costus afer*	"	+	-	+	+	+	-	+	-	+	+
8	*Vernonia amygdalina*	"	+	-	+	+	+	-	+	-	-	-
9	*Lasienthera africanum*	"	+	+	+	+	+	-	+	+	-	+
10	*Bryophyllum pinnatum*	"	+	+	+	+	+	-	+	-	+	+

where A= Alkaloid, T= Tannin, S= Saponin, Cg=Cardiac glycocide, F= Flavonoid, P= phlobatannin, Ph= Phenol, An= anthraquinon, Te= Terpenoid and St= Steroid

The ethanolic extracts were tested for the presence of alkaloid, tannin, saponin cardiac glycocide, flavonoid, phlobatannin, phenol, anthraquinon, terpenoid and steroid.

The phytochemical analysis carried out on the plant extracts revealed the presence of active constituents which are found to exhibit medicinal, biological and physiological properties. This was in line with the earlier studies of [9] and [7]. Analysis of the plant extract revealed the presence of alkaloid, tannin, saponin, cardiac glycocide, phenol, anthraquinon, phlobatannin, flavonoid, terpenoid and steroid. It was evident that these phytochemicals are contained in the leaves of the plants which are commonly used for the treatment of several diseases, as revealed in table 2, such as malaria, stomach disorder, inflammation of the urethra, kidneys, liver and ovaries, diabetes, infertility, internal heat,

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anaemia and other disease of humans. The phytochemical screening revealed that all the plants investigated contained alkanoid and flavonoid which are of great medicinal important such as antimalaria, anti-asthmatic, anti-cacer, as reported by [8].*Chasmantheradependens* contained, alkaloid, tannin, saponin, flavonoid, Phenol, anthraquinnon and steroid while cardiac glycoside, phlobatannin and terpenoid were lacking. The presence of these active ingredient help in the curation of sprains, arthritis, rheumatic, stoppage of bleeding and fracture dressing as reported by ogunlesi, [1]. *Justica carnea* has been found to contain eight of the phytochemicals while saponin and cardiac glycoside were not found. The presence of diverse phytochemical substances induce the curation of arthritis, asthma, intestinal disorder, rheumatism and gastroenteritis as observed [3]. Asystacia gangetica is a medicinal plant that is used for the cure of arthritis, asthma, urethral discharge, leprosy and rheumatism ([11]. Its potency in the curation of variety of diseases is due to the presence of alkaloid, cardiac glycoside and flavonoid, as evident in the study. However, tannin, saponin, Phenol, anthraquinon, terpenoid and steroid were not found.

Stachytarphetacayennensis has high medicinal value as it is used to curation of many diseases such as malaria, fever, dysentery, diabetes, pain, liver problem and stomach disorder [6] and [12]. The ability to combat diseases results from the presence of important phytochemicals used for the study except phlobatannin.

One of the most important medicinal plants is *Eremomastax polysperma* which has been observed to contain all the phytochemical constituents screened in the study. These chemicals are very active in the proper functioning of the ovaries of a woman, treatment internal heat and infertility [9] and [10].

Senna alata was found to contain eight (8) phytochemicals while tannins and phlobatannin were not found. The presence of these phytochemicals enhance the curation of ringworm,eczema, after birth problem, fever, cough, headache, [7]. *Costusafer* was found to contain alkaloid, Saponin, cardiac glycoside, flavonoid, phenol, terpenoid and steroid while tannin, phlobatannin and anthraquinon were not found. The plant has anti-diabetes, anti-inflammatory and anti-microbial properties. It cures cough, stomach disorder, malaria and measles [2]. Vernonia amygdaline contained alkaloid, saponin, cardiac glycoside, flavonoid and phenol, while tannin, phlobatannin, phenol, anthroquinon, terpenoid and steroid were not found. Alkaloid and other phytochemical found are very active in the treatment of worms, fever, hiccups, stomach problem, and cancer[13].

Lasientheraafricanum leaves extract was found to contain many phytochemicals analyzed in the study, except, phlobatannin, and terpernoid. Many researchers found that, Lasienthera has cooling effect in the body when the content is extracted and use as edema. It cures malaria and purifies the blood as well as anti-inflammatory, anti-microbial and anti-helminthes [1].*Bryophyllumpinnatum* contained very many phytochemicals as analyzed in the study but lacked phlobatannin and anthraquinon. The plant's leaves, as reported by many researchers, are used for the treatment of respiratory tract infection, diarrhea, diuresis, tumur, and cough [8].

4. Conclusion

The results of the study revealed the presence of medicinally, biological, therapeutic and physiological important constituents of the studied plants. Several studies have confirmed the presence of these phytochemicals in the treatment of several diseases of humans which are also sources of useful drugs and pharmaceutical products. Therefore, these plants are highly recommended for use, as traditional medicines it was investigated that further studies be carried out to elucidate the structure of the active chemicals used in the study.

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