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Preliminary Phytochemical Screening of Some Indigenous Medicinal Plants Used In the Treatment of Tuberculosis in Bauchi State, Nigeria.

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Abstract: *Preliminary phytochemical screening of medicinal plants used in the treatment of tuberculosis and other respiratory diseases in Bauchi State was carried out. The result revealed that stem-bark of Erythrina senegalensis DC. showed positive test for tannin, saponin, flavonoid, steroid, terpene and glycoside but negative test for alkaloid, anthraquinone and phenol. The aerial part of Striga hermonthica (Del.) Benth showed positive test for tannin, saponin, flavonoid, steroid and terpene but negative test for alkaloid, glycoside, anthraquinone and phenol. The root-bark of Tamarindus indica L. showed positive test for alkaloid, steroid, terpene, glycoside, and anthraquinone but negative test for tannin, saponin, flavonoid and phenol. The leaves of Ximenia americana L. showed positive test for tannin, saponin, steroid, glycoside and anthraquinone but negative test for alkaloid, flavonoid, terpene and phenol. The leaves of Vitellaria paradoxa Gaertn.f showed positive test for tannin, saponin, flavonoid,steroid and phenol but negative test for alkaloid, terpene, glycoside and anthraquinone. The extract of Whole plant of Euphorbia hirta L. showed positive test for alkaloid, tannin, flavonoid, saponin, and glycoside but negative test for steroid, terpene and anthraquinone. The Leaves of Pilostigma reticulatum (DC) Hochst showed positive test for alkaloid, tannin, saponin and flavonoid but negative test for steroid, terpene, glycoside, anthraquinone and phenol. The Leaves of Waltheria indica L.showed positive test for saponin, steroid,terpene and phenol but negative test for alkaloid, tannin, flavonoid, glycoside and anthraquinone. The Root of Cissampelos mucronata A. Rich showed positive test for alkaloid, tannin, saponin and steroid but negative test for flavonoid, terpene, glycoside, anthraquinone and phenol.*

Keywords*: Phytochemical screening, Erythrina senegalensis, Striga hermonthica, Tamarindus indica, Ximenia Americana, Vitellaria paradoxa, Euphorbia hirta, Pilostigma reticulatum, Waltheria indica, Cissampelos mucronata*

I. Introduction

Plants are natural reservoirs of chemical compounds useful to man not only as food ingredients but also as source of medicines or remedies for the numerous human ailments. Different parts of plants have proven therapeutic potential for the treatment of many diseases. Using plants for medicinal purposes is an important aspect of many cultures and traditions in most part of the World (Sofowora, 1993).

Despite the influence of orthodox medicines, medicinal plants have remained a very important aspect of health care especially in rural areas. It was reported that 80% of world's population relies on traditional medicines as primary source of their medication (Newman, 2006). In some countries like China, India and Vietnam the research into medicinal plants has been fully developed and plant-based remedies have been incorporated as alternative or complementary medicines to supplement the modern drugs. However, in Nigeria like in most African countries the research into medicinal plants has not been given a desire attention as such the therapeutic potentials of these natural endowments were under-utilized (Ogundaini, 2005).

Several plant extractives have showed significant inhibitory activity against microscopic pathogens like bacteria, fungi and viruses (Kubmarawa *et al.,* 2007; Tanaka *et al*., 2010). Some medicinal plants were used in folklore medicine to treat respiratory diseases like asthma, cough, sorethroat, cold, cataarh, whooping cough and symptoms of tuberculosis therefore such plants may contain bioactive agents that are responsible for the observed therapeutic potentials (Uba *et al.,* 2003; Gupta *et al.,* 2010).

With the current trends of the high depletion of tropical forest resources and little known about most of the world's plant species especially African tropical rain forest floras, there is need to document the medicinal flora of indigenous communities. Predominant communities in Bauchi State are Kare-Kare, Ningawa, Gyarawa, Jarawa and Hausa-Fulani. These communities are well-known in Nigeria for combining orthodox and traditional medicines especially in the treatment of witches, asthma, leprosy, tuberculosis, jaundice and other respiratory diseases. Screening of medicinal plants has provided an insight into valuable chemical constituents with proven therapeutic effects. Therefore, the Plants used for this study are selected based on the folkloric claims that they

are effective or frequently prescribed in the treatment of tuberculosis and other respiratory diseases in Bauchi State, Nigeria.

II. Materials And Methods

Plant material

Sample collection and identification

The plants samples were collected in Bauchi State, Nigeria using standard method. The freshly collected plant samples were identified by Prof. S.D. Abdul Department of Biological science, Abubakar Tafawa Balewa University Bauchi, Nigeria and Voucher specimen was deposited in the Departmental Herbarium as described by Zailani, *et al*.,2010, Abdalfatah, *et al*., 2013.

Identification number	Scientific name	Local name	Family	Part Collected	Location
001	Striga hermonthica (Del.) Benth.	Makasa(H)	Scrophulariaceae	Aerial parts	Azare
002	Ximenia americana L.	Tsada(H)	Olacaceae	Root	Shira
003	Tamarindus indica L.	Tsamiya(H)	Caesalpiniaceae	Leaves	Shira
004	Waltheria indica L.	Hankufa(H)	Sterculiaceae	Leaves	Misau
005	Pilostigma reticulatum (DC) Hochst	Kargo(H)	Caesalpiniaceae	Leaves	Azare
006	Cissampelos mucronata. A. rich.	Kunnen Damisa(H)	Menispermaceae	Root	Misau
007	Euphorbia hirta L.	Nonon kurciya(H)	Euphorbiaceae	Whole plant	Misau
008	Erythrinasenegalensis DC.	Minjirya(H)	Fabaceae	Stem bark	Azare
009	Vitellariaparadoxa Gaertn.f.	Kadanya(H)	Scrophulariaceae	Leaves	Shira

Fig. 1: List of the selected medicinal plants and the parts used in the study. **Key: H= Hausa Language**

Methods:

Drying and Pulverising

The samples the plants were dried under shade. The fresh samples were spread out and turned regularly. The well dried samples were pulverized into fine powder using a wooden mortar and pestle. The powder of each sample was weighed using analytical balance and kept at room temperature until use (Ibrahim, *et al*., 2012).

Extraction of plant samples

The plants samples were subjected to exhaustive extraction using soxhlet extractor. One hundred grams (100g) of each sample and 99.5% Methanol was used in the extraction process. The crude extract of each sample was concentrated in an oven at 40°c. The Methanol extracts were then packed in plastic bottles with proper labeling for future use.

Qualitative Phytochemical analysis

The Qualitative analysis of the extracts was carried out in accordance with standard methods as described by Harborne (1973), Trease and Evans (1989) and Sofowora (1993).

Test for Alkaloids

Few drops of picric acid solution were added to 2ml of the extract. An orange colouration indicates the presence of alkaloids.

Test for Flavonoids

Sodium hydroxide test: 5g of the sample was weighed and detanned completely with acetone. The mixture was warmed on water bath to evaporate the acetone. The residue was then extracted with water on a water bath. The mixture was filtered and the filtrate was used for the test. 5ml of 10% sodium hydroxide was added to an equal volume of the detanned water extract. A yellow solution indicates the presence of Flavonoids.

Test for Terpenoid

About 0.2g extract was mixed with 2ml Chloroform and 3ml of concentrated sulphuric acid was added carefully to form a layer. A reddish brown coloration of the interface formed indicates the presence of terpenoids.

Test for Tannins

2g of the sample was boiled in 50 ml distilled water for 30 minutes on a hot plate. The mixture was then filtered and a portion of the filtrate was diluted with sterile water in a ratio of 1:4 and 3 drops of 10% ferric chloride solution was added. A blue or green color indicates the presence of tannins.

Test for Saponins

Froth test: 1g of the sample was weighed into a conical flask in which 10ml of sterile distilled water was added and boiled for 5 minutes. The mixture was filtered and 2.5 ml of the filtrate was added to 10 ml of sterile distilled water in a test tube. The test tube was shaken vigorously for about 30 seconds and allow to stand for half an hour. Persistent honey comb froth indicates the presence of Saponins(Ghambal *et al,* 2014).

Test for Steroids

2 ml of acetic anhydride was added to 0.5g of the extract follow by 2 ml of Sulphuri acid. A violet color turns to blue which indicates the presence of steroids.

Test for Anthraquinones

0.5g of the plant extract was shaken with 10 ml of aqueous sulphuric acid and then filtered while hot, the filtrate was then shaken with 5 ml of benzene, the benzene layer separates and half its own volume of 10% ammonia solution was added. A violet or red coloration in the ammonical (lower) phase indicates the presence of combined Anthraquinones(Ghambal et al., 2014).

Test for Phenol

25 ml of extract was added to 2 ml of ferric chloride solution, formation of deep bluish green solution indicates the presence of phenols.

Test for Glycosides

25 ml of 1% Sulphuric acid was added to 5ml of the extract in a test tube and boiled for 15minutes, cool and neutralize with 10% sodium hydroxide, and then 5ml of fehling's solution **A** and **B** was added. A brick red precipitate of reducing sugars indicates the presence of Glycosides

RESULTS:

Table 1: Phytochemical Screening of Methanol Extracts of the Plant Samples.

Parameters	EXTRACTS								
	E_1	E_2	E_3	E_4	E_5	E_6	E_7	E_8	E_9
Alkaloids	-	-	+	-	-	+	+	+	-
Tannins	-	+	+	+	+	+	+	-	+
Saponins	+	+	+	+	+	+	+	-	+
Flavonoids	-	-	+	+	+	-	+	-	+
Steroids	+	+	-	+	+	+	-	+	+
Terpenes	+	-	-	+	-	-	-	+	+
Glycosides	-	+	-	-	-	-	+	+	+
Anthraquinones	-	+	-	-	-	-	-	+	_
Phenols	+	-	-	-	+	-	+	-	_

Key:

+ = present

- = absent

$E_{1=}$ Leaf extract of Waltheria indica

$E_{2=}$ Stem bark extract of Ximenia americana

$E_{3=}$ Leaf extract of Pilostigma reticulatum

$E_{4=}$ Aerial part extract of Striga hermonthica

$E_{5=}$ Leaf extract of Butyrospermum paradoxum

$E_{6=}$ Root extract of Cissampelos mucronata

$E_{7=}$ Whole plant extract of Euphorbia hirta

$E_{8=}$ Root-bark extract of Tamarindus indica

$E_{9=}$ Stem-bark extract of Erythrina senegalensis

III. Results And Discussion

The result of the preliminary phytochemical screening of the methanol extracts of the plants was presented in table 1. The result revealed that stem-bark of *Erythrina senegalensis DC.* contained tannins, saponins, flavonoids, steroids, terpenes and glycosides but showed a negative test for alkaloids, anthraquinones and phenols. The aerial part of *Striga hermonthica (Del.) Benth* contained tannins, saponins, flavonoids, steroids and terpenes but showed a negative test for alkaloids, glycosides, anthraquinones and phenols. The root-bark of *Tamarindus indica L.* contained alkaloids, steroids, terpenes, glycosides, and anthraquinones but showed a negative test for tannins, saponins, flavonoids and phenols. The leaves of *Ximenia Americana L.* contained tannins, saponins, steroids, glycosides and anthraquinones but showed a negative test for alkaloids, flavonoids, terpenes and phenols. The leaves of *Vitellaria paradoxa Gaertn.f* contained tannins, saponins, flavonoids,steroids and phenols but showed a negative test for alkaloids, terpenes, glycosides and anthraquinones. The extract of Whole plant of *Euphorbia hirta L.* contained alkaloids, tannins, flavonoids, saponins, and glycosides but showed a negative test for steroids, terpenes and anthraquinones. While the Leaves

extract of *Pilostigma reticulatum (DC) Hochst* contained alkaloids, tannins, saponins and flavonoids but showed a negative test for steroids, terpenes, glycosides, anthraquinones and phenols. The Leaves extract of *Waltheria indica L.*contained saponins, steroids,terpenes and phenols but showed a negative test for alkaloids, tannins, flavonoids, glycosides and anthraquinones. The Root extract of *Cissampelos mucronata. A. Rich* contained alkaloids, tannins, saponins,and steroids but showed a negative test for flavonoids, terpenes, glycosides, anthraquinones and phenols. Okpako and Ajaiyeoba (2004) also reported the presence of saponins, tannins, flavonoids, volatile oils and cardiac glycosides in *S. hermonthica*. Diallo, *et al*., 1999,Olowokudejo, *et al*., 2008 and Zailani *et al*, 2010 also reported the presence of steroids, tannins, saponins, and cardiac glycosides in *W. indica.* Naznin and Monirul, 2009 has also reported the present in the plant include flavonoids, saponins, alkaloids and glycosides and cardiac glycosides in *T. indica*. The result of phytochemical screening of the stem bark of *P. reticulatum* agreed with the findings of Dosso *et al*., 2012. Abd alfatah *et al*., (2013) also reported the present of steroids, terpinoids, alkaloids, flavonoids, tannins, saponins and glycosides in *X.americana.* Tanko *et al*.,(2007) has also reported the presence of flavornoids, saponins, tannins, cardiac glycosides resin, reducing sugar and steroids in *C. mucronata.* The preliminary phytochemical screening of *V. paradoxa* agreed with the findings of Kubmarawa *et al*., 2007. The preliminary phytochemical screening of stem bark of *E. senegalensis* agreed with the findings of Saidu *et al*., 2000. The preliminary phytochemical screening of *E. hirta* agreed with the findings of Atallah and Nicholas, 1972.

Flavonoids have a wide range of biological activities like antimicrobial, anti-inflammatory, antiangionic, analgesic, anti-allergic, cystostatic and antioxidant properties, anticancer activities (Hodek *et al*., 2002).Tannins are known to interact with protein to give the astringent effects which is important for the treatment of ulcer (Adegboye *et al*., 2008). Tannins have been found to form irreversible complex with proline-rich protein (Shimada, 2006) resulting in the inhibition of cell protein synthesis. Steroids were reported to exhibit strong antiviral properties and steroidal extracts from some medicinal plant have showed antibacterial activities on some bacterial isolates (Quilan *et al.*). Alkaloids have wonderful physiological effect on human and used for the development of powerful analgesic drugs (Kam and Liew, 2002). Interestingly, the most common biological properties of alkaloids are their toxicity against cells of foreign organisms which makes them good antimicrobial agents.

Secondary metabolites such as alkaloids, flavonoids, terpenes, steroids, tannins, saponins, cardenolides (cardiac glycosides), anthraquinones are usually biologically active in both humans and animals (Sofowora, 1993). The presence of these compounds will make the plants useful for treating several ailments since pharmacological activity of plant is usually traced to a particular compound(s). Many plant species in Nigeria were reported to be used in traditional medicine for treating of respiratory diseases such as asthma, catarrh, chronic bronchitis, cough, hay-fever, hemoptysis, pneumonia, pulmonary disorders and tuberculosis (Mann *et al.,* 2007). The curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites. Therefore, apart from giving an insight into valuable chemical constituents, screening of different parts of medicinal plants would be a prerequisite for evaluation of the pharmacological activities of a plant.

In conclusion the findings of this research study suggest that these plants contained important phytochemicals which could be the reason for their folkloric uses in the local communities but the anti tuberculosis screening of the samples is on progress which will establish the scientific evidence for their uses in treatment of tuberculosis.

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