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The phytochemical and chemotherapeutic effect of three indigenous Africa plant used in asthma therapy

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Abstract
Pet ether and Ethanol solvent was used to extract the roots, stem-bark and leaves of three indigenous plant *Alstonia boonei, Mimosa pudica* and *Sansevieria transfica* locally reputed for their treatment of asthma. Ethanol has higher % of extract. The extract were phytochemically screened and tested for their biological activity against *Staphylococcus aureus* (bacteria) and *Aspergillius niger* (fungi). The phytochemical test showed that both the ethanol and petroleum ether extracts contain bio-active agent. The petroleum ether extracts of *Alstonia boonei, Sanseviera transfica* and *Mimosa pudica* shows inhibition zones against *staphylococcus aureus* and *Aspergillus niger.*

Keywords: medicinal plant, antimicrobial activity, solvent extraction, phytochemical.

1. Introduction
Many cultures throughout the world still rely on indigenous medicinal plants for their primary health care needs [1]. To date, 25% of modern medicines are derived from plants that have been used by traditional medical practitioners [2]. It is a fact that traditional systems of medicine have become a topic of global importance. Although modern medicine may be available in many developed countries, people are still turning to alternative or complementary therapies including medicinal herbs [3]

The medicinal flora in the tropical region has a preponderance of plant that provide raw material for addressing medical disorders, pharmaceutical and nutraceuticals requirement [4]. Human diseases management in Nigeria history is one accord evidence of the relationship of plant and medicine. Plant serve as the basis of traditional medicine system for thousands of years in Nigeria. the active principle of many drugs found in plant are secondary metabolites [5] the medicinal value of these metabolites is due to the presence of chemical substance present and produce definite physiological action on the human body, source as alkaloid, glucosides, steroids, flavanoids, terpenoids, fatty oils, reseins, mulilages, tannis, gums, phosphorus and calcium for cell growth, replacement, and body building [6-7] there are report of antibiotic resistance of human pathogens, to available antibiotics [8-10]. In Benin south Nigeria *Alstonia boonei, Mimosa pudica and Sansevieria transfica* are said to have medicinal properties that are effective in the management of asthma and related ailment

Alstonia boonei, (Bini: Ukhu) the tree plants from which the leaves stem, bark roots are obtained belong to the Apocynaceal family. A large tree often with a deeply fluted bole, yielding copious latex when slashed with the branches and distinctive leaves in whorls. [11] A. boonei contain alkaloids and yield latex [12] the root bark is commonly used in west Africa along with other herb in the management of arthritic [13, 14] the anti-inflammatory and antiarthritic properties of the root bark have been demonstrated [15] furthermore the antioxidant property of the stem-bark has been documented [16]

Mimosa Pudica "humble plant" (Bini Awu-yore) The 'sensitive plant Mimosa pudica also known as or touch me not, is a source of fascination to adults and children alike when gently touch the narrow fem-like leaflets they almost instantaneously fold together and the leaf stalk droops.

M. pudica is known to possess sedative, emetic, and tonic properties, and has been used traditionally in the treatment of various ailments including alopecia, diarrhea, dysentery, insomnia, tumor, and various urogenital infections. Phytochemical studies on *M. pudica* roots have revealed the presence of alkaloids, non-protein amino acid (mimosine), flavonoids C-glycosides, sterols, terpenoids, tannins, and fatty acids [17]. The roots of *M. pudica* were studied for wound healing activity by incorporating the methanolic and the total aqueous extracts in simple ointment base B.P. in concentration [18] the seeds and other parts of mimosa pudica contain mimosine, a non protein alpha acid and that is known to cause hair loss and depressed

growth in mammals. However, an unlikely large dose would be necessary to cause such problem in humans [19].

Sansevieria trifasciata Bini (Ebe Ofiokpan) is an evergreen perennial plant forming dense stands, spreading by way of its creeping rhizome, which is sometimes above ground. Mature leaves are dark green with light gray-green cross-banding and usually range between 70–90 centimetres (28–35 in) long and 5–6 centimetres (2.0–2.4 in) wide [20] and has been traditionally used by Orang Asli in Perak, Malaysia for the treatment of ear pain, swellings, boils and fever. We found no relevant literature substantiating the uses indicated. Phytochemical screening of the plant has shown the presence of carbohydrates, saponins, glycosides [21].

2. Material and Method

2.1 Collection and Identification of Plants

Fresh sample of the roots, stem-bark, and leaves of three indigenous were sourced from Urhonigbe village. Orhionmwom local Government area of Edo State. And indentify at the department of botany, university of Benin, Benin City Edo state. The plants were air in the laboratory. It was then pulverized to enable it enter the thimble of soxhlet using mortal and pestle

2.2 Extraction

Continuous extraction method was used; crude sample was packed into a thimble and introduced into a soxhlet apparatus. 200ml of pet- ether (60-80) was put into the flask (quick-fit round bottom flask, which served as collector. The soxhlet was fitted to the flask and a condenser was fitted to the soxhlet apparatus.

The condenser was connected to ice cold water and the extraction was carried out for about four hours. The flask was allowed to cool and the pet ether removed.

This same sample was further extracted using ethanol, following the same process.

2.3 Concentration of Extracted Solution

After extraction has been completed the solution was concentrated using rotavapour apparatus (rotary evaporator) at the temperature of the solvent. The solvent was reduced to a small volume and poured out of the flask. Complete vaporization of the solvent was done by genteelly application of heat.

2.4 Phytochemical Screening

Phytochemical for active constituent was undertaken using standard qualitative methods as described by [22] saponins, tannins, flavanoids, glycoside, alkaloids, phenols, and resin test were conducted in all fractions

2.5 Preparation of Calture Medium and Inoculation

staphylococcus aureus (bacteria) and *Aspergillius niger*(fungi) stock cultures were collected from university of Benin teaching hospital. The organism was indentified in the Microbiology Department of University of Benin, Benin City. The stock was maintained on nutrient agar slant and sub-cultured in nutrient broth for incubation at 37 ^{0}C prior antimicrobial testing. Inoculation of test organism on nutrient agar- prepared plates was achieved by flaming a wire loop on a sprit lamp, cooling the wire loop (air cooling) and them fetching the test organism. The discs were prepared using a what- man filter paper. 100 discs were obtained by pouncing and putting in vials- bottles and sterilizing in an oven at a temperature of 151 ^{0}C for 20 Min.

The prepared disk containing the various fraction were carefully placed on the inoculated plates using a sterilized forceps in each [23] the plate were them turned upside- down and incubated at 37 ^{0}C for 24 hours in an incubator.

2.6 Scoring and Reading

The result was taken by considering the zone of growth and the inhibition of the organism by the test traction and activity and inactivity were observed in accordance with the standard and acceptable [24].

3. Result and Discussion

Table 1: %yield of the different extracts

	***A. Boonei* (%)**	***M. Pudica* (%)**	***S. transifica* (%)**
Pet ether	18	18.19	22.30
Ethanol	6.4	20.37	18.30

The phytochemical analysis of the ethanol and pet ether extract from root, stem-bark and leaves of three indigenous plants is shown in table I and II

Table 2: Result of Phytochemical Analysis of Ethanol extract from root, stem-back and leaves of *S. transifica, M pudica* and *A boonei*

	S. *transifica*			***M Pudica***			***A Boonei***		
Bioactive agents	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**
Tannins	+	−	+	+		+	+	+	+
Saponins	−	+	+	+	+	+	+	+	−
Alkaloids	+	+	+	+	+	−	−	−	+
Flavanoids	−	−	−	−	+	+	+	+	−
Phenols	+	+	+	+	−	+	−	+	−
Volatile Oil	−	+	−	+	−	+	+	+	+

Key: *Present (+); Absent (-)*

Table 3: Result of Phytochemical Analysis of Pet- ether extract from root, stem-back and leaves of *S. transifica, M pudica* and *A boonei*

	S. *transifica*			***M Pudica***			***A Boonei***		
Bioactive agents	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**
Tannins	+	+	+	+		+	−	+	+
Saponins	+	+	+	+	+	+	+	+	−
Alkaloids	−	+	+	+	+	−	−	−	+
Flavanoids	+	−	−	−	+	+	+	+	−
Phenols	+	+	+	−	−	+	+	−	+
Volatile Oil	−	+	−	+	+	+	+	+	+

Key: *Present (+); Absent (-)*

Table 4: Result of antimicrobial efficacy of Ethanol extract of root stem –bark and leaves of three indigenous plant against *Aspergillius niger*(fungi) and *staphylococcus aureus*(bacteria)(zone of inhibition in millimeters).

	S. *transifica*			*M Pudica*			*A Boonei*		
Microorganism	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**
S. Aureus	8.9±0.5	6.6±0.4	4.0±0.3	6.1±0.3	5.9±0.3	5.5±1	7.2±0.3	4.4±0.1	3.1±0.2
A.niger	7.5±0.2	4.4±0.1	6.0±0.1	9.4±0.1	9.1±0.4	8.9±0.4	9.7±0.2	8.2±0.3	9.1±0.4

Table 5: Result of antimicrobial efficacy of pet- ether extract of root stem –bark and leaves of three indigenous plant against *Aspergillius niger*(fungi) and *staphylococcus aureus*(bacteria))(zone of inhibition in millimeters).

	S. *transifica*			*M Pudica*			*A Boonei*		
Microorganism	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**	**S.bark**	**Root**	**Leaves**
S. Aureus	7.0±0	7.3±0.2	6.4±0.3	9.0±0.2	8.8±0.3	8.4±01	6.3±0.5	5.4±0.3	6.9±0.1
A.niger	4.0±0.2	6.3±0.3	6.0±0.2	7.7±0.6	6.0±0.1	7.0±0.1	6.4±0.2	6.0±0.2	5.9±0.3

Results of the present study showed that ethanol has higher percentage extracts compare to that of pet- ether. Why the phytochemical screening (table 2 and 3). Most of the natural product tested was present in both ethanol and pet ether extract tannins, saponins, alkaloids, phenols and volatile oils. Biological action are primarily due to these component in a complex concert of synergistic or antagonistic activities [4]. mixtures of such chemicals show a broad spectrum of biological effect and pharmacological properties to a large extent the phonological age of the plant, percentage humidity of the harvested material, geographical location, climatic condition, soil condition, time of harvest and method of extraction are possible source of variation for the chemical composition, toxicity and bioactivity of the extract [24]. Table III and IV show the result of the sensitivity test carried out in the two extract for various plant, both the ethanol and the pet-ether extracts inhibited the growth of *staphylococcus aureus* (bacteria) and *Aspergillius niger*

4. Conclusion

In the beginning of this work, it was uppermost in our minds to find out the compound that gave the project plant their medicinal properties such as its use as asthma drugs by local doctors. These work suggest that, the ethanol extract and pet ether extract of the root stem back and leaves of three indigenous plant, probably contain bioactive agents and could be a promising source for drugs development and validate their tribal/folkloric claim, as a cure for asthma treatment. This assertion is upheld while scientific evaluation of its active principle is given consideration. This would involve characterization and elucidation of the bioactive constituent responsible for its active properties. Also other curative claims by local herbalist need to be further investigated.

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