

Preliminary Phytochemical and Antimicrobial Screening of the Water, Ethanol and N-Hexane Leaf Extracts of *Azadirachta Indica*

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Abstract: This research on the phytochemical and antimicrobial properties of the water, ethanol and n-hexane extracts of neem leaf was carried out to establish the bio-active constituents and antimicrobial properties of the plant which is used in traditional medicine. Phytochemical and antimicrobial screening of the neem leaf extracts revealed the presence of alkaloids, tannins, flavonoids, terpenoids and glycosides. Antimicrobial effects of the plant extracts were also carried out and their effects on test micro-organisms zones of inhibition recorded. The micro-organisms tested include *E.coli*, *Salmonella typhi*, *Strep. Pyrogens*, *P.aeruginosa*, *Shigella Sonnei*, *Staph. aureus*, *Neis.gonorrhoea*, *Strep. faecalis*, *Shigella dysenterine* and *Basillus cereus*.

Key words: Phytochemicals • Neem Plants • Antimicrobials and Zones of Inhibition

INTRODUCTION

Medicinal plants are plants that have healing properties [1-3]. The plant kingdom is divided into several groups, but the botanical classification is beyond the scope of this section. Medicinal herbalism is the practice of healing with medicinal plants [4-6]. Modern western treatment is different from medicinal herbalism e.g the use of *Aloe-vera* gel for treatment of sunburn and bruise and the use of cascara or senna to relieve constipation. The tendency in modern medicine is to use synthetic drugs that eventually were modeled on compounds obtained mainly from plants [7-9]. Medicinal plant can be found growing in numerous settings all over the world some medicinal plants are world created meaning that they are harvested in the world regions by people who are skilled at plant identification [10, 11].

Fundamentally, the use of plants that can provide therapeutic benefits all comes down to the chemical make-up of a given plant [12, 13].

For million years mankind used plant for their healing abilities, having no rational explanation for their effectiveness today [14-16].

MATERIALS AND METHODS

Sample Collection: The leaves of the plant were collected at Uli town located in Ihiala L.G.A. of Anambra State, Nigeria.

Reagents and Chemicals: All the reagents and chemicals used were of analytical grade.

Sample Preparation and Extraction: The sample was washed and allowed to dry under room temperature to avoid varying chemical change under high temperature for about 8 days, after drying, the leaves were ground into fine powder with the help of a blender. The ground leaf was divided into three parts. The first sample was soaked in 500cm³ of distilled water for 24h, which was then filtered with a filter paper and the excess water removed by concentrating to 50cm³ with the aid of water bath. Also the two remaining samples were extracted with ethanol and n-hexane respectively. After which the water, ethanol and hexane concentrated crude extracts were used for the study.

Phytochemical Screening: Phytochemical screening was carried out on the leaf samples using standard methods of Harborne, (1973) in order to detect the presence of some valuable phytochemical of interest in qualitative and quantitative analysis.

RESULTS

The results from table 1 and 2 revealed that alkaloids, saponins, flavonoids and steroids were all present in the three extract analyzed.

Preparation of Bacterial/fungal Suspension: The bacterial cultures were inoculated into nutrient both and incubated for 24 hours at 37°C. The growth was observed microscopically. The turbidity of the medium indicated the growth of organisms.

The fungal cultures were inoculated into potato dextrose both and allowed to incubate at 25°C for 48 hours.

The results from table 3 revealed that all the three extracts had some zones of inhibition on the *E.coli*, *Salmonella typhii*, *Strep. Pyrogenes*, *P.aeruginosa*, *Shigella sonnei*, *Staph. Aureus*, *Neis. Gonorrhoea*, *Shigella dysenterine* and *Basillus cereus*.

DISCUSSION

Phytochemicals are chemical compounds that are found naturally in plants. They are responsible for the medicinal and organoleptic properties of the plants [1, 2, 4]. Some phytochemicals are responsible for the colouration of the plants and hence determines the medicinal applications of the plant.

Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties [7, 8, 9].

The results from this research showed that alkaloids, saponins, flavonoids and steroids were all present in the three extract analyzed.

Alkaloids have a wide range of pharmacological activities including antimalarial, anticancer, antibacterial and antihyperglycemic activities. Saponins have anti-tumor effect, flavonoids have antioxidant and steroids have anti-inflammatory properties.

Table 1: Qualitative phytochemical analysis

Constituent	Water	Ethanol	Hexane
Alkaloids	+	++	+
Saponins	+	+	+
Tannins	-	+	-
Flavonoids	++	+	+
Terpenoids	-	+	-
Steroids	+	+	+
Total glycosides	+	+	-

+++ = present in High Concentration

++ = present in Moderate Concentration

--= Absent

Table 2: Quantitative phytochemical analysis

Constituents	Water	Ethanol	Hexane
Alkaloids	0.84	1.26	0.2
Saponins	0.75	0.43	0.3
Tannins	0.02	0.27	0.00
Flavonoids	0.47	0.36	0.32
Terpenoids	0.00	0.08	0.00
Steroids	0.16	0.09	0.11
Total glycosides	0.20	0.26	0.00

Table 3: Antimicrobial analysis of Neem Leaves

S/N	Organisms (1mg.ml)	Zones of inhibition (mm) extracts			Control	
		Water	Ethanol	Hexane	+ve	-ve
1	<i>E.coli</i>	4.86	7.00	10.90	28.00	
2	<i>Salmonella typhii</i>	10.00	14.00	8.00	31.00	NA
3	<i>Strep. pyrogenes</i>	8.00	2.00	5.00	22.60	NA
4	<i>P. aeruginosa</i>	13.12	17.80	6.29	26.00	NA
5	<i>Shigella sonnei</i>	16.00	16.00	10.00	26.32	NA
6	<i>Staph. aureus</i>	27.81	24.29	28.17	31.88	NA
7	<i>Neis. gonorrhoea</i>	4.37	8.70	1.83	18.55	NA
8	<i>Strep. faecalis</i>	0.00	0.00	2.00	25.44	NA
9	<i>Shigella dysenterine</i>	23.00	17.49	23.56	29.62	NA
10	<i>Basillus cereus</i>	11.58	4.42	0.00	23.72	NA

The phytochemical tests indicated the presence of alkaloids, glycosides and flavonoids in the neem leaf extract, these constituents found in the plant extracts are known to have anti-protozoal and anti-bacterial activities.

Extracts from the seed, bark and leaf extracts of the Neem tree has been reported to have strong biological activities against insects and pests, but with very low toxicity to mammals and the environment generally. Therefore the wide use of the neem plant is attributed to the presence of bioactive compounds, which may explain its many traditional uses against various ailments.

Further studies should be carried out to characterize the structure of compounds from the plant for industrial drug formulation.

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