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Phytochemical and Antibacterial Activity of *Delbergia saxatilis* Leaf Extract

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ABSTRACT
Dalbergia saxatilis is widely used in traditional medicine system. The species are used in traditional system of medicine all over the world in the treatment of various ailments qualitative phytochemical analysis and antibacterial activity of the leaf extract were evaluated. Phytochemical analysis was carried out using standard procedure, the bioactive compounds detected were flavonoids, tannins, saponins, steroids, balsam, saponin glycosides, volatile oils, alkaloids, cardiac glycoside and glycosides and absence of anthraqinone,. Antibacterial activity of the leaf extract was also tested against the certain strains of clinical isolates of bacteria such as Streptococcus spp., Escherichia coli and Salmonella typhi using disc diffusion and broth techniques. The antibacterial test result had indicated that the test isolates were sensitive to the leaf extract of Dalbergia saxatilis plant with highest efficiency against Streptococcus spp at 400mg/ml (24mm), 500mg/ml (19mm) for E. coli and then 0.00mm for Salmonella typhi at all concentration. The lowest activity for E. coli and Streptococcus spp was at 300mg/ml (16mm and 19mm) respectively. The leaf extract of the plant found to show strong inhibitory activity against some of the tested organisms at higher concentrations which was in dose dependent manner. The study had indicated that the leaf extract of the plant has potential against microbial infections.
Key words: Phytochemical, Antibacterial, Dalbergia saxatilis.

INTRODUCTION
The plant species belonging to the genus *Dalbergia saxatilis* (*Fabaceae*) are found generally in many tropical areas of the globe, particularly Africa, Asia, Central and Southern America where they are used to manage a number of ailments (Khare, 2007; Kazembe *et al.*, 2012). The species *Dalbergia saxatilis* is found in both the northern and southern Nigeria. The powdered leaf is known to drive off flies from saws while the aqueous root extract is used to accelerate birth and expel placenta in human subjects (Oliver, 1960; Ayensu, 1978). It is also used for the management of a wide range of disorders such as diarrhoea, dysentery, stomach ache, gonorrhoea, syphilis, scabies, leprosy and

pains (Khare, 2007; Vasudeva *et al.,* 2009). Previous pharmacological studies have also confirmed the folkloric use of *D. saxatilis* as analgesic, anthelmintic, antibiotic, anti-inflammatory, antipyretic, pesticidal, antioxidant and contraceptive agents properties (Uchendu and Leek, 2000; Hajare *et al.,* 2001; Mujumdar *et al.,* 2005; Okwute *et al.,* 2009; Khalid *et al.,* 2011; Nqushad and Penugonda, 2012).

A number of phytochemicals including cinnamyl, phenols, quinine, furan, steroids, benzophene, sterene, terpenoids, flavonoids, isoflavonoids, neo-flavonoids and polyphenols have been isolated from various species of *Dalbergia* (Beldjoudi *et al.,* 2003; Tao and Wag, 2010; Hou *et al.,* 2011). However, only very few studies have been carried on *Dalbergia saxatilis* and the few reports have been on the biological activities (Uchendu and Leak, 2000; Yemitan *et al.,* 2001; Okwute *et al.,* 2009). In fact, no work on the chemical constituents of any part of *Dalbergia saxatilis* has previously been reported. The study was designed to determine the antimicrobial activity of leaf of *D. saxatilis* extract.

MATERIALS AND METHODS

Sample Collection

Fresh leaves of *Dalbergia saxatilis* plant were collected from the garden of biology unit Umaru Ali Shinkafi Polytechnic, Sokoto, Nigeria. It was botanically authenticated at the herbarium of botany Unit, Department of biological sciences, Usmanu Danfodiyo University, Sokoto. A voucher specimen of the plant was deposited at the herbarium for referencing. The leaves was then air dried under shade grounded into a powder using mortar and pestle and kept in a container until required for analysis.

Preparation of Sample Extracts

A twenty five grams (25g) of the leaf of *D. saxatilis* powder of the plant was dissolved in 200mls of distilled water in 250ml, conical flask and kept to settle for one day (24 hours). The extracts was filtered using Whatman Filter Paper (No. 1) and dried in an oven. The residue was reconstituted for phytochemical screening test (Harbone, 1998).

Preliminary Phytochemical Screening

The extracts were subjected to various phytochemical tests to identify the constitutents, secondary plant metabolites using standard methods (Harbone, 1973; Sofowara, 1993) with some modifications. The metabolites that were tested for includes Anthraquinones, Alkaloids, Cardiac glycosides, flavonoids, Saponins steroids, Tannins, Balsam, Saponnins, Volatile oils, Glycosides.

Preparation of Extract for Antibacterial Activity

The powdered leaf sample of *Dalbergia saxatilis* plant; 0.3, 0.4 and 0.5g/ml were used, the various grams of leaf extracts were placed in a test tubes, 10ml of distilled water was added to each test tube to give different concentrations of (300mg/ml/ 400mg/ml and 500mg/ml) of the plant extract. 250mg/ml concentration of the standard drug tetracycline was used.

Bacteria Culture

Isolates of *Salmonella typhi, Streptococcus spp* and *Escherichia coli* were obtained from Microbiology Department of Faculty of Sciences, Usmanu Danfodiyo University, Sokoto Nigeria.

Antibacterial Test

The antibacterial tests of the leaf extracts of *Dalbergia saxatilis* plant was tested on the microbial isolates using disc diffusion method of (NCCLS, 2008). The grams of the leaf powdered used for the preparation of various concentrations were 0.3, 0.4 and 0.5g which were dissolved in 10ml of distilled water to give different concentrations of 300, 400 and 500mg/ml respectively. 250mg/ml concentrations of the standard control drug tetracycline was prepared. Disc of variable concentrations of the prepared extract was incorporated into Mueller Hinton Agar medium and allowed to solidify. Sensitivity test was determined by the absence of growth on or around the plate. The plates were incubated at 37°C for 24hours before observation was made and measurement of zone of inhibition.

RESULTS

The phytochemical screening test presented in table 1 had indicated that *D. saxatilis* leaf extract contains the active ingredients tested such as Flavonoids, Tannins, Saponnins, Steroids, Balsam, Saponnins glycosides, Volatile oil, Alkaloids, Cardiac glycosides and glycosides and the absence of Anthraquinones.

Table 1: Qualitative Phytochemical Screening of the leaf extracts of *D. saxatilis*

ALK	TAN	STER	BAL	FL	SAP	SAP GLY	ANTH	V.O	CG	GLY
++	++	+	++	++	+++	+	ND	+++	+	+

Key: Trace = +, Moderate = ++, Highly = +++, Not Detected = ND
ALK = Alkaloids, TAN = Tannins, STER = Steroids, BAL = Balsam, FL = Flavonoids, SAP GLY = Saponin glycosides, SAP = Saponin, ANTH = Anthraquinones, V.O = Volatile oils, CG = Cardiac glycosides, GLY = Glycosides.

Table II: Antibacterial activity of leaf of *Dalbergia saxatilis* Extracts had shown the strong effect on growth of some of the clinical isolates at all concentration on a dose dependent manner with the highest activity at 500mg/ml. The lowest with lowest activity was *Salmonella typhi* at all concentration (0.00mg/ml) as indicated in the table II below.

Table II: Antibacterial activity of leaf extracts of *Dalbergia saxatilis*

		Zone of Inhibition (mm)		
Plant part/control	Conc. (mg/ml)	*S. typhi*	*E. coli*	*Strep. S*
Leaf	300	0.00	16	19
	400	0.00	17	24
	500	0.00	19	19
Tetracycline (Standard control)	250	19	20	24

Key: = 0.00 = No inhibition, Value 1mm = Inhibition, *S. typhi* = *Salmonella typhi, E. coli* = *Escherichia coli, Strep. S.* = *Streptococcus spp*

DISCUSSION

The presence of phytochemical constituents in the lef of *Dalbergia saxatilis* such as alkaloids, tannins, saponnins, saponnins glycosides, volatile oils, balsam, steroids, flavonoids, cardiac glycosides and glycosides and the absence of anthraquinones have been reported by Helms and Barone, (2008). Plants metabolites are the active ingredients that possesses pharmacological activity against the growth of certain microbial organisms (Balogun *et al.,* 2015). Antibacterial activity of the leaf extract of *Dalbergia saxatilis* had shown strong inhibitory effects against the growth of clinically tested isolates in a dose dependent manner and this similar to the findings of (Lino and Deogracious, 2006; El-Mahmood *et al.,* 2008; Ahuoch, 2010; Ogueke *et al.,* 2011; Maitera *et al.,* 2011). The activity of the leaf extract of the plant might be attributed to the presence of some secondary plant metabolites which were reported to have antimicrobial activity (Singh and Bhat, 2003). The antibacterial activity reported in this research study might be due to the presence of phytoconstituents such as tannins, glycosides whose antimicrobial properties was documented and reported by Tschehe, (1971). The results of the study had demonstrated some antibacterial properties of *D. saxatilis* leaf extract that may serve in further study to investigate the actual structure and characterized active ingredients tested for further pharmacological research.

CONCLUSION

Phytochemical and antibacterial activity of the leaf extracts of *Dalbergia saxatilis* had indicated that the plant part possess pharmacological activity against the clinically tested isolates of bacteria.

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