Wild Sage(*Lantana camara*)Flower and Leave: Bactericidal Efficacy on Bacterial Growth

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***Abstract*- Plants contains myriad amount of chemical with medicinal properties. This study aim at evaluating the antibacterial efficacy of wide sage leave and flower extracted with ethanol on some bacterial growth. Flower and leave of Wide sage collected from the vicinity of Abeokuta were washed, sun-dried, grinded and extracted with 200mlof 95% ethanol solution. Extract was treated against four bacterial strains (*Proteus vulgaris, Pseudomonas aeruginosa, Staphylococcus aureus*and *Lactobacillus sp.).* Flower extract shows inhibition zone diameter of 8.00±1.00 mm lower to that of leave extract with theinhibition zone diameter of 10.00±1.08mm against the growth of*Pseudomonas aeruginosa.*Flower extract also shows inhibition zone diameter of 7.75±0.75 mm which is significantly lower to that of leave extract withinhibition zone diameter of 17.75±0.85mm against the growth of*Staphylococcus aureus.* The study however, indicated that ethanolextracted leave of wide sage is significantly active against *staphylococcus aureus* andand moderately active on*Pseudomonas aeruginosa* which are causal agents of urogenital, skin and health related infections.**

***Keywords*-bactericidal, bacterial growth, folk medicine, lantana camara, wild sage**

I. INTRODUCTION

Folk medicine which is the utilization of herbs, shrubs and plant derived products for various therapeutic purposes has been in existence before the advent of modern medication [1]. Plant-based drugs are still a common and effective used treatment option for a wide range of diseases [2]. An estimated 80% of the world's population relies on folk medicine for their primary health treatment, therefore, production of folk medicines and the utilization of medicinal plants for the treatment of various diseases have significant economic benefits [3]. The flowering ornamental wild sage plant (*Lantana camara*) belongs to the Verbenaceae family. Lantana, Surinam tea plant, Spanish flag, and West Indian lantana are other names for wild sage plant [4]. Phytochemical screening of wild sageconducted by Kumar *et al.* [4],reveals that leaf extracts of wild sagecontains Alkaloid, Tannins, Flavonoids and soluble starch as major active secondary metabolite and the flower extractsreveals the presence of reducing sugar, tannins, flavanoid and soluble starch, some of which can inhibit bacterial growth.Most people (especially the underdeveloped nations and rural areas) are forced to the use of folk medication for their everyday illnesses due to a lack of communication, poverty, ignorance, and the absence of easily accessible health care facilities [5]. It is imperative to investigate the anti-bacterial efficacy of leave and flower of wild sageon bacterial growth in other to enhance our knowledge of such plant species.Hence, the reason for the study.

II. MATERIALS AND METHODS

A. Plant Collection and Processing

Leave and Flower of *Lantana camara*was collected from the vicinity of Abeokuta, Nigeria. To avoid contaminations, the Leave and Flower were thoroughly washed in running tap water then rinsed properly in a distilled water, sun dried and homogenized into a fine powdered using a wooden mortar and pestle.

B. EthanolicExtraction of Leaf and Flower

20g of the powdered material was extracted using 200ml of 95% ethanol (CH_2CH_3OH) Solution (19:1 v/v %) and allowed to stay for the duration of 72 hours as described by Barreto*et al.* [6].The extracts was filtered through a filter paper (Whatman No.1) while theremoval of excess ethanol and the concentration of the extract was done by evaporating to a volume of 5mlwith the use of a water bath[7]. The green and chocolate brown pure concentrated extracts was then preserved in an air-tight container respectively until usage.

C. Test Bacterial Strains

Four pathogenic bacteria usually found in urogenital and gastrointestinal tract, skin were obtained from the microbiology unit of the Medical laboratory (Kenny Ogun Laboratory Complex, Abeokuta, Nigeria). Test organisms are gram negative (*Proteus vulgaris and Pseudomonas aeruginosa)* and gram positive (*Staphylococcus aureus*and *Lactobacillus sp.).*

D. Media Preparation and Bacterial Culture

All glass wares used were sterilized using aseptic method. The work bench and the used areas were sterilized with 95% ethanol solution. A spirit lamp was lit up to ensure that the air of the vicinity of the work bench was free of contaminants. The media used were Nutrient agar for the culturing of the bacterial species.

E. Agar Disc Diffusion Method and Indication of Zone of Inhibition

Sterilized filter paper discs (Whatman No.1) 6 mm was saturated with filtered sterilized plant extract. The impregnated disc was then placed onto the inoculated nutrient agar medium. This was however maintained in four replicas to obtain a precise result. Prepared plates were incubated at 37^{o}C for 24 hours [8]. Bactericidal efficacy was determined by the diameter of zonal inhibition around the impregnated disc which was measured and recorded in millimeter (mm)with a metre rule.Zone of inhibition was indicated by the clear area around the disc which shows no bacterial growth.

F. Statistical Analysis

Data were subjected to statistical analyses One Way ANOVA using the Statistical Package for Social Sciences (SPSS) version 21.0 while graphical presentation was done using Microsoft Excel 2013 version. Mean value expressed as Mean±SEM at $p<0.05$.

III. RESULTS AND DISCUSSION

A. Result

Bactericidal efficacy of flower and leave extract of wide sageagainst test bacteria indicated in Table 1 and Fig. 1, showed that the inhibition zone diameter of flower extract was 0.00±0.00 mm lower than that of leave extract which shows inhibition zone diameter of 3.50±2.02 mm against the growth of Proteus *vulgaris* (plate 1). Flower extract shows inhibition zone diameter of 8.00±1.00 mm lower to that of leave extract which shows inhibition zone diameter of 10.00±1.08 mm against the growth of*Pseudomonas aeruginosa* (plate 2).Flower extract shows inhibition zone diameter of 7.75±0.75 mm which is significantly lower to that of leave extract which shows inhibition zone diameter of 17.75±0.85 mm against the growth of*Staphylococcus aureus* (plate 3). Flower extract shows inhibition zone diameter of 0.00±0.00 mm which is equal to the leave extract which shows inhibition zone diameter of 0.00±0.00 mm against the growth of*Lactobacillus sp.* (plate 4).

B. Discussions

Based on the study, the ethanolic flower and leave extracts shows varying bactericidal efficacy against the growth oftest bacterial strains.*Proteus vulgaris* is a bacteria widely known to cause urogenital infection and abnormalities [11, 12] while *Lactobacillus sp.* is a bacteria known to be friendly to the intestinal, urogenital health[13]. Observation from the study show thatflower and leave extracts shows nobactericidal efficacy against *Proteus vulgaris* and *Lactobacillus sp.*respectively. This is similar to the work of Ajiboye*at al.*[9]who reported that *Proteus vulgaris* exhibited the lowest inhibition zone diameter of 10mm among the studied 14 bacterial strains when treated with the methanolic and aqueous leave extracts of *Lantana camara*. *Pseudomonas aeruginosa*is a bacteria causing health care associated illness [14].The flower extract shows lower inhibition zone diameter compared to that of the leave extract which shows a higher inhibition zone diameter against the growth of*Pseudomonas aeruginosa.Pseudomonas aeruginosa*was sensitive to the leave extract than the flower extract. This is in good tandem with the report made by Ajiboye*at al.*[9] in their research works which indicated an inhibition zone diameter of 10mm with aqueous leave extracts. Similarly the antibacterial

studies conducted by Kumar *et al*. [4] on*Pseudomonas aeruginosa* using petroleum ether, diethyl ether, chloroform and acetone leave and flower extract using tetracycline as control shows no sensitivity.*Staphlococcusaureus* is a common disease causing bacteria ofpublic health concern [15, 16].Flower extract shows inhibition zone diameter significantly lower to that of leave extract withinhibition zone diameter against*Staphylococcus aureus.*This is however not in a total agreement with work of Kumar *et al*. [4] who reported that diethyl ether, chloroform and acetone flower extract shows inhibition zone diameter of 10mm but leave extract withinhibition zone diameter of 15mm.Based on the present investigation, the highest sensitivity to ethanolic leave extract was found in *Staphylococcus aureus*while the lowest was found in *Lactobacillus sp.,* whereas the *Pseudomonas aeruginosa*shows the highest sensitivity to ethanolic flower extract while lowest was found in *Proteus vulgaris* and *Lactobacillus sp.*.The flower extract shows no significant sensitivity to the test bacterial strain which may be as a result of the concentration used for the studies. This is supported by the work of Snehali and Mohammed [10] who reported that the three studied strains of *Staphylococcus aureus*are not sensitive to 10-18mg/ml of ethanolic flower extract but sensitive to 20-50mg/ml of the flower extract. Although the studies was done using agar well diffusion method.

IV. CONCLUSION

This research study showed thatwild sage leave extract has a bactericidal activityagainst the growth of *Staphylococcus aureus* and *Pseudomonas aeruginosa* which iscausal agent forskin, urogenital infection and associated health care infection respectively. Therefore, it may be used as treatments or co-medication forillness caused by *Staphylococcus aureus* and *Pseudomonas aeruginosa.*

RECOMENDATIONS

Base on the study,it is therefore recommended that

i. Higher concentration of flower extract should be used for further studies.
ii. Investigation should be carried out onthe pharmacology and human toxicity of wild sage in other to ascertain the appropriate dosing

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TABLE 1
Inhibition Zone Diameter of Flower and Leave Extract of Wild Sage against Growth of Test Bacteria

Test Bacteria	Inhibition Zone Diameter (mm)		ANOVA TABLE	
	Flower	**Leave**	**F**	**P**
Proteus vulgaris	0.00±0.00	3.50±2.02	3.00	0.13
Pseudomonas aeruginosa	8.00±1.00	10.00±1.08	1.85	0.22
Staphylococcus aureus	7.75±0.75	17.75±0.85	77.42	0.00*
Lactobacillus sp.	0.00±0.00	0.00±0.00		

*Mean±SEM value is significant at p<0.05

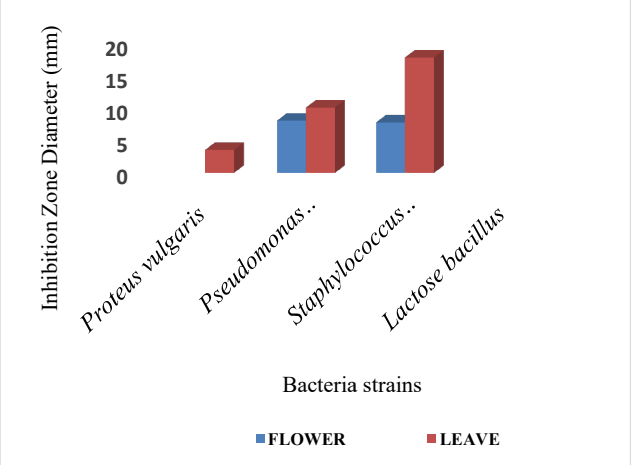
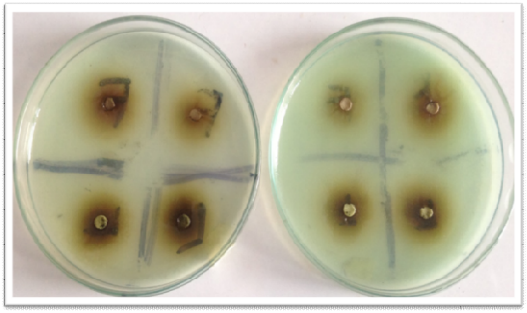
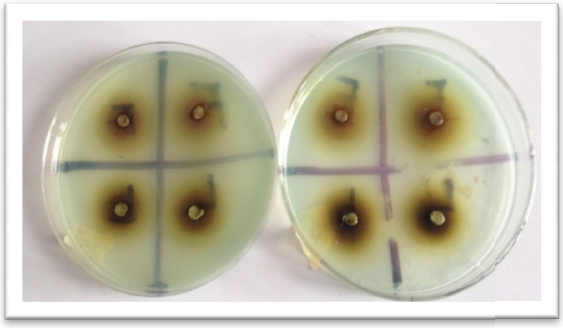


Fig. 1: Inhibition zone diameter between ethanolic extracted flower and leave

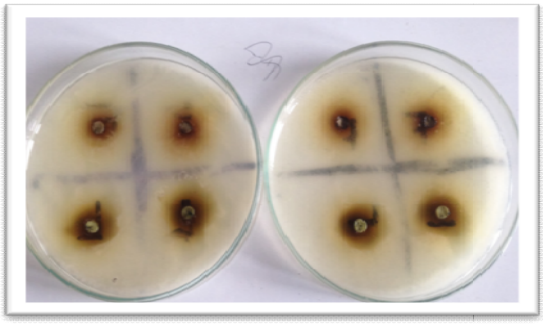
NB: Flower and Leave Extract on Top and Bottom Rows Respectively



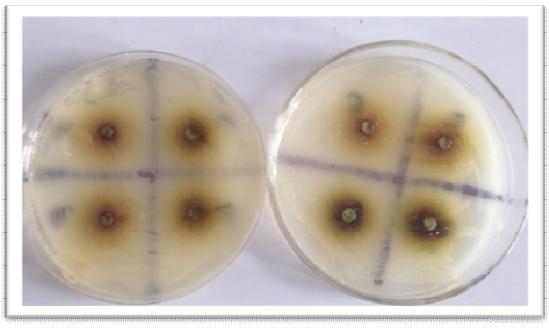
Plates 1: *Proteus vulgaris*



Plates 2: *Pseudomonas aeruginosa*



Plates 3: *Staphylococcus aureus*



Plates 4: *Lactobacillus*