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Qualitative, Quantitative Phytochemical And Antibacterial Activity Of The Leaf Extracts Of Ficus Capensis On Bacterial Isolates From Wound Samples

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Abstract
Background: *Medicinal plants have over the years been adopted in both traditional and modern medicine due to their therapeutic action and potentials. This study focused on the determination of the phytochemical and antibacterial activities of the leaf extracts of Ficus capensis on wound isolates.*
Materials and Methods: *The leaf extracts were obtained using various solvents (water, ethanol, chloroform and ethyl acetate) by maceration. A total of 30 samples from open cut, burnt and ulcer wounds were collected from infected patients. The samples were cultured into different media for identification. The isolates were characterized and identified on their basis of gram staining reaction and biochemical test. Agar Well diffusion method was employed for the antimicrobial test.*
Results: *The phytochemical analysis showed various bioactive compounds such as alkaloids, tannins, saponins, flavonoids, glycosides, phenol, terpenoids in all the extract. Quantitatively, alkaloid was highest in aqueous extract (2.033±1.017%) and saponin was found highest in ethanol extract (5.70±1.50%). Prevalent bacterial organisms include Pseudomonas aeruginosa, Proteus terrea, Staphylococcus sp., E. coli (burns wound); Proteus mirabilis, Streptococcus spp., Proteus terrea, Klebsiella spp., Proteus vulgaris (open cut wound); Klebsiella spp., Providencia vennicola faecalis, Staphylococcus sp. and E. coli (ulcerated wound). Occurrence of the bacterial isolates were 5(50%) for open cut wound and 4(60%) for both ulcerated and burn wounds. Furthermore, the extracts showed varying inhibition rate while the organisms were most resistant to the chloroform extract.*
Conclusion: *These results suggest the efficacy of the traditional use of Ficus capensis and its adoption in medicinal and therapeutic activities. It also provides preliminary evidence for the potential use of Ficus capensis leaves in traditional medicine for the treatment of diseases associated with free radicals and microbial infections.*
Key Words: *Wounds, Ficus capensis, Bacteria, Phytochemicals, Antibacterial*

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I. Introduction

Majority of the world's population in developing countries still rely on herbal medicines to meet their health needs. Many of the world's population are knowledgeable in the use of plants and herbs in their environs for the treatment, cure and or management of different diseases [1]. Herbal medicines are often used to provide first-line and basic health services, both to people living in remote areas where it is the only available health service and to people living in poor areas where it offers the only affordable remedy. Even in areas where modern medicine is available, the interest in herbal medicines and their utilization have been increasing rapidly in recent years [2]. Medicinal plants and herbal medicines account for a significant percentage of the pharmaceutical market. Modern medicine recognizes herbalism as a form of alternative medicine, as its practice is not strictly based on evidence gathered using the scientific method [2].

Ficus capensis commonly known as fig tree, locally called "akororo or akpulu" in igbo, "uwar-yara" in hausa, "opoto" in Yoruba, "rimabichehi" in Fulani and "obada" in Edo, is a medicinal plant found in terrestrial zones mostly along rivers. It is a spreading deciduous or evergreen tree with a thick bole and spreading roots. It belongs to the family of Moraceae and it produces fruits throughout the year and the leaves are broad and green. In Nigeria, *F. capensis* has been used for the treatment of dysentery as well as for wound dressing [3]. It is also

used in circumcision and in the treatment of leprosy and epilepsy, rickets, infertility, gonorrhoea, oedema, respiratory disorders and emollient. The leaves of *F. capensis* are commonly used as a vegetable in foods with a substantial blood boosting effect [4]. In Nigeria, decoctions and aqueous extract of *F. capensis* are said to be used traditionally in the treatment of anemia, tuberculosis, pains, convulsions and wounds [5]. Oral administration of aqueous extract of *F. capensis* increased haemoglobin con-centration, packed cell volume and red blood cells. Furthermore, the leaves and stems bark of the plant have inhibitory effect against *Escherichia coli* and *Shigella* species. It is also used in herbal medicines to treat threatened abortion [6]. It is unfortunate that only a small portion of these plants had been thoroughly investigated for their medicinal values. In Nigeria and other parts of the world, the practice of herbal medicine in modernized form is now gaining momentum with various health official and other persons coming to realize the potency and efficacy of some of the indigenous plant. Certain chemical compounds found in plants impact the animal system, with a number of them exhibiting therapeutic qualities that have been harnessed and applied in the treatment of human illnesses [6].

The control of wound infections has become more challenging due to wide spread of bacterial resistance to antibiotics and to a greater incidence of infections caused by methicilin-resistant *Staphylococcus aureus* (MRSA) and polymicrobic flora. The bacterial agents often associated with wound infections include *Staphylococcus* species, *Pseudomonas* species, *Klebsiella*, *Proteus*, *Streptococcus* and *Escherichia coli* as well as anaerobes such as *Clostridium* and *Bacteriodes* species [7]. Bacteria found in wounds are through contamination, colonization, critical colonization and infection [8]. Thus, this study is aimed at the determination of the phytochemical and antibacterial activity of *Ficus capensis* leaf extract on bacterial isolates from wound samples.

II. Materials And Methods

Sample Collection: The fresh leaves of *Ficus capensis* (also called akpulu or akororo in Igbo) were harvested from ESUT, Agbani, Enugu State. The collected plants materials were placed in clean and sterile Ziplock bags and transported immediately to the Applied Microbiology and Brewing laboratory. It was authenticated in the Department of Applied Biology, ESUT by Prof. C.C. Eze.

Preparation of Crude Extract from the Plant Materials: Fresh *Ficus capensis* leaves were exposed to suitable preliminary processing by removal of unwanted materials and contaminants. They were shade dried in at room temperature for 7 days. Thereafter, pulverized, divided into five portions of gram each then stored in sterile ziplock bags for further use [9]. A total of 165g of air-dried powdered *Ficus capensis* was weighed into conical flask and mixed with 500ml of ethanol. The mixture was left at room temperature for 3 days for maceration. The solution was filtered using sterile mushin cloth and the filtrates evaporated using a water bath at $50^{O}C$ to dryness. It was then stored at $4^{0}C$ for further use. The same method of preparation was carried out for ethyl acetate, aqueous and chloroform extract. The percentage yield of each extract was calculated.

Phytochemical Screening of Plant Extract: The extract and fractions were subjected to both quantitative and qualitative phytochemical screening using standard phytochemical methods as outlined by Uthayarasa, [10]. Test for alkaloids, saponins, terpenoids, steriods, phenol, flavonoids, tannins and glycosides were carried out.

Media Preparation: All media used for the microbiological analysis were prepared according to manufacturer's instructions.

Isolation of Organism: A total of 30 samples from open cut, burnt and ulcer wounds were collected from infected patients. The samples were cultured into different media (EMB agar, MRS agar, Nutrient agar, Macconky agar and Cled agar) for identification. All isolates were sub cultured into a nutrient agar plate and further sub cultured into a nutrient agar slant to save the isolated organisms for further use.

Inoculum Preparation: MacFaland turbidity standard was prepared by dissolving of 1ml barium chloride ($BaCl_2$) into 9ml of sulphuric acid (H_2SO_4). A 1oopful of each of the pure isolates were transferred into sterile 5ml nutrient broth in a test tube and incubated at $28^{0}C$ for 24hr. Each of the cultures was then adjusted to 0.5 MacFaland turbidity standard.

Characterization and Identification of Bacteria Isolates: The isolates were characterized and identified on their basis of gram staining reaction and biochemical test (catalase, citrate, coagulase, oxidase, urease, Indole, methyl red and sugar fermentation test as described by [11,12,13,14,15,16]

Antimicrobial Sensitivity Test: The antimicrobial method employed in this study was the Agar-Well diffusion method as described by Ogata *et al.* [17] and Naveena and Joy [14]. These include the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal concentration (MBC).

Data Analysis: The statistical analysis of the result of the result was analyzed with statistical package for social science (SPSS) to obtain the mean and the standard deviation of the triplicate of result data for the descriptive analysis. ANOVA and Duncan table will be used to obtain the comparative result of the various groups of the study. $P<0.05$ (95%) confidence interval will be considered for the statically analysis.

III. Result

Phytochemical analysis of Ficus capensis leaf extract

The plant showed varying result with the various extracts used and the results for the qualitative and quantitative analysis are summarized in Table 1 and Table 2.

Identification Scheme of the Bacterial Isolates

The isolated samples showed varying biochemical characteristics and the results are summarized in Table 3. The cultural and morphological characteristics of the isolates showed the presence of 9 nine bacterial organisms (Table 4).

Occurrence of Isolates from Different Wound Samples

A total number of 30 samples were collected and from the analysis, the highest occurrence was found in open cut [5(50%)] while burns and ulcer wounds had similar result with 4(60%). In total, the occurrence was sum up to 13(43.3%) [Table 5].

Antibacterial Activity of *Ficus capensis* Leaf Extract

The *Ficus capensis* leaf from various extract showed an appreciable inhibitory activity in different concentration (6.25-2000mg/ml) for the test organisms. The results are summarized in Table 6-10.

Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC)

The least concentration of the extract inhibition was found at 6.25mg/ml and the least concentration at which no growth occurred was recorded in chloroform extract at 6.25mg/ml. The results are summarized in Table 11 and 12.

Table 1: Qualitative Phytochemical Analysis of the *Ficus capensis* Leaf Extract

S/N	Constituents	Exp. Method	Aqueous Extracts	Ethanol Extracts	Ethyl Acetate Extracts	Chloroform Extracts
1	Saponins	*Foam test*	+	++	+	ND
2	Tannin (Catecholic)	*FCT*	+	+	+	ND
		LAT	+	+	+	ND
3	Flavonoids	*AT*	+	+	++	ND
		ST	ND	ND	ND	ND
		20% NaOH test	+	+	ND	ND
4	Alkaloids	*Alkaloid test*	+	+	ND	ND
		WT	+	+	+	ND
		DT	+	+	++	ND
		Hager's test	ND	ND	+	ND
		Simon's Test	ND	ND	+	ND
5	Steroids	*Salkowiski Test*	ND	ND	ND	ND
		LT	ND	ND	ND	ND
6	Terpenoids		+	+	+	+
7	Glycosides	*KKT*	+	+	+	ND
8	Phenol	*5% $FeCl_3$ test*	+	+	+	ND

***Key**: Ferric Chloride Test (FCT); Lead Acetate Test (LAT); Alkaline Test (AT); Shinoda Test (ST); Wagner's test (WT); Dragindroff test (DT); Liberman's test (LT); Keller-Kilani Test (KKT)*

+ Trace concentration;++ Moderate concentration ++; +++ high concentration; ND- (not detected)

Table 2: Quantitative Phytochemical Analysis of *Ficus capensis* Leaf Extract

Constituents/Extract	Aqueous Extract (%)	Ethanol Extract (%)	Ethyl Acetate (%)	Chloroform Extract (%)
Alkaloids	2.033±1.017	1.90±1.149	ND	ND
Saponins	1.50±7.05	5.70±1.50	1.28±7.27	ND
Flavonoids	0.407±0.203	0.297±0.313	ND	0.003±0.609
Phenols	0.4545±0.222	0.431±0.246	0.274±0.404	0.011±0.666
Tannins	5.227±4.887	2.118±7.997	6.743±3.371	ND
Glycosides	**0.1285±0.268**	**0.0375±0.36**	**0.392±0.006**	**0.372±0.026**

Key: ND represent NOT DETECTED

The mean difference is significant at $p \geq 0.05$ and considered insignificant at $p \leq 0.05$ (n=3).

Table 3: Cultural Identification and Microscopic Characteristics of Isolates

	Growth appearance on media	Organism
Burns		
B 1	Grayish white smooth, mucoid and medium sized colony on nutrient agar	*E. coli*
B 2	Round, flat, and colorless colonies on MacConkey agar	*pseudomonas-aeruginosa*
B 3	Large, mucoid and white colony on nutrient agar	*Proteus terrea*
B4	Large yellow colonies on nutrient agar	*Staphylococcus* sp.
Open Cut		
O 1	Large, mucoid and white colony on nutrient agar	*Proteus mirabilis*
O 2	Small, grey, moist colonies on nutrient agar	*Streptococcus* sp.
O 3	Large, mucoid and white colony on nutrient agar	*Proteus terrea*
O 4	Medium pinkish mucoid colonies on MacConkey agar	*Klebsiella* sp.
O 5	Large, mucoid and white colony on nutrient agar	*Proteus vulgaris*
Ulcer		
U 1	Medium pinkish mucoid colonies on MacConkey agar	*Klebsiella* sp.
U 2	Large, mucoid and white colony on nutrient agar	*Providencia vennicola faecalis*
U 3	Grayish white smooth, mucoid and medium sized colony on nutrient agar	*E. coli*
U4	Large yellow colonies on nutrient agar	*Staphylococcus* sp.

Key: B (Burns); O (Open Cut): U (Ulcer)

Table 4: Identification and Characterization of the Wound Isolates

Isolates	**Biochemical Tests**								**Sugar Fermentation**		
	Gram Reaction	**Cat test**	**Oxi test**	**Coa test**	**Methyl red test**	**Citrate test**	**VP test**	**Indole test**	**Glu**	**Ma**	**Lac**
Burns											
B 1	-v short rod in pairs	+v	-v	-v	+v	-v	-v	+v	AG	AG	AG
B 2	-v short rod in pairs	+v	+v	-v	+v	-v	-v	+v	-v	A	-v
B 3	-v short rod in pairs	+v	-v	-v	+v	+v	-v	-v	A	-v	-v
B4	+ve cocci in clusters	+v	-v	-v	+v	-v	-v	-v	A	A	A
Open Cut											
O 1	-v short rod in pairs	+v	-v	-v	+v	+v	-v	-v	A	-v	-v
O 2	+ve cocci in chains	-v	-v	-v	-v	-v	-v	-v	A	-v	A
O 3	-v short rod in pairs	+v	-v	-v	+v	+v	-v	-v	A	-v	-v
O 4	-v short rod in pairs	+v	-v	-v	-v	+v	-v	-v	A	A	A
O 5	-v short rod in pairs	+v	-v	-v	+v	+v	-v	-v	A	-v	-v
Ulcer											
U 1	-v short rod in pairs	+v	-v	-v	-v	+v	-v	-v	A	A	A
U 2	-v short rod in pairs	+v	-v	-v	+v	+v	-v	-v	A	-v	-v
U 3	-v short rod in pairs	+v	-v	-v	+v	-v	-v	+v	AG	AG	AG
U4	**+ve cocci in clusters**	**+v**	**-v**	**-v**	**+v**	**-v**	**-v**	**-v**	**A**	**A**	**A**

KEY: Cat test (Catalase Test); Oxi test (Oxidase Test); Coa test (Coagulase Test); Glu (Glucose); Ma (Mannitol test); Lac (Lactose Acid) VP (Voges-proskauer test); A (Acidic); AG (Acidic and Gas); G (Gas); +ve (positive); -ve (negative); B (Burns); O (Open Cut): U (Ulcer)

Table 5: Occurrence of Isolates from Different Wound Samples

Samples	Number Tested	Number Positive	Number Negative
Burns	10	4(40%)	6(60%)
Open Cut	10	5(50%)	5(50%)
Ulcer	10	4(40%)	6(60%)
Total	30	13(43.3%)	17(56.6%)

Table 4.6: Antibacterial Activity of *Ficus capensis* Leaf Extract on *Proteus terrae*

Conc./Sample	Aqueous	Ethanol	Ethyl Acetate	Chloroform	Ciprotab (Standard)
2000mg/ml	2.5mm	0.7mm	4.8mm	R	7.2mm
1000mg/ml	2.0mm	0.4mm	4.1mm	R	-
500mg/ml	2.0mm	0.2mm	4.0mm	R	-
200mg/ml	0.7mm	R	3.65mm	R	-
100mg/ml	0.3mm	R	3.65mm	R	-
50mg/ml	R	R	3.65mm	R	-
25mg/ml	R	R	3.60mm	R	-
12.5mg/ml	R	R	1.60mm	R	-
6.25mg/ml	R	R	0.9mm	R	-

Key: R represent Resistance

Table 7: Antibacterial Activity *Ficus capensis* Leaf Extract on *Pseudomonas aeruginosa*

Conc./Sample	Aqueous	Ethanol	Ethyl Acetate	Chloroform	Ciprotab (Standard)
2000mg/ml	0.3mm	1.5mm	3.7mm	0.3mm	5.72mm
1000mg/ml	R	0.9mm	3.7mm	R	-
500mg/ml	R	0.6mm	3.4mm	R	-
200mg/ml	R	0.2mm	2.3mm	R	-
100mg/ml	R	R	1.4mm	R	-
50mg/ml	R	R	0.9mm	R	-
25mg/ml	R	R	0.9mm	R	-
12.5mg/ml	R	R	0.9mm	R	-
6.25mg/ml	R	R	0.7mm	R	-

Key: R represents Resistance

Table 8: Antibacterial Activity *Ficus capensis* Leaf Extract on *Klebsiella aerogenes*

Conc./Sample	Aqueous	Ethanol	Ethyl Acetate	Chloroform	Ciprotab (Standard)
2000mg/ml	2.3mm	1.6mm	4.8mm	1.2mm	5.62mm
1000mg/ml	2.1mm	1.0mm	4.8mm	1.0mm	-
500mg/ml	1.4mm	R	4.2mm	0.4mm	-
200mg/ml	0.7mm	R	3.4mm	R	-
100mg/ml	0.5mm	R	3.4mm	R	-
50mg/ml	0.2mm	R	3.2mm	R	-
25mg/ml	0.2mm	R	2.6mm	R	-
12.5mg/ml	R	R	0.9mm	R	-
6.25mg/ml	R	R	0.2mm	R	-

Key: R represents Resistance

Table 9: Antibacterial Activity *Ficus capensis* Leaf Extract on *Providencia vennicola*

Conc./Sample	Aqueous	Ethanol	Ethyl Acetate	Chloroform	Ciprotab (Standard)
2000mg/ml	2.4mm	2.0mm	3.7mm	0.6mm	4.84mm
1000mg/ml	2.0mm	2.0mm	3.3mm	0.1	-
500mg/ml	1.8	1.8mm	3.1mm	R	-
200mg/ml	1.0	R	2.4mm	R	-
100mg/ml	0.6	R	2.4mm	R	-
50mg/ml	0.2	R	2.4mm	R	-
25mg/ml	R	R	1.5mm	R	-
12.5mg/ml	R	R	1.0mm	R	-
6.25mg/ml	R	R	0.8mm	R	-

Key: R represents Resistance

Table 10: Antibacterial Activity *Ficus capensis* Leaf Extract on *Proteus vulgaris*

Conc./Sample	Aqueous	Ethanol	Ethyl Acetate	Chloroform	Ciprotab
2000mg/ml	2.1mm	2.0mm	3.0mm	0.3mm	5.6mm
1000mg/ml	2.0mm	2.0mm	2.5mm	0.1	-
500mg/ml	1.8	1.5mm	1.6mm	R	-
200mg/ml	1.0	1.3	1.4mm	R	-
100mg/ml	0.6	1.0	1.2mm	R	-
50mg/ml	0.2	R	1.0mm	R	-
25mg/ml	R	R	1.0mm	R	-
12.5mg/ml	R	R	0.6mm	R	-
6.25mg/ml	R	R	R	R	-

Key: R represents Resistance

Table 11: Minimum Inhibitory Concentration (MIC) of the extracts of *Ficus capensis* Leaf (mg/ml)

Test Organism	Extract/Conc. (mg/ml)	MIC (mg/ml)
Proteus terrae	**Aqueous**	**100**
	Ethanol	**500**
	Ethyl Acetate	**6.25**
	Chloroform	**R**
Pseudomonas aeruginosa	**Aqueous**	**2000**
	Ethanol	**200**
	Ethyl Acetate	**6.25**
	Chloroform	**2000**
Klebsiella aerogenes	**Aqueous**	**25**
	Ethanol	**1000**
	Ethyl Acetate	**6.25**
	Chloroform	**500**
Providencia vennicola	**Aqueous**	**50**
	Ethanol	**500**
	Ethyl Acetate	**6.25**
	Chloroform	**1000**
Proteus vulgaris	**Aqueous**	**50**
	Ethanol	**100**
	Ethyl Acetate	**12.5**
	Chloroform	**1000**

Key:
R: Resistance

Table 12: Minimum Bacterial Concentration (MBC) of the extracts of *Ficus capensis* Leaf (mg/ml)

Test Organism	Extract/Conc. (mg/ml)	MBC (mg/ml)
Proteus terrae	**Aqueous**	**50**
	Ethanol	**200**
	Ethyl Acetate	**6.25**
	Chloroform	**6.25**
Pseudomonas aeruginosa	**Aqueous**	**1000**
	Ethanol	**200**
	Ethyl Acetate	**6.25**
	Chloroform	**1000**
Klebsiella aerogenes	**Aqueous**	**12.5**
	Ethanol	**500**
	Ethyl Acetate	**6.25**
	Chloroform	**200**
Providencia vennicola	**Aqueous**	**25**
	Ethanol	**200**
	Ethyl Acetate	**6.25**
	Chloroform	**500**
	Aqueous	**25**

Proteus vulgaris	**Ethanol**	**50**
	Ethyl Acetate	**6.25**
	Chloroform	**500**

IV. Discussion

The phytochemical analysis of *Ficus capensis* leaf extracts, as presented in Table 4.1, provides valuable insights into the composition of these extracts and their potential health benefits. The table outlines the presence and concentration of various constituents in different solvent extracts, including aqueous, ethanol, ethyl acetate, and chloroform extracts. Saponins are a class of phytochemical compounds with detergent-like properties, often found in plants. Saponins were detected in the aqueous and ethanol extracts, with a moderate concentration in the ethanol extract and trace amounts in the aqueous extract. They were not detected in the ethyl acetate and chloroform extracts. These results are in line with the previous study of Rao *et al*. [18] and Yuan *et al*. [19]. The quantitative phytochemical analysis of *Ficus capensis* leaf extracts reveals significant variations in the composition of different constituents across various solvents. Ethanol extract demonstrated consistent presence of alkaloids and saponins (saponins (5.70±1.50%); aqueous extract (1.50±7.05%) and ethyl acetate extract (1.28±7.27%)) compared to aqueous and ethyl acetate extracts.

Alkaloids, known for their diverse pharmacological activities, were relatively higher in aqueous and ethanol extracts, suggesting their potential as bioactive compounds. The result obtained from this study correlates with the study of Mahato and Sen, [20] and Adegbite *et al.* [21]. Saponins, recognized for their antioxidant and anticancer properties, were notably abundant in ethanol extract. Flavonoids, with their antioxidant and anti-inflammatory properties, were detected in all extracts except ethyl acetate. Adegbite *et al*. [22] also found the presence of these biological constituents. From this present study, the ethyl acetate extract exhibited the highest concentration of tannins (6.743±3.371%), followed by the aqueous extract (5.227±4.887%) and ethanol extract (2.118±7.997%). Pandey and Rizvi, [23] has similar result as detected from the flavonoids content of *Ficus capensis* leaf extract with aqueous and ethanol extracts having 0.407±0.203% and 0.297±0.313%, respectively. Phenols, tannins, and glycosides exhibited varying degrees of presence across different extracts, with aqueous extract showing higher content of tannins and glycosides.

Contrary to the study of previous studies Ma *et al.* [24], who identified abundant terpenoid content in *F. capensis* leaf extract, more advanced methods are required to meet up to the pharmacological potentials of the leaf extract but the study of Atanasov *et al*. [25] and Liao *et al.* [26] were found to support the result of this present study via the steroid content. Previous studies have investigated the glycoside content of Ficus species and highlighted their biological activities, including antioxidant and antimicrobial effects [27, 28]. In the quantitative analysis for glycosides, the ethyl acetate extract had the highest concentration of glycosides (0.392±0.006%), followed by the chloroform extract (0.372±0.026%). The aqueous and ethanol extracts contained lower concentrations of glycosides (0.1285±0.268% and 0.0375±0.36%, respectively). Also, Ranasinghe *et al*. [29] and Zengin *et al*. [30] discovered similar result of the phenol content of *F. capensis.* The highest concentration was observed in the aqueous extract (0.4545±0.222%), followed by the ethanol extract (0.431±0.246%), ethyl acetate extract (0.274±0.404%), and chloroform extract (0.011±0.666%). These evaluations proved that the plant leaf extract are beneficial and have potential antimicrobial effects and equally can be employed in pharmacological examinations.

From the study, various bacterial organisms were identified from the wound isolates and most of the prevalent bacterial organisms include *Pseudomonas aeruginosa, Proteus terrea, Staphylococcus* sp., *E. coli* (burns wound); *Proteus mirabilis, Streptococcus spp., Proteus terrea, Klebsiella spp., Proteus vulgaris* (open cut wound); *Klebsiella spp., Providencia vennicola faecalis, Staphylococcus* sp. and *E. coli* (ulcer wound) (table 3) The prevalence of bacterial organisms were found in open cut wound isolates with 5(50%) while the ulcer and burns wound isolates have equal number of bacterial organisms (Table 5). These organisms are known to cause various diseases in humans and animals, including urinary tract infections, wound infections, respiratory tract infections, gastrointestinal infections, septicemia, etc [31]. A similar study by Nester *et al*. [32] showed the disposition of some of these bacterial organisms on wounds isolates especially in the skin surfaces. Weledji [33] identified the presence of *Klebsiella aerogenes, Pseudomonas aeruginosa, Staphylococcus aureus* and *Escherichia coli* in wound isolates. The presence of these bacterial organisms especially *Klebsiella aerogenes, Proteus vulgaris, Proteus terrae, Pseudomonas aeruginosa, etc* in wounds is of public health concern as their presence can lead to serious complication of nosocomial infections if unchecked in good time, especially in cases where the wounds are not properly treated or just left open [31].

In this study, ciprotab (standard drug used) exhibited the highest inhibitory activity against the test organisms/isolates. The sensitivity were detected in the following proportion: *Proteus terrae* (7.2mm), *Pseudomonas aeruginosa* (5.72mm), *Klebsiella aerogenes* (5.62mm), *Providencia vermicola* (4.84mm) and *Proteus vulgaris* (6.5mm). Similar to the work of Obioma *et al*. [31], different antibiotics showed varying zones of inhibition against bacterial organisms. In their study, they found chloramphenicol and lincocin with their zones of inhibition being 9.0 mm. Rifampicin had the least antibiotic effect on *S. aureus* with a zone of

inhibition of 6.0 mm. The susceptibility pattern of *E. coli* to gram negative antibiotic discs indicated that it was most susceptible to ciprofloxacin with a zone of inhibition of 13 mm and it was least susceptible to Nalidixic acid and Streptomycin with zones of inhibition of 6 mm [31].

Ethyl acetate proved to be sensitive to the test organisms at higher dose (2000mg/ml): Proteus terrae (4.8mm), *Pseudomonas aeruginosa* (3.7mm), *Klebsiella aerogenes* (4.8mm), *Providencia vermicola* (3.7mm) and a lower effect of *Proteus vulgaris* with 3mm. Ethanol and aqueous extracts showed lower zone of inhibition against the test organisms whereby the organisms showed full resistance to the chloroform extract. The inhibitory activity of *Ficus capensis* leaf extract is lower as to compare the study of Ogbodo and Tasie [34] whose inhibitory activity was about 11.00mm-16.00mm. Table 4.11 showed that the least concentration that inhibited the test organisms was 6.25mg/ml for the various extracts used for the analysis. Also the MIC for ethanol and aqueous extract were found to be same in 50, 25, 12.5 and 6.25mg/ml for the organisms tested. Table 12 indicates the minimum bacterial concentration at which at which no growth occurred and from the table, this was rightly found in chloroform extract (6.25mg/ml) for all the test organisms. Ethyl acetate extract showed quality zones of inhibition whereby ethanol showed no evidence of growth in all the test organisms at the concentration of 50, 25, 12.5 and 6.25mg/ml.

This study suggests that the plant leaf extract can be an alternative to the use of most antibiotics for the treatment of human and animal infections caused by *Proteus terrae*, *Pseudomonas aeruginosa*, *Klebsiella aerogenes* and *Providencia vermicola*. The effect of the plant extract on the test organisms is in agreement with the findings of Igwe *et al*. [35]; Solomon-Wisdom *et al.* [36] while Obonga *et al*. [37]; Oyeleke *et al*. [38] recorded the plant effect on *Staphylococcus aureus, Candida albicans* and *Escherichia coli.* Adebayo-Tayo and Odeniyi, [39]; Esievo *et al*. [40] and Owolabi *et al*. [41] had similar phytochemical and antibacterial result as obtained in this present study. These results suggests the efficacy of the traditional use of *Ficus capensis* and its adoption in medicinal and therapeutic activities.

Furthermore, the measurement and determination of the actual doses of the medicinal plants have also provoked massive challenges to the traditional herbal doctors during the prescription and treatments of their patients in our rural villages. Thus, the need to create enabling grounds that would promote the mass production of the medicinal plants with minimal cost cannot be over emphasized, since it has already been proven to possess rich therapeutic attributes as an alternative option to synthetic commercially prepared medicines (drugs). It is strongly believed that, the promotion of the use of medicinal plants would help to reduce the increasing statistic of antibiotic resistance crises in our various hospitals and health centers globally.

V. Conclusion

In conclusion, the phytochemical analysis of *Ficus capensis* leaf extracts revealed the presence of various bioactive compounds, including saponins, tannins, flavonoids, alkaloids, terpenoids, glycosides, phenols, and steroids. These compounds have been associated with a range of health benefits, such as antimicrobial, anti-inflammatory, and antioxidant properties. The antibacterial activity of the extracts varied depending on the solvents used for extraction. The ethyl acetate extract consistently showed the highest activity against tested the bacterial strains (*Proteus terrae, Pseudomonas aeruginosa* and *Providencia vennicola*). The ethanol extract also exhibited moderate antibacterial activity, while the aqueous and chloroform extracts had limited effectiveness on the isolates. However, it's important to note that the standard antibiotic (Ciprotab), displayed strong antibacterial activity against all strains, indicating the need for further research and comparisons. These findings suggest that *Ficus capensis* leaf extracts have the potential to be explored as natural alternatives or complementary agents in the development of antibacterial therapies. However, additional studies are necessary to identify and isolate specific active compounds responsible for the observed effects and to evaluate their safety, efficacy, and mechanisms of action. Overall, this study contributes to the growing body of knowledge on *Ficus capensis* as a valuable source of bioactive compounds. It highlights the importance of continued research and investigation into the therapeutic applications of this plant, with the aim of harnessing its potential for the development of novel pharmaceuticals or nutraceuticals.

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