Journal of Research in Chemistry

E-ISSN: 2709-9423
P-ISSN: 2709-9415
JRC 2021; 2(1): 04-10

www.chemistryjournal.net
Received: 03-11-2020
Accepted: 06-12-2020

Muhammad F Yahaya
Department of Petroleum Chemistry, American University of Nigeria, Yola, Nigeria

Sunday A Osemeahon
Department of Chemistry, Modibbo Adama University of Technology, Yola, Nigeria

Mohammed H Shagal
Department of Chemistry, Modibbo Adama University of Technology, Yola, Nigeria

Oliver N Maitera
Department of Chemistry, Modibbo Adama University of Technology, Yola, Nigeria

Peter M Dass
Department of Chemistry, Modibbo Adama University of Technology, Yola, Nigeria

Jibrin M Yelwa
Department of Scientific and Industrial Research, National Research Institute for Chemical Technology, Zaria, Nigeria

Correspondence
Muhammad F Yahaya
Department of Petroleum Chemistry, American University of Nigeria, Yola, Nigeria

Antimicrobial, antioxidant, cytotoxicity profiles and chemical compositions of ethanolic extracts of *Ficus polita* and *Ficus thonningii* plant

Muhammad F Yahaya, Sunday A Osemeahon, Mohammed H Shagal, Oliver N Maitera, Peter M Dass and Jibrin M Yelwa

Abstract
Ficus polita and *Ficus thonningii Blume* are one of the medicinal plants used in the treatment of various diseases traditionally by Lala people of Adamawa State, Nigeria. The present study was conducted with the objectives of evaluating the possible phytochemical components present in the methanol extract of *Ficus polita* and *Ficus thonningii Blume* and analyse the effective bioactive compounds using GC-MS. And to evaluate the cytotoxicity, antimicrobial and antioxidant profiles of the plant extracts. The cytotoxicity, anti-microbial and antioxidant activities of plants leaves were carried out using standard methods. Among the compounds found in *Ficus polita* extract, cis-Vaccenic acid (43.17%) was found with the highest peak area % followed by Oleic Acid (5.01%), 9-Octadecenoic acid, (E)- (4.31%), Corynan-17-ol, 18,19-didehydro-10-methoxy-, acetate (ester) (4.83%), 11-Octadecenoic acid, methyl ester (3.30%), 9-Octadecenoic acid (Z)-, 2-hydroxy-1-(hydroxymethyl) ethyl ester (3.18%), 9,12-Octadecadienoic acid (Z,Z)- (2.26%) and for *Ficus thonningii Blume* extract, cis-Vaccenic acid (41.11%) was found with the highest peak area % followed by Phenol, 2,5-bis(1,1-dimethylethyl) (9.04%), 8-Octadecenoic acid, methyl ester, (E)- (5.98%), 9-Octadecenoic acid (Z)-, 2,3-dihydroxypropyl ester (5.74%), 9-Octadecenoic acid, (E)- (4.19%), and Oleic Acid (2.57%). The results of the cytotoxicity of the ethanolic extract of the plants showed direct relationship with the mortality rate of the brine shrimp because as the concentration of the plants extracts increases, the value of brine shrimp mortality from 6 - 24 hours also increases. Moderate antimicrobial activity of ethanol extract of *Ficus polita* and *Ficus thonningii Blume* leaves were observed against *Klebsiella Pneumonia, Escherichia coli,* Muti drug resistant *Acinetobacter, Pneumonia, Salmonella Typhi* and *Candida*. Antioxidant capacity of these two plants extracts of *Ficus polita* and *Ficus thonningii Blume* were determined by DPPH and H_2O_2 assays. This result indicates the use of *Ficus polita* and *Ficus thonningii Blume* in ethno-medicine for the management of different illness.

Keywords: Brine shrimp, DPPH, lethality, bioassay, scavenging activities

Introduction
Medicinal plant is defined as any plant which in one or more of its organs contain substances that can be used for therapeutic purposes or which are precursors for the synthesis of useful drugs [1]. This definition has set a difference between medicinal plants whose medicinal value have been tested and their medicinal constituents have been studied and plants that are regarded as medicinal but have not been studied scientifically. However, through trial and error, humans have learned that under certain condition, physiological effects of some secondary metabolites can have curative benefits or narcotic effects [2]. The medicinal effect benefited from plant materials typically resulted from the combination of secondary metabolites found in the plant. Unlike primary products like carbohydrates, protein, nucleic acids, chlorophyll and lipids, the medicinal actions of plants that are peculiar to particular plant species or groups are consistent with this idea as the combinations of secondary products in a particular plant are often taxonomically distinct [3] and [2].
Healing with medicinal plants is as old as mankind itself. The connection between man and his search for drugs in nature dates from the far past, of which there is ample evidence from various sources: written documents, preserved monuments, and even original plant medicines. Awareness of medicinal plants usage is a result of the many years of struggles against illnesses due to which man learned to pursue drugs in barks, seeds, fruit bodies, and other parts of the plants [4].

This study seeks to determine the antimicrobial, antioxidants, cytotoxicity profiles and chemical compositions of methanolic extracts of *Ficus polita* and *Ficus thonningii Blume* plants collected from Lala community of Adamawa State.

Materials and Methods

Materials

Ethanol, Soxhlet apparatus, rotary evaporator, filter papers, freeze dryer, n-hexane and ethyl acetate, DPPH, H_2O_2, methanol etc.

Sample Collection

In this work, fresh parts of roots of *Ficus polita* and *Ficus thonningii Blume* plants were used.

Extraction of Plants

The air-dried and powdered plant materials (10 g of each) were extracted with 400 mL ethanol by using a Soxhlet apparatus for 8 h. The ethanol extracts obtained were filtered and evaporated by using a rotary evaporator (Buechi, Switzerland) and freeze dried to give the crude dried extract. Moreover, a portion of ethanol extract were successively partitioned with n-hexane and ethyl acetate to yield hexane fraction, the ethanol crude extract and its fractions were stored at 4°C till usage for phytochemical and biological assays.

Analysis of the plant materials

Gas chromatographic mass spectrometry (GC/MS)

GC-MS analysis was performed as adopted by Runde *et al.* [5] on a J and W Scientific gas chromatography directly couple to the mass spectrometer system (model GC Agilent S/N 20102969, polarise Q S/N 210729) HP 5ms 5% phenyl Methyl) silox: 469.56. Capillary Colum (30M x 250m) were used under the following condition: Ovum temperature 50 ^{0}C for 1 min, then 10 and 20 min to 300 ^{0}C for 2 min and the descriptions is as follows;

Injector temperature 230 ^{0}C carrier gas He, flow rate 1m/min; the volume of the injected sample will be 1uL of diluted extract in methanol. Split less injection techniques, ionization energy 70ev. In the electron ionization (EI) mode, ion source temperature 230 ^{0}C scan mass range of M/Z 60-335; the constituents of the plant material will be identified base on comparison of the retention indices and mass spectra of most of the compound with data generated under identical experimental conditions by applying a 2D search algorithm considering the retention index as well as mass spectra similar with those of authentic compounds available in NIST 2011 Library.

Determination of Antimicrobial Activity

The antimicrobial activities of the extracts were determined using Disc Diffusion Method [6]. Petri plates containing 10ml of Mueller Hinton agar medium were seeded with 24 hours old culture of a selected bacteria strain. Sterilized filter paper disc (9mm in diameter) containing 1000-5000 ppm of a plant extract dissolved in ethanol, were allowed to dry off and placed on the medium. Moreover, the disc alone served as negative controls.

A standard disc containing chloramphenicol antibiotic drug (30 ug/disc) were a positive control and Incubation were done for 14 hours at 37 °C. The assessment of antimicrobial activity was based on the measurement of diameter of incubation zone formed around the disc (diameter of inhibition zone minus diameter of the disc). An average zone of inhibition was calculated for three replicates. An inhibition zone of 8mm or greater were considered a good antimicrobial activity [7]. According to Ogunwande [8] a cleared zone> 10mm will be interpreted as sensitive while < 9mm will be interpreted as resistance.

Determination of Anti-Oxidant Activity of plant materials

Quantitative 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity assay.

The quantitative 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay were carried out for the evaluation of the antioxidant activity of the plant extracts. The purple color, typical for free DPPH radical fades, and the change in absorbency at λ = 517 nm was measured spectrophotometrically.

The method was carried out as described previously by Kubmarawa *et al.* [9] and adopted by Yahaya *et al.* [6]. The extracts were dissolved in methanol, and various concentrations (2, 6, 12, 24, and 50µL/mL) were used. The assay mixture contained in a total volume of 1 mL, 500 µL of the extract, 125 µL prepared DPPH (1mM in methanol), and 375 µL solvent (methanol). After 30 min incubation at 25°C, the decrease in absorbance was measured at λ = 517 nm. The radical scavenging activity was calculated from the equation below: % or radical scavenging = [(Abs control – Abs Sample) ÷ Abscontrol] x 100 [4].

Hydrogen peroxide scavenging activity

A solution of H_2O_2 (40 mM) was prepared in phosphate buffer (pH 7.4). Extracts (20-500µg/ml) in methanol was added to a H_2O_2 solution (0.6 ml, 40 mM). The absorbance value of the reaction mixture was recorded at 230 nm. Blank solution contained the phosphate buffer without H_2O_2. The percentage of H_2O_2 scavenging was calculated as:

H_2O_2 scavenging effect (%) = A control – A sample / A control × 100

Where A control is the absorbance of the control, and A sample is the absorbance in the presence of the sample or standards [10].

Cytotoxic brine shrimp assay

Brine shrimp lethality bioassay was carried out to investigate the cytotoxicity of plant extracts. 50mg of *Artemia salina* (Leach) eggs were added to a hatching chamber containing Ocean/Sea water (75ml). The hatching chamber was kept under an inflorescent bulb for 48h for the eggs to hatch into shrimp larvae. 20mg of test fractions of the various plant species were separately dissolved in 2ml of methanol, form this, 1000, 500, 200, 100 and 10 ppm of each solution was transferred into vials. Each dosage was tested in triplicate. The vials (5 per test fraction) were allowed to evaporate to dryness in about 48h at room temperature.

Fourty five millilitre (45ml) of Ocean/Sea water were added to each vial, and more than 10 larvae of *A. salina* each (taken 6 – 24h after the initiation of hatching) were added to each vial. The final volume of solution in each vial was adjusted to 5ml with Ocean/Sea water immediately after adding the shrimps. One drop of dimethyl sulphoxide

(DMSO) was added to the test vials before adding the shrimps to enhance the solubility of test materials. LC50 values were determined at 95% confidence intervals by analyzing the data on a computer loaded with 'Finney Programme' [11]. The LC50 values of the brine shrimps obtained for extracts of the plants studied were recorded. After 6, 12 and 24 h of incubation survivors were counted with help of 3× magnifying glass and calculation was done using Abbot's formula; % Death = (Sample-control/control) × 100.

Results and Discussion

GM-MS analysis

GC-MS analysis is one of the best techniques to identify the constituents of volatile matter, long chain, branched hydrocarbons, alcohols, acids, ester etc. The GC-MS analysis of the methanol extract of leaves of *Ficus polita* and *Ficus thonningii Blume* showed the presence of twenty-two (22) and thirteen (13) major compounds respectively that could contribute to the medicinal property of the plant. The identification of the phytochemical compounds was established on the basis of peak area, retention time and molecular formula. The compounds along with their retention time, molecular formula, molecular weight and peak area in percentage are presented in Table I. for *Ficus polita* extract and Table 3 for *Ficus thonningii Blume* extract. Their structures are also shown below the tables. GC-MS chromatograms are presented in Figure I for *Ficus polita* extract and Figure III for *Ficus thonningii Blume* respectively. Among the compounds found in *Ficus polita* extract, cis-Vaccenic acid (43.17%) was found with the highest peak area % followed by Oleic Acid (5.01%), 9-Octadecenoic acid, (E)- (4.31%), Corynan-17-ol, 18,19-didehydro-10-methoxy-, acetate (ester) (4.83%), 11-Octadecenoic acid, methyl ester (3.30%), 9-Octadecenoic acid (Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester (3.18%), 9,12-Octadecadienoic acid (Z,Z)- (2.26%), 13-Octadecenal, (Z)- (1.93%), Octadec-9-enoic acid (1.63%), Methyl stearate (1.43%), Benzeneacetic acid, alpha.-hydroxy-, methyl ester, (S)- (1.36%), Hexadecanoic acid, methyl ester (1.15%), 8-Hexadecenal, 14-methyl-, (Z)- (1.11%), 1-Heptadecene (0.87%), Phenol, 2-propyl- (0.73%), Benzeneacetic acid, alpha.-hydroxy-, methyl ester, (S)- (0.36%), Cyclohexa-2,5-diene-1,4-dione, 2-methyl-5-(4-morpholinyl)- (0.34%), 2-(But-2-enylideneamino)-succinonitrile (0.30%), 2-(Acetoxymethyl)-3-(methoxycarbonyl) biphenylene (0.15%), 7-Norcarancarboxylic acid, methyl ester (0.14%), and 3-Isopropoxy-1,1,1,7,7,7-hexamethyl-3,5,5-tris (trimethylsiloxy) Tetrasiloxane (0.06%). However, the compounds found in *Ficus thonningii Blume* extract, cis-Vaccenic acid (41.11%) was found to have highest peak area % followed by Phenol, 2,5-bis(1,1-dimethylethyl) (9.04%), 8-Octadecenoic acid, methyl ester, (E)- (5.98%), 9-Octadecenoic acid (Z)-, 2,3-dihydroxypropyl ester (5.74%), 9-Octadecenoic acid, (E)- (4.19%), Oleic Acid (2.57%), 1H-Pyrrole-2,5-dione (1.39%), Benzene, 1-methyl-4-(phenylmethyl) (1.24%), 9-Acetoxynonanal (0.77%), Hexadecanoic acid, methyl ester (0.67%), 4-Ethylbiphenyl (0.65%), 4,4'-Dimethylbiphenyl (0.49%), and 1H-Inden-5-ol, 2,3-dihydro- (0.28%).

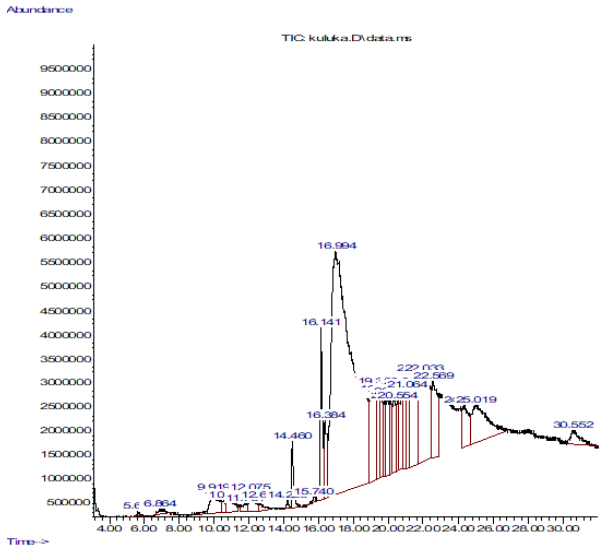

Fig 1: GC-MS chromatogram of methanolic extract of *ficus polita* plant.

Table 1: GC-MS analytical report of methanolic extract *ficus polita* plant.

Name of the compounds	Molecular Formula	Molecular Weight	Retention Time (Min)	Area (%)
7-Norcarancarboxylic acid, methyl ester	C9H14O2	154	5.645	0.14
2,6-Dimethylbenzaldehyde	C9H10O	134	6.863	0.30
Phenol, 3,5-bis(1,1-dimethylethyl)	C14H22O	206	9.919	1.36
Benzeneacetic acid, alpha.-hydroxy-, methyl ester, (S)-	C9H10O3	166	10.537	0.36
Phenol, 2-propyl-	C9H12O	136	10.857	0.73
2-(But-2-enylideneamino)-succinonitrile	C8H9N3	147	11.779	0.30
1-Heptadecene	C17H34	238	12.076	0.87
Cyclohexa-2,5-diene-1,4-dione, 2-methyl-5-(4-morpholinyl)-	C11H13NO3	207	12.666	0.34
2-(Acetoxymethyl)-3-(methoxycarbonyl)biphenylene	C17H14O4	282	14.222	0.15
Hexadecanoic acid, methyl ester	C17H34O2	270	14.462	1.15
3-Isopropoxy-1,1,1,7,7,7-hexamethyl-3,5,5-tris(trimethylsiloxy) Tetrasiloxane	C18H52O7Si7	576	15.738	0.06

11-Octadecenoic acid, methyl ester	C19H36O2	296	16.139	3.30
Methyl stearate	C19H38O2	298	16.385	1.43
cis-Vaccenic acid	C19H36O2	296	16.991	43.17
9-Octadecenoic acid, (E)-	C18H34O2	282	19.166	4.31
Oleic Acid	C18H34O2	282	21.592	5.01
13-Octadecenal, (Z)-	C18H34O	266	20.316	1.93
Octadec-9-enoic acid	C18H34O2	282	20.556	1.63
9-Octadecenoic acid (Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester	C21H40O4	356	22.570	3.18
9,12-Octadecadienoic acid (Z,Z)-	C18H32O2	280	24.338	2.26
Corynan-17-ol, 18,19-didehydro-10-methoxy-, acetate (ester)	C22H28N2O3	368	25.019	4.83
8-Hexadecenal, 14-methyl-, (Z)-	C17H32O	252	30.552	1.11

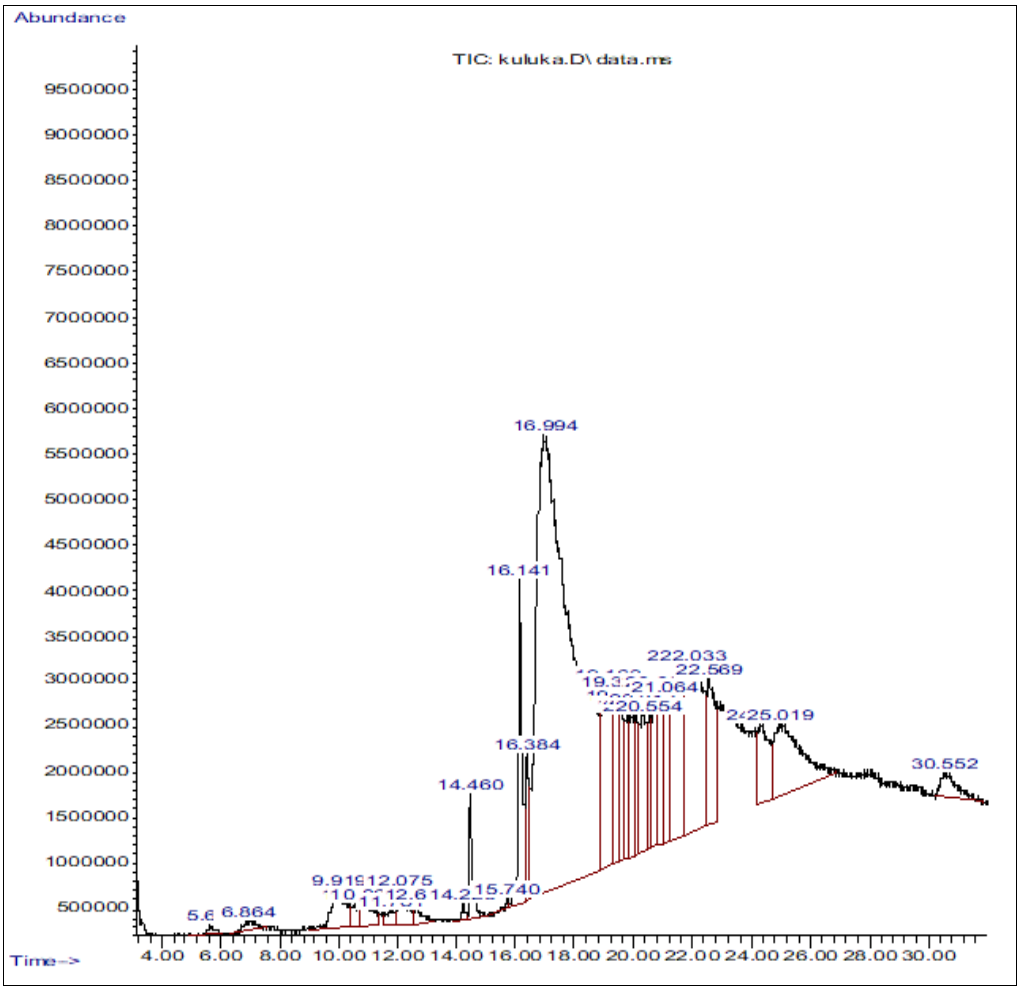

Fig 2: GC-MS chromatogram of methanolic extract of *ficus thonningii* Blume leaves

Table 2: GC-MS analytical report of methanolic extract *ficus thonningii* Blume leaves

Compounds	Molecular Formula	Molecular Weight	Retention Time (Min)	Area (%)
1H-Inden-5-ol, 2,3-dihydro-	C9H10O	134	6.909	0.28
1H-Pyrrole-2,5-dione	C4H3NO2	97	9.038	1.39
Phenol, 2,5-bis(1,1-dimethylethyl)	C14H22O	206	9.919	9.04
Benzene, 1-methyl-4-(phenylmethyl)	C14H14	182	11.429	1.24
4,4'-Dimethylbiphenyl	C14H14	182	11.738	0.49
9-Acetoxynonanal	C11H20O3	200	12.065	0.77
4-Ethylbiphenyl	C14H14	182	12.477	0.65
Hexadecanoic acid, methyl ester	C17H34O2	270	14.462	0.67
8-Octadecenoic acid, methyl ester, (E)-	C19H36O2	296	16.139	5.98
cis-Vaccenic acid	C19H36O2	296	17.529	41.11
Oleic Acid	C18H34O2	282	18.731	2.57
9-Octadecenoic acid, (E)-	C18H34O2	282	20.733	4.19
9-Octadecenoic acid (Z)-, 2,3-dihydroxypropyl ester	C21H40O4	356	20.916	5.74

Cytotoxicity of *Ficus thonningii Blume* and *Ficus polita* plants using brine shrimps

Brine shrimp lethality assay was primarily proposed by Michael in the year 1956 and was later developed by Vanhaecke in 1981 [12]. Cytotoxicity test is the ability of a plant extract to kill a laboratory cultured Artemia nauplii, brine shrimp. This assay serves as an important tool for preliminary assessment of toxicity, safety of plant extracts,

for the detection of fungal toxins, plant extract toxicity, and cyanobacteria toxins [12].

The brine shrimp lethality of the 2 tested plants for ethanolic extract were found to be concentration-dependent (see table 3). The methanolic extract of the plants showed direct relationship with the mortality rate of the brine shrimp because as the concentration of the plant extracts increases, the value of brine shrimp mortality after 24 hours also increases. Similar Arquion *et al.*, [13] and Noraya *et al.* [14] in separates studies found that as the concentration of *Ficus nota* and *Acmella grandiflora* extracts increases mortality rate of the brine shrimp also increases respectively. Morilla *et al.* [15] also found that the % mortality of the brine shrimp exposed for 24 hours increased with increasing concentration of the *Kleinhovia hospita* extracts. In this study, LC_{50} values of *Fiscus thonningii Blume and Ficus polita* plants ethanolic extract were 197 and 269 respectively. From the observed lethality of the selected plant extracts to brine shrimps indicated the presence of potent cytotoxic and probably anti-tumour components of these plants. According to Meyer *et al.*, [16] crude plant extract is toxic (active) if it has an LC50 value of less than 1000µg/ml while non-toxic (inactive) if it is greater than 1000 µg/ml.

Figure 1 shows the activities of the different plant extracts at varying concentrations over % mortality. The percentage % mortality incubated showed significant differences at varying concentrations. The lowest concentration had the lowest % mortality rate. Similar trend was reported by Ohikhena *et al.* [17].

The effect of exposure time on the hatching success on the brine shrimp is shown in figure 2. It showed the response of the cysts in ethanolic extract of *Fiscus thonningii Blume* for 6, 12 and 24 hours of exposure. The same trend was observed in all the extracts tested. There was a lower significant number of dead nauplii at 24 hours in all the extracts. Similar trend was reported by Ohikhena *et al.* [17].

Table 3: Cytotoxicity test of *Fiscus thonningii Blume* and *Ficus polita* plants extracts using brine shrimps' assay.

Extracts	Conc.(ppm)	No. nauphi	6hr	12hr	24hr	Mortality (%)	Lc_{50}
Fiscus thonningii Blume	10	16	2	2	3	13	197
	100	20	5	8	12	40	
	200	18	9	12	13	61	
	500	19	8	13	14	63	
	1000	20	10	14	16	65	
Ficus polita	10	20	1	2	4	10	99
	100	20	2	4	3	15	
	200	16	4	5	7	31	
	500	18	3	4	6	22	

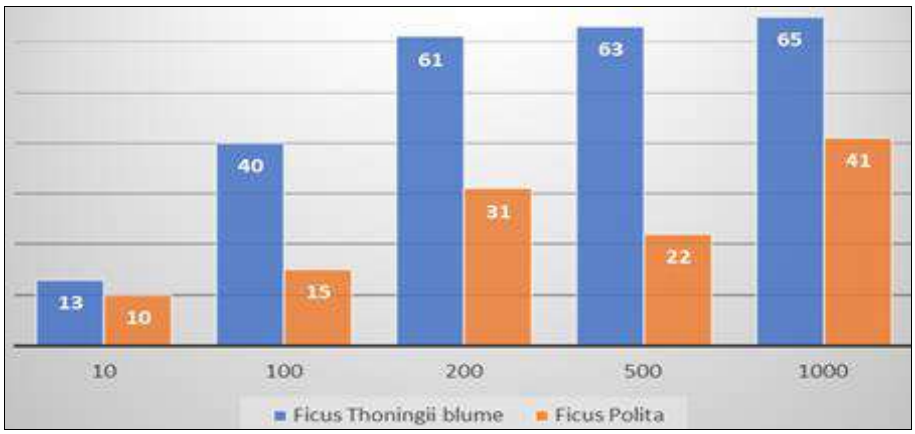

Fig 3: Plot of percentage mortality of brine shrimps against concentration of three plants extracts

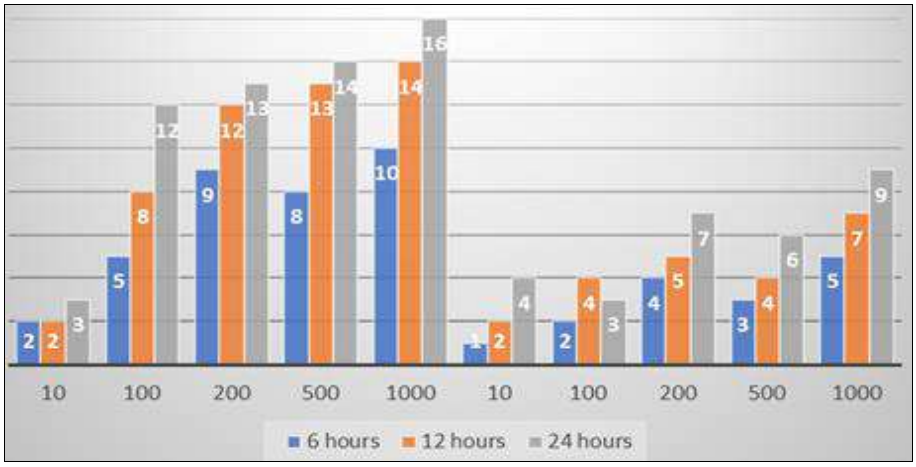

Fig 4: Plot of number of dead of *Artemia salina* against concentration the plant extracts with respect to incubation time.

Antimicrobial profile of *Ficus polita* and *Ficus thonningii Blume* plants

The antimicrobial effects of essential oils derived from plants are the basis of plentiful applications, in several revenue generating firms such as cosmetic, perfume, pharmaceutical, nutraceutical, sanitary and agronomy industries [14]. Many antibiotics are available for treating various bacterial pathogens. However, increased multidrug resistance has led to the increased severity of diseases caused by bacterial pathogens [18]. The anti-bacterial activity of 3 selected plant extracts against six microbes is summarized in Table IV. The antimicrobial activities of the ethanolic extracts were investigated using disc diffusion method against five selected microorganisms, namely *Klebsiella peumoniae, Escherichia coli*, Muti-drug resistant *acinetobacter*, *S. typhy*, *Candida* and *Pseudomonas aeruginosa*. The results revealed that the selected essential oils showed antibacterial activity with varying magnitudes. The zone of inhibition above 7 mm in diameter was taken as positive result. All of the tested organisms were sensitive to many of the plants extract. *Ficus polita* plant extract showed activity against *Klebsiella peumoniae, S. typhy* and Muti-drug resistant *acinetobacter* species tested respectively. The extract of *Ficus thonningii* doesn't have inhibition over *Klebsiella pneumoniae, candida auris* and *Pseudomonas*. The results showed that multi-drug resistance *Acinetobacter, Escherichia Coli* and *Salmonella Typhi* were inhibited by *Ficus polita* extract.

Table 4: Antimicrobial profile of *Ficus thonningii Blume* and *Ficus polita* plants.

Microbes	*Ficus thonningii Blume*	*Ficus polita*
Klebsiella pneumoniae	-	+
Muti drug resistant acinetobacter	++	+++
Escherichia Coli	+	++
Salmonella Typhi	+	++
Candida auris	-	-
Pseudomonas	-	+

Antioxidant profile of *Ficus polita* and *Ficus thonningii Blume* plants

DPPH and H_2O_2 are stable free radical generally used to determine the ability of compounds to scavenge free radicals. Free radicals are involved in many disorders like cancer and liver disease [19]. The free radical scavenging activity of the medicinal plants of *Ficus polita and Ficus thonningii Blume* were obtained using DPPH and H_2O_2 methods. The percentage Scavenging capacity for each medicinal plant and that of the standard (Ascorbic acid) were measured at varying concentrations (5, 10, 15, 10, 20 and 25 µL). From the result all the samples have exhibited antioxidant activity as shown in table V. All the two extracts showed a dose dependent scavenging activity DPPH comparable to standard antioxidant. In DPPH assay, the antioxidant activities of the *Ficus thonningii Blume* ranged from 27.67 to 96.8 µl, *Ficus polita* ranged between 13.45 to 91.43 µl] and the control ranged between 43.65 to 98.23 µl. The free radical scavenging activity of the plant *Ficus thonningii Blume* by DPPH method exhibited a concentration-dependent response with the highest concentration found to be the most active free radical scavenger exhibited (96.8µl inhibition at a concentration of 25 µl) and the lowest was observed in *Ficus polita* (91.43µl inhibition at a concentration of 25µl) being the least active free radical scavenger. The IC_{50} of *ficus thonningii Blume and ficus polita* were determined to be were 2.89 and 2.89 respectively while Control showed the lesser activities with the IC_{50} of (2.33 IC_{50}).

However, the results of antioxidant activities (H_2O_2) of the various plants are presented in table VI. H_2O_2 is involved in the generation of hydroxyl radicals which can initiate cytotoxicity. Therefore, any substance that can remove H_2O_2 will protect the living system [19]. The results of free radical scavenging activity by H_2O_2 method also showed a concentration dependent activity. All the extracts scavenged H_2O_2 probably by donating electrons to the hydrogen peroxidase, thereby converting it into water. The H_2O_2 scavenging activity of prepared extracts were found in the following order of *ficus thonningii Blume* > *ficus polita* significantly different from the standard ascorbic acid. The maximum antioxidant activities by H_2O_2 assay were observed at 25µL while the lowest were observed at concentration 5µL. It was noticed that the highest scavenging capacity the lowest scavenging capacity for each of the samples were observed in their corresponding lowest concentrations. The % inhibition produced by ascorbic acid at concentration of 25µL was greater than the scavenging activities of each extract at a concentration of 25µL. With the above order the IC_{50} were 2.62 and 2.50 IC_{50}) for *ficus thonningii Blume and ficus polita* respectively, while Control showed the higher activities with the IC_{50} of (2.70 IC_{50}). Thus, it can be concluded that the antioxidant activity of these plants is due to the presence of phytoconstituents [20].

Table 5: Results of antioxidant activities using DPPH methods.

Plant extract	5µl	10 µl	15 µl	20 µl	25µl	IC_{50} µL
Ficus thonningii blume	27.67	44.89	61.65	78.78	96.8	2.89
Ficus polita	13.45	36.26	59.45	73.96	91.43	2.89
Control	43.65	68.63	77.98	88.71	98.23	2.33

Table 6: Results of antioxidant activities using H_2O_2 methods

Plant extract	5 µl	10 µl	15 µl	20 µl	25 µl	IC_{50} µL
Ficus thonningii blume	36.67	44.89	51.65	68.78	78.8	2.62
Ficus polita	23.45	38.45	52.45	74.45	83.45	2.70
Control	43.55	56.93	74.78	83.61	92.59	2.50

% scavenging property per microliter.

Conclusion and Future Scope

The selected ethnomedicinal plants exhibited moderate to potent cytotoxicity against *Artemia salina*. Biopharmaceutical industries are in need of eco-friendly alternative drug molecules to treat diseases associated with microbial pathogens and body metabolism. Thus, methanolic extracts of *Ficus polita* and *Ficus thonningii Blume* plants might be a prospective source of alternative antimicrobial and antioxidant agents and may play an important role in the discovery of new drugs for the treatment of a wide range of pathogenic microorganisms in the near future.

Reference

1. Sofowora A. Medicinal Plants and Traditional Medicine in Africa. Wiley, New-York 1982, 10-13.
2. Wink M. function of secondary metabolites, in function of plant secondary metabolites and their exploitation in Biotechnology, annual plant reviews, Sheffield

Academic Press, Sheffield U.K 1999;(3):1-16.
3. Sahreen S, Khan MR, Khan RA. Evaluation of antioxidant activities of various solvent extracts of Carissa opaca fruits. Food Chem 2010;122:1205-11.
4. Argueta A, Cano LM, Rodarte ME. Atlas de las Plantas de la Medicina Traditional I y III. Instituto Nacional Indigenista 1994, 537-538.
5. Runde M, Kubmarawa D, Maina HM. Compositional Analysis and Anti-Oxidant Assessment of Essential Oil of some Aromatic Plants Obtained from North-Eastern Nigeria, Res. J Chem. Sci 2015;5(10):7-12.
6. Yahaya MF, Kubmarawa D, Yelwa JM, Runde M. Antioxidant and antimicrobial activity of essential oils extracted from aromatic plants. World Scientific News. An International Journal. WSN 2018;111:13-25.
7. Ali M, Ravinder E, Ramachandran RA. New flavonoid from the aerial parts of *Tridax procumbens*. Fitoterapia 2001;72:313-5.
8. Ogunwande IA, Guido F, Olubusayo O, Alese PL, Akintayo LO, Williams NS. A new chemical form of essential oil of hyssopus officinalis (Lamiceal). Int. J Biol chem Sci 2011;5(1):46-55.
9. Kubmarawa D, Ajoku GA, Enworem NM, Okorie DA. African Journal of Biotechnology 2007;6:1690-1696.
10. Ruch RJ, Cheng SJ, Klaunig JE. Prevention of cytotoxicity and inhibition of intracellular communication by antioxidant catechins isolated from Chinese green tea. Carcinogenesis 1989;10:1003-1008.
11. Adoum OA. Determination of Toxicity Level of Some Savannah Plants Using Brine Shrimps Test. Bayero Journal of Pure and Applied Sciences 2009;2(1):135-138.
12. Bhatt D, Jethva K, Zaveri M *In-Vitro* Cytotoxicity Screening of the Selected Ethnomedicinal Plants for Their Activity on Breast Cancer. Int. J Pharm. Sci. Rev. Res 2016;41(2):273-277.
13. Arquion CD, Nuñeza MO, Uy MM. Evaluating the Potential Cytotoxic Activity of Ficus nota Using Brine Shrimp Lethality Test". Bull. Env. Pharmacol. Life Sci 2015;4(12):40-44.
14. Noraya E, Nuñeza OM, Uy MM. Evaluating the Potential Cytotoxic Activity of Acmella grandiflora Flower and Whole Plant using Brine Shrimp Lethality Test. International Research Journal of Biological Sciences 2014;3(10):90-92.
15. Morilla LJG, Nuñeza OM, Uy MM. Brine Shrimp Lethality Test of Kleinhovia hospita stem and bark from Agusan del Sur, Philippines. Extreme Life, Biospeology & Astrobiology. International Journal of the Bioflux Society 2015;7(1):61-66.
16. Meyer BN, Ferrigni NR, Putnam JE, Jacobsen LB, Nichols DE, McLaughlin JL. Brine shrimp: A convenient general bioassay for active plant constituents. Planta Medica 1982;45:31-34.
17. Ohikhena FU, Wintola OA, Afolayan AJ. Toxicity assessment of different solvent extracts of the medicinal plant, Phragmanthera capitata (sprengel) balle on brine shrimp (*Artemia salina*). Int. J Pharmacol 2016;12:701-710.
18. Usunomena U, Chinwe VI. Phytochemical screening, mineral composition and *in vitro* antioxidant activities of Pterocarpus mildbraedii leaves. International Journal of Scientific World 2016;4(1):23-26.
19. Al-Owaisi M, Al-Hadiwi N, Khan SA. GC-MS analysis, determination of total phenolics, flavonoid content and free radical scavenging activities of various crude extracts of Moringa peregrina (Forssk.) Fiori leaves. Asian Pac J Trop Biomed 2014;4(12):964-970.
20. Swamy MK, Akhtar MS, Sinniah UR. Antimicrobial Properties of Plant Essential Oils against Human Pathogens and Their Mode of Action: An Updated Review. Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine 2016, 21. http://dx.doi.org/10.1155/2016/3012462.