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Phytochemical Analysis and Antioxidant Activity of Aqueous and Ethanolic Root and Stem bark Extracts of Ficus *sycomorus* Linn.

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Abstract

This study was designed to investigate the phytochemical constituents and antioxidant activities of the root and stem bark of Ficus sycomorus. The root *and* stem bark of *Ficus sycomorus* were extracted using water and ethanol. Qualitative and Quantitative Phytochemical analysis was done using Standard methods. Two *in vitro* antioxidant tests-hydrogen peroxide (H_2O_2) and 2, 2-diphenyl-1-picrylhydroxyl (DPPH) scavenging models were employed. Phytochemical analysis revealed that, all the phytochemicals were found in reasonable amount in all the extracts except glycoside and reducing sugars (carbohydrates). Aqueous stem bark extract (ASBE) have the highest amount of Alkaloids, Flavonoids and saponins (72.00 ± 0.01, 31.43 ± 0.01, 42.00 ± 0.01) mg/100g respectively. Steroid was highest in Ethanol stem bark extract (ESBE), 96.00 ± 0.01 mg/100g while ethanol root bark extract (ERBE) have the highest amount of total phenols, (62.14 ± 0.02 mg/100g). Lower values were found in all the extracts for Cardiac glycosides, cyanogenic glycosides and reducing sugars. In the antioxidant models, the results from Hydrogen peroxide model suggest that the IC_{50} against the free radicals were exhibited in this order: ARBE < ERBE < ASBE < ESBE. The result of this study indicates that Aqueous Root Bark Extract (ARBE) exhibits stronger antioxidant activity than the other extracts. In the 2, 2-diphenyl-1-picrylhydroxyl (DPPH) scavenging models, the IC_{50} against the free radicals were exhibited in this order: ERBE < ERBE < ESBE < ASBE. In the DPPH Scavenging model, Ethanol Root Bark Extract (ERBE) exhibit stronger activity than the other extracts. This study has shown that this plant possess antioxidant activity. The abundance of phenols,flavonoids, terpenoids, alkaloids and tannins was observed in these extracts and these phytochemicals could be responsible for the biological activities of the plant. The present study supports previous works on this plant and further justifies the traditional use of these plants in the treatment of various diseases.

Keywords: Antioxidant, *Ficus sycomorus*, Preliminary phytochemical constituent; hydrogen peroxide (H_2O_2); 2, 2-diphenyl-1-picrylhydroxyl (DPPH)

Introduction

Medicinal plants are known to be good sources of various bioactive compounds having various activities such as antioxidant and antimicrobial effects. Oxidative stress results from an imbalance between free radical species and the anti-oxidative system. High concentration of free radicals during oxidative stress causes a loss of cellular function and mutagenesis and induces structural changes in cellular biomolecules, such as lipids, proteins and DNA (Akoua-Koffi *et al*., 2007). These alterations lead to the development and progression of chronic diseases, such as metabolic, neurological, pulmonary and cardiovascular diseases as well as cancer (Aniagu *et al*., 2005). In addition to the constituents with antioxidant activity, antimicrobial phytoconstituents are of interest because of problems of antibiotic resistance associated with the existing drugs (Babajide *et al*., 2008).

Ficus sycomorus is a fig species that has been cultivated since ancient times. The *F. sycomorus* plant has several names depending on the locality. It is called *subula* in Arabic, *wild fig*, *Strangler fig*, *Sycomore*, *Sycomore fig* and *Bush fig* in English, *Figuier sycomore* in French, *Baure* in Hausa, *Iwere-jeje* in Yoruba, *Oju ologbo* in Igbo, *Burum* in Kanuri

and *Ibbi* in Fulfulde, *dashakawi* in Sukur and *kamda* in Kilba and Marghi.

Naturally, *F. sycomorus* originates from the Middle East west to Cape Verde Islands and to South Africa, Namibia and the Comoro Islands (Igbokwe *et al*., 2010). *Ficus sycomorus* is found in many countries including the following countries; Zambia and Zimbabwe, Syrian Arab Republic, Cote d'Ivoire, South Africa, Uganda, Swaziland, Djibouti, Egypt, Tanzania, Nigeria, Namibia, Angola, Sudan, Benin, Botswana, Burundi, Cameroon, Congo, Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Israel, Kenya, Lesotho, Madagascar, Mozambique, Rwanda, Saudi Arabia, Senegal and Somalia (Maundu and Tengnas, 2005, Wakil *et al*., 2016). It is very common in the Northern regions of Nigeria, Maiduguri, Sahel, Sudan, and Guinea savanna (Garba *et al*., 2006). It grows favorably in regions having well drained loamy, clay and sandy soils (Kassa *et al*., 2015).

F. sycomorus have been reported to possess anti-diarrhea activities. Sedative and anticonvulsant properties of this plant have also been reported (Olusesan *et al.,* 2010). The plant stem bark is used in treating tuberculosis and the plant also reported to have antibacterial activity (Mohamed *et al.,* 2013). The extract of this plant is used in Hausa ethnomedicinal medicine of Northern Nigeria for the treatment of various ailments such as diarrhea, chest pain, and other chest conditions, dysentery, cough, convulsive disorders and pain relief (Wakeel *et al*., 2004). Hot water extract from the dried stem bark of this plant is orally taken by adult human beings in treatment of diarrhea in Northern Nigeria, which is one of its numerous antibacterial activities. They are also used as astringents and diuretics as reported (Evans and Trease, 1996).They are also used for Dropsy and ascites, for treatment of jaundice, coughs, sore throats, asthma. Leaves are used as choleretic. Jaundice, headaches coughs stomatitis malaria snake bites. Fruit is used for treating tuberculosis. Latex is used for Dysenery, colic. Latex from the root is used traditionally in curing tuberculosis disease (Kwari and Sandabe, 2000). *F. sycomorus* has also been reported to be used in the treatment of snake bites, jaundice, cold, coughs and throat infections (Pravin, 2006). Sandabe *et al.,* (2003) showed that the aqueous extract possess a sedative effect and an anti-convulsive properties in rats. Simple sugars, tannins, saponins, alkaloids and flavone aglycones have been identified in the plant (Sandabe *et al.,* 2006).

Alteration in the structure and function of cell constituents and membranes may be caused by rapid production of free radicals which can results in human neurologic and other disorders such as cancer, diabetes, inflammatory disease, asthma, cardiovascular, neurodegenerative diseases, and premature aging (Sun *et al.,* 2002; Bimal *et al.,* 2011). Therefore, to prevent the above condition, the presence of antioxidants or the free radical scavenging molecules in the body is required. This research was aimed at preliminary Phytochemical screening and anti- oxidant activity of root and stem bark extract of *Ficus sycomorus.*

Materials and Methods

Sample Collection and identification

The Root and Stem Bark of *Ficus sycomorus* was collected from the study area (Sukur Kingdom) in Madagali Local Government Area, Adamawa State, Nigeria between the months of March to July, 2016. The plant was identified and authenticated by a Botanist in the Department of Biological Sciences, Adamawa State University, Mubi, where it was given Voucher specimen number AD170023.

Sample Preparation

The root and Stem-barks (cut into small pieces) washed with water and rinsed with distilled water and then dried in the shade for two weeks. The dried samples was grinded by wooden mortar and pestle and sieve using clean Kitchen sieve to obtain a fine powder and was stored in a tight container until required for use.

Aqueous Extract

The water extraction was done by cold maceration method according to the prodecure descrbed by (Nguta *et al.,* 2011) with little modification. Two hundred grams (200 g) of each of the stem and root barks powder was weighed and soaked in 1000 mL of distilled water in a beaker for 48 h to obtain aqueous extracts. The aqueous extracts were filtered using sterile filter paper (Whatman No.1) into a clean conical flask. The filtrate was concentrated with a

rotary evaporator. The extracts were then stored in a refrigerator.

Percentage yield was calculated as: $\frac{\text{Weight of extract}}{\text{Weight of dried powdered sample}} \times 100$

Preparation of ethanol extracts

Maceration method of extraction as described by (Nguta *et al.,* 2011) was adopted in this study. Two hundred grams (200g) each of the root and stem bark powdered material was weighed and soaked in 1000 mL of 70% ethanol and left for 24 h .Thereafter, it was decanted. The procedure was repeated with another 1000 mL to ensure complete extraction of the active ingredient .The extract was filtered and evaporated to dryness with rotary evaporator.The dried extract was then weighed and stored in tightly closed bottle in a refrigerator until required.

Percentage yield was calculated as: $\frac{\text{Weight of extract}}{\text{Weight of dried powdered sample}} \times 100$

Qualitative Phytochemical Analysis

The qualitative phytochemical screening of the samples was carried out as described by Trease and Evans (2002), Nweze *et al.,* (2004) and Senthilkumar and Reetha, (2009) with slight modification. The root and stem bark extracts was screened for tannins, saponin, terpenoids, flavonoids, alkaloids, glycosides, steroids, phenols and, reducing sugar (carbohydrates).

Preparation of stock solution

Two grams (2 g) each of root or stem bark extracts were dissolved in 10 mL of water or ethanol to make a concentration of 200 mg/mL

Test for Tannins

One milliliter (1 mL) of the extracts was taken in a test tube and 2 mL of 5 % ferric chloride was added. Formation of blue –black, green or blue – green precipitate was taken as evidence for the presence of tannins.

Test for Saponins

One milliliter (1 mL) of the extracts was shaken with 5 mL of distilled water in a test tube for 5 min. Frothing which persists on warming was taken as evidence for the presence of Saponins.

Test for Terpenoids

Five milliliters (5 mL) of aqueous extract of each plant sample was mixed with 2mL of $CHCl_3$ in a test tube and then 3 mL of concentrated H_2SO_4 was carefully added to the mixture to form a layer. An interface with a reddish brown coloration was considered as indication for the presence of terpenoids.

Test for Flavonoids

A little amount of magnesium powder and a few drops of concentrated hydrochloric acid were added to 3 mL of the extracts in a test tube. A red or intense coloration indicated the presence of flavonoids.

Test for Alkaloids

To 2 mL of plant extracts, 2 mL of concentrated hydrochloric acid was added. The mixture was filtered and then 3 drops of Mayer's reagent was added. Presence of green colour or white precipitate indicated the presence of alkaloids.

Test for glycosides

Two milliliter (2 mL) of the extracts was hydrolyzed with HCl solution and neutralized with NaOH solution. A few drops of Fehling's solution A and B were added. Presence of red precipitate indicates the presence of glycosides.

Test for Steroids (Salkowski's test)

To 1 mL of plant extract, equal volume of chloroform and 3 drops of concentrated sulphuric acid was carefully added to form a lower layer. Formation of brown ring indicates the presence of steroids.

Test for phenols

Five drops of 10% ferric chloride was added to 1 mL of the extracts in a test tube. Formation of green or dirty green precipitate indicated the presence of phenols.

Test for reducing Sugar

To 2 mL of plant extract, 1 mL of Molisch reagent and 4 drops of concentrated sulphuric acid was added. Formation of purple or reddish ring indicates the presence of carbohydrates.

Quantitative Phytochemical Studies

Estimation of Tannins

Preparation of Sample

Five grammes of root or stem bark powder of *Ficus sycomorus* was boiled with 400 mL of water for 30 min. The extract was cooled and transferred to 500 mL flask and made up to the volume.Tannin content of the root and stem bark extract was estimated by following standard procedure (AOAC, 1980). The sample extract (1 mL) was mixed with Folin-Ciocalteau's reagent (0.5 mL), followed by the addition of saturated Na_2CO_3 solution (1ml) and distilled water (8 mL). The reaction mixture was allowed to stand for 30 min at room temperature. The supernatant was obtained by centrifugation and absorbance was recorded at 725 nm using UV-Visible Spectrophotometer. Increasing concentrations of standard tannic acid was prepared and the absorbance of various tannic acid concentrations was plotted for a standard graph. The tannin content was expressed as mg tannic acid equivalent per 100 g of the sample.

Preparation of standard curve

Ten milliliters of standard solution was made up to 100 mL distilled water. 1 – 10 mL aliquots were taken in clear test tubes. 0.5 mL of Folin-Denis reagent and 1 mL of sodium carbonate solution was added to each tube. Each tube was made up to 10 mL with distilled water. All the reagents in each tube was mixed well and kept undisturbed for about 30 min. and read at 725 nm against reagent blank.

$$\text{Tannin as tannic acid} = \frac{\text{mg. of tannic acid} \times \text{dilution} \times 100}{\text{mg.of sample taken for colour development} \times \text{weight of sample taken} \times 100}$$

Estimation of total Terpenoid

One hundred grammes of plant powder (root or stem bark) was taken separately and soaked in alcohol for 24 h. Then filtered, the filtrate was extracted with petroleum ether; the ether extract was treated as total terpenoids (Ferguson, 1956).

Estimation of total Alkaloid

Five grammes of the root or stem bark powder of *Ficus sycomorus* was weighed into a 250 mL beaker and 200 mL of 10% acetic acid in ethanol was added and covered and allowed to stand for 4 h. This was filtered and the extract was concentrated on a water bath to one quarter of the original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitated collected and then washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloid, which was dried and weighed (Harbone, 1973).

The residue which is the crude alkaloid was weighed and calculated according to the equation: amount of chloride (mg/g) = weight of precipitate/weight of sample

Flavanoid determination

Ten grammes of the root or stem bark powder of *Ficus sycomorus* was extracted repeatedly with 100 mL of 80% aqueous methanol at room temperature. The whole solution was filtered through Whatman filter paper No 42 (125 mm). The filtrate was transferred into a crucible and evaporated into

dryness over a water bath and weighed to a constant weight (Chang *et al*., 2002).

Saponin determination

Twenty grammes of the root or stem bark powder of *Ficus sycomorus* was dispersed in 200 mL of 20% ethanol. The suspension was heated over a hot water bath for 4 h with continuous stirring at about 55ºC. The mixture was filtered and the residue re-extracted with another 200 mL of 20% ethanol. The combined extracts shall be reduced to 40 mL over water bath at about 90ºC. The concentrate was transferred into a 250 mL separating funnel and 20 mL of diethyl ether was added and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded. The purification process was repeated. 60 mL of normal butanol extracts was washed twice with 10 mL of 5% aqueous sodium chloride. The remaining solution was heated in a water bath. After evaporation the sample were dried in the oven into a constant weight. The saponin content was calculated in percentage (Obadoni and Ochuko, 2001)

The saponin content was calculated according to the equation:
amount of saponin (mg/g) = weight of residue/weight of sample.

Determination of total phenols

The fat free sample was boiled with 50 mL of ether for the extraction of the phenolic component for 15 min. 5 mL of the extract was taken into a 50 mL flask, then 10 mL of distilled water was added added. 2 mL of ammonium hydroxide solution and 5 mL of concentrated amyl alcohol will also be added. The samples were made up to mark and left to react for 30 min for colour development (Edeoga1 *et al.,* 2005 and Jing-Chung *et al.,* 2007). This was measured at 505 nm. These data was used to estimate the total phenolic content using a standard calibration curve that was obtained from various diluted concentrations of gallic acid.

Estimationof gylcosides

Cardiac glycoside content in the sample was evaluated using Buljet's reagent as described by (El–Olemyi *et al*., 1994). One gram (1g) of the fine powder of *C. populnea*was soaked in 10ml of 70% alcoholfor 2hours and then filtered. The extract obtained was then purified using lead acetate and Na_2HPO_4solution before the addition of freshly prepared Buljet's reagent (containing 95ml aqueous picric acid + 5ml 10% aqueous NaOH). The difference between the colour intensity of theexperimental and blank (distilled water and Buljet's reagent) samples was measured and is proportional to the concentration of the glycosides.

Results

The result of preliminary phytochemical study shows the presence of phytochemicals considered as active medicinal chemical constituents as shown in table 1. Phytochemicals such as tannins, saponin, terpenoids, flavonoids, alkaloids, glycosides, steroids, phenols and reducing sugars were all found to be present in both the ethanol extracts of roots and stem bark of *Ficus sycomorus.* However, glycosides was the only constituent not detected in Aqueous extracts of the root and stem bark

The result of the quantitative analysis is presented in table 2. From the result, all the phytochemicals were found in reasonable amount in all the extracts except glycoside and reducing sugars (carbohydrates). Aqueous stem bark extract (ASBE) have the highest amount of Alkaloids, Flavonoids and saponins (72.00 ± 0.01, 31.43 ± 0.01, 42.00 ± 0.01) mg/100g respectively. Steroid was highest in Ethanol stem bark extract (ESBE), 96.00 ± 0.01 mg/100g while ethanol root bark extract (ERBE) have the highest amount of total phenols, (62.14 ± 0.02 mg/100g). Lower values were found in all the extracts for Cardiac glycosides, cyanogenic glycosides and reducing sugars (carbohydrates).

The result hydrogen peroxide scavenging activity of the root and stem bark extracts of *Ficus sycomorus* is shown in Table 3 and Figure 1 below. The percentage inhibition of the extracts ; ESBE, ASBE, ERBE and ARBE increases with decrease in concentration, with the lowest concentration 0.0625 mg/mL had the percentage inhibition of 66.7%, 66.2%, 60.1% and 52.5% respectively. The activity of the extracts was compared with ascorbic acid which is a standard antioxidant. The percentage inhibition of ascorbic acid (Vitamin C) – a standard antioxidant is in the range of 28.6% - 57.1%. The lowest concentration (0.0625 mg/mL) showed the

highest percentage of inhibition value (57.1 %). This indicates that the extracts followed similar activity as the standard antioxidant used. There is a characteristics increase in inhibition as the concentration decreases. This is in agreement with the work of Odeja *et al*., (2015). From the result obtained, in hydrogen peroxide radical scavenging method, the IC_{50} value of ESBE, ASBE, ERBE, and ARBE are 0.51, 0.50, 0.39 and 0.28 respectively. The IC_{50} value for Vitamin C is 0.49, less effective than the root bark extracts but more effective antioxidant than the stem bark extracts.

Table 1: Qualitative Phytochemical analysis of the root and stem bark extract of

	Aqueous extract		**Ethanol extract**	
Test	**Stem**	**Root**	**Stem**	**Root**
Tannins	+	+	+	+
Saponin	+	+	+	+
Terpenoid	+	+	+	+
Flavonoids	+	+	+	+
Alkaloids	+	+	+	+
Glycosides	-	-	+	+
Steroids	+	+	+	+
Phenols	+	+	+	+
Reducing sugar	+	+	+	+

Table 2: Quantitative Phytochemical analysis of the root and stem bark extract of *Ficus sycomorus* Linn (mg/100g)

Phytochemicals	ASBE	ESBE	ARBE	ERBE
Tannins	7.00 ± 0.01	26.50 ± 0.01	11.00 ± 0.01	36.00 ± 0.00
Saponin	42.00 ± 0.01	23.87 ± 0.01	14.00 ± 0.01	12.60 ± 0.01
Terpenoid	11.40 ± 0.01	26.20 ± 0.01	9.40 ± 0.01	0.83 ± 0.02
Flavonoids	31.43 ± 0.01	13.46 ± 0.01	6.84 ± 0.02	11.72 ± 0.01
Alkaloids	72.00 ± 0.01	64.40 ± 0.02	22.00 ± 0.01	12.50 ± 0.01
Glycosides	0.12 ± 0.01	0.62 ± 0.01	0.87 ± 0.01	3.12 ± 0.01
Steroids	16.40 ± 0.01	96.00 ± 0.01	13.00 ± 0.01	29.00 ± 0.01
Phenols	22.64 ± 0.01	47.83 ± 1.43	19.54 ± 0.02	62.14 ± 0.02
Reducing sugar	0.78 ± 0.01	0.87 ± 0.02	0.52 ± 0.01	1.43 ± 0.01

Values are expressed as mean ± S.D (n = 3)

KEY: ASBE = Aqueous Stem Bark Extract, ARBE = Aqueous Root Bark Extract
ESBE = Ethanolic Stem Bark Extract ,ERBE = Ethanolic Root Bark Extract

Table 3: Hydrogen peroxide radical scavenging of *Ficus sycomorus*

	Percentage Inhibition (%)				
Concentration (mg/mL)	ASBE	ESBE	ARBE	ERBE	Vitamin C
1.00	33	32.7	22.7	25.7	28.6
0.50	43.3	41.7	27.1	31	36.1
0.25	51.1	51	36	36.5	41.6
0.125	59.8	58.7	44.6	48.4	48.4
0.0625	66.2	66.7	52.5	60.1	57.1
IC_{50}	**0.50**	**0.51**	**0.28**	**0.39**	**0.49**

ESBE: Ethanolic stem bark extract, ASBE: Aqueous stem bark extract
ERBE: Ethanolic root bark extract, ARBE: Aqueous root bark extract

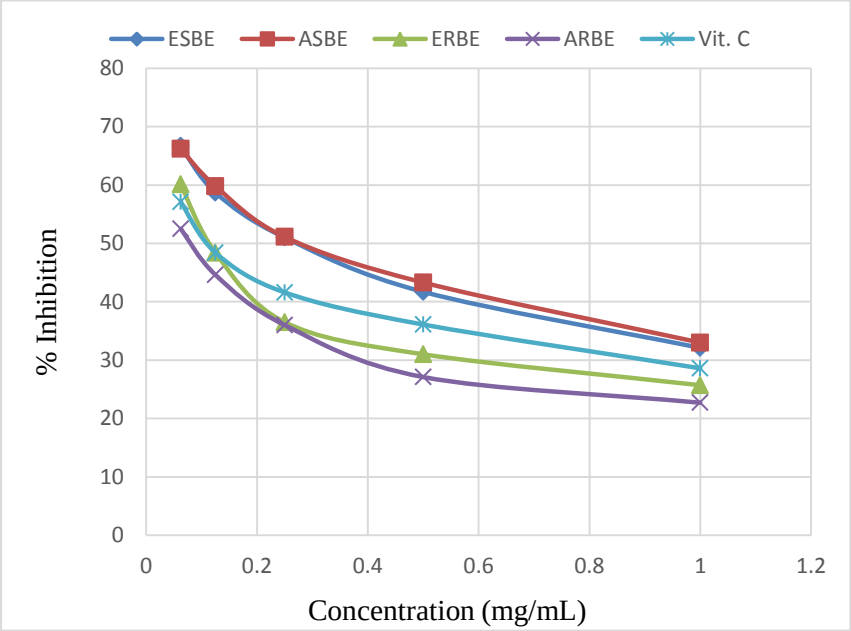

Figure 1: Hydrogen peroxide radical scavenging of ethanolic and aqueous of root and stem bark extract of *Ficus sycomorus*

In DPPH free radical scavenging method, the percentage inhibition of the extracts and standard antioxidant (ascorbic acid) is presented in Table 4 and Figure 2 below. The percentage inhibition of ERBE decreases in with decrease in concentrations (mg/mL) of 0.125, 0.0625, 0.03125, and 0.015625 as follows; 81.3%, 64.2%, 53.2% and 41 % respectively. ARBE had the percentage inhibition of 94.4%, 61.4%, 39.9% and 30.7% at the same pattern of decrease in concentrations (mg/mL) of 0.125, 0.0625, 0.03125, and 0.015625 respectively. Similarly, the stem bark extracts of both ethanolic and aqueous (. ESBE and ASBE) showed decrease in % inhibition with decrease in concentration. At concentrations (mg/mL) 0.125, 0.0625, 0.03125, and 0.015625, ESBE had the % inhibition of 93.1%, 76.1%, 57.9% and 23.2% respectively. While ASBE had the % inhibition of 94%, 71.5%, 58.2% and 30.3% respectively. The decrease in %inhibition with decrease in concentration is in agreement with the work of Musa (2008). Also, the ascorbic acid (vitamin C) showed decrease in inhibition as the concentration decreases. The % inhibition at concentrations (mg/mL) of 0.125, 0.0625, 0.03125, and 0.015625 are 47.6%, 37%, 26.6% and 17.6% respectively. In DPPH radical scavenging method, the IC_{50} value of ERBE, ARBE, ESBE, and ASBE are 0.05, 0.07, 0.13 and 0.18 respectively. The IC_{50} value of vitamin C is 0.11, less effective than the root bark extracts but more effective antioxidant than the stem bark extracts though the results showed that all the extracts are good antioxidants.

Table 4: DPPH radical scavenging of *Ficus sycomorus*

	Percentage Inhibition (%)				
Concentration (mg/mL)	ASBE	ESBE	ARBE	ERBE	Vitamin C
0.125	94.0	93.1	94.4	81.3	47.7
0.0625	71.5	76.1	61.4	64.2	37.0
0.03125	58.2	57.9	39.9	53.2	26.6
0.015625	30.3	23.2	30.7	41.0	17.6
IC_{50}	**0.18**	**0.13**	**0.07**	**0.05**	**0.11**

ESBE: Ethanolic stem bark extract, ASBE: Aqueous stem bark extract
ERBE: Ethanolic root bark extract, ARBE: Aqueous root bark extract

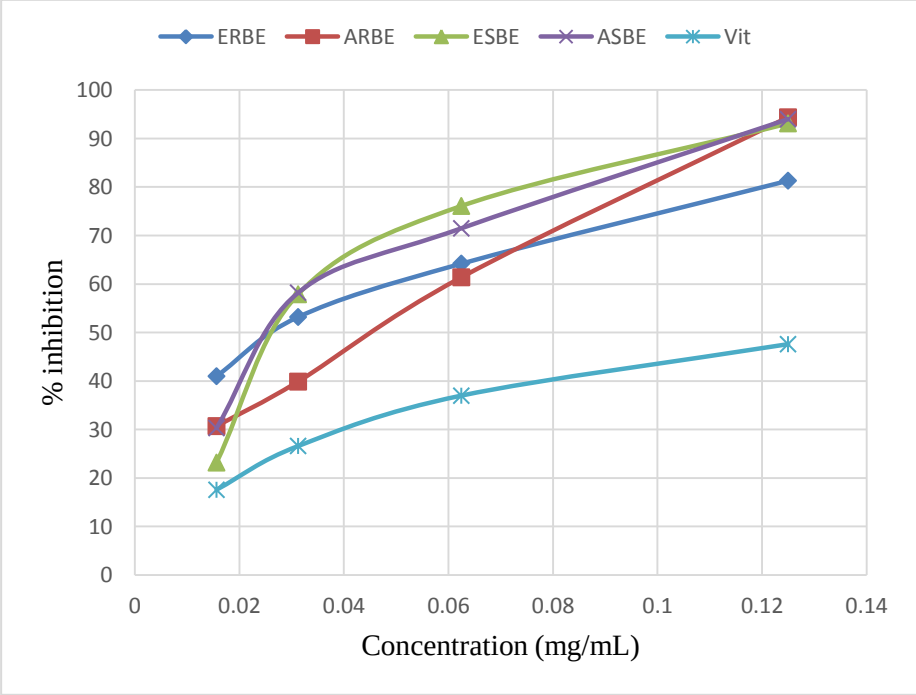

Figure 2: DPPH radical scavenging of ethanolic and aqueous of root and stem bark extract of *Ficus sycomorus*

Discussion:

The antioxidant activity of the Aqueous and Ethanolic root and stem bark extracts of *Ficus sycomorus* labeled ; ARBE, ASBE, ERBE and ESBE was investigated by two in vitro models and the plants showed varying degrees of antioxidant activity (and varying IC50) by inhibiting the free radicals. The results from Hydrogen peroxide model suggest that the IC50 against the free radicals were exhibited in this order: ARBE < ERBE < ASBE < ESBE. The lower the IC_{50} the greater the overall effectiveness of suspected antioxidant sample in question (Odeja *et al.*, 2015). The result of this study indicates that Aqueous Root Bark Extract (ARBE) exhibits stronger antioxidant activity than the other extracts. In a similar study using 2, 2-diphenyl-1-picrylhydroxyl (DPPH) scavenging models, the IC_{50} against the free radicals were exhibited in this order: ERBE < ERBE < ESBE < ASBE. In the DPPH Scavenging model, Ethanol Root Bark Extract (ERBE) exhibit stronger activity than the other extracts. In a previous report, which is in agreement

with the present findings, Antioxidant activities of methanolic stem bark extracts of *F.sycomorus* using DPPH radical scavenging activity, hydrogen peroxide scavenging activity and ferric reducing antioxidant power showed that the extracts significantly ($p < 0.05$) exhibited robust antioxidant activity compared to the standard (L-Ascorbic Acid) at the concentrations used (Daniel and Dluya, 2016).

The antioxidant activity of the extracts may be associated with the high content of phenolics, tannins and flavonoids as seen in Table 4. The effects of the extracts could be due to the biological systems that are connected to their ability to transfer electrons to free radicals, chelate metals, activate antioxidant enzymes, reducing radicals of alpha-tocopherol or to inhibit oxidases (Bruneton, 2009). The various phytochemical compounds isolated are known to be of benefit in industrial and medicinal sciences. These secondary metabolites have antimicrobial activity which they exert through different mechanisms. Phenolic compounds from plant source especially flavonoids are currently of growing interest due to their supposed properties as anti-oxidants (Dahiru and Thagriki, 2016). Flavonoids have been found to have antiinflammatory, antiallergenic, anti-viral, anti-aging, and anti-carcinogenic activity among others. The broad therapeutic effects of flavonoids can also be largely attributed to their being good antioxidant agents. In addition to having an antioxidant property, flavonoid compounds may play a role of protection against heart disease through the inhibition of cyclooxygenase and lipoxygenase activities in platelets and macrophages(Fateh *et al*., 2017).Tannins are reported to have physiological astringent and haemostatic properties, which is capable to hasten wound healing and ameliorate inflamed mucus membrane and can also prevent the growth of microorganisms by precipitating microbial proteins and depriving them of nutritional proteins; they form irreversible complexes with proline rich proteins, thereby resulting in the inhibition of the cell protein synthesis. They have important roles such as stable and potent antioxidants (Fateh *et al*., 2017). Tannins act as binders and for treatment of diarrhea and dysentery (Dharmananda, 2003). Tannins are also reported to exhibit antiviral, antibacterial, anti-tumor activities. It was also reported that certain tannins are able to inhibit HIV replication selectivity and is also used as diuretic (Fateh *et al*., 2017).

The free radicals that are concerned within the process of lipid peroxidation are considered to play a serious role in varied chronic pathologies such as cancer and cardiovascular diseases among others. Therefore, the ability of the plant extracts as free radical scavenger disclosed that these extracts may be used as new of natural antioxidants and prevent the reactive radical species from reacting biomolecules such as lipoproteins, polyunsaturated fatty acid (PUFA), DNA, amino acids, proteins and sugars in susceptible biological and food systems (Chew *et al.*, 2008; El-Beltagi, 2018).

The inhibitory concentration required to scavenge 50% of the radicals (IC_{50}) calculated from the graph was actually used to examine the effectiveness of the antioxidant of the samples. Both the root bark extract that is ERBE and ARBE are more effective antioxidant than the stem bark extract (ESBE and ASBE). The aqueous extracts in hydrogen peroxide radical scavenging method (ASBE and ARBE) are more effective antioxidant than the ethanolic extracts.The ethanolic extract in DPPH radical scavenging method, ESBE and ERBE are more effective antioxidant than the aqueous extract in this scavenging method, although, all the extracts are good antioxidants.

From the results based on the IC_{50}, the extract showed more scavenging activity in DPPH than in hydrogen peroxide. The effective antiradical of *Ficus sycomorus* in this research may be due to the presence of phenolic compounds such as flavonoids and they are known to be in synergistic relationship with tannins in plants obtained in the phytochemical screening of this research. The antioxidant property of *Ficus sycomorus* in this research is in agreement with the earlier studies by Dahiru and Thagriki (2016) which reveals the antioxidant property of methanol stem bark extract of *Ficus sycomorus* plant.

Conclusion

The present study has shown that Aqueous and Ethanolic root and stem bark extracts of *Ficus sycomorus* labeled; ARBE, ASBE, ERBE and ESBE possess antioxidant properties. The abundance of phenols,flavonoids, terpenoids, alkaloids and tannins

was observed in these extracts and these phytochemicals could be responsible for the biological activities of the plant. The present study supports previous works on this plant and further justifies the traditional use of these plants in the treatment of various diseases. In the light of these current findings, all the extracts could be considered for future detailed isolation and evaluation of their bioactive constituents.

COMPETING INTEREST

The authors declare that they have no competing interest..

AUTHORS' CONTRIBUTION

DD designed and supervised laboratory experiment of the study; TI performed the laboratory experiments and drafted part of the manuscripts. MAM co-supervised the laboratory work and participated in the drafting of the manuscripts. All authors read and approved the final manuscripts.

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