



Phytochemical, Proximate and Mineral contents of Leaves and Bark of *Ficus Capensis*

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ABSTRACT: The phytochemical, proximate and mineral contents of *Ficus capensis* (leaves & bark) were analyzed, using Trease and Evans and Harboure procedure, the Association of Official Analytical Chemist (AOAC) method and Atomic Absorption Spectrophotometry and Flame Photometry respectively. This study is aimed at evaluating (using ethanol and water as solvents) the nutrient composition, phytochemical constituents and minerals present. The results of the phytochemical screening showed the presence of tannins, terpenoids, alkaloids, flavonoids, cardiac glycosides and reducing sugars, with steroids and anthraquinones absent in the water extract of the leaves and bark of *Ficus capensis*. Saponin was however present in the bark but absent in the leaves (water extract) of the plants. Terpenoids, flavonoids, steroids, cardiac glycosides and reducing sugars were present in ethanol extract of the leaves and bark, while anthraquinones were absent. Alkaloids were present in the ethanol extracts of the bark but absent in leaves. The proximate analysis of the leaves and bark of *Ficus capensis* yielded 25.80% and 10% for moisture, 17.47% and 3.73% for proteins, 1.80% and 2% for crude fat, 11.00% and 10.95% for ash, 41.00% and 20.5% for crude fiber and 2.93% and 52.82% for carbohydrates respectively. The mineral analysis of the leaves and bark of the plant yielded calcium-2640.00mg/kg and 1772mg/kg, magnesium- 2383.00mg/kg and 1605mg/kg, iron-25.00mg/kg and 6.6mg/kg, zinc-29.30mg/kg and 4.4mg/kg, copper-14.60mg/kg and 6mg/kg and phosphorus-1012mg/kg and 305mg/kg. Manganese was absent in the bark but yielded 1.1mg/kg in the leaves. Sodium and potassium were not detected in the leaves but yielded the values 97.2mg/kg and 126.4mg/kg in the bark. The presence of some phytochemicals (saponins, alkaloids, flavonoids, cardiac glycosides, tannins and terpenoids) and some essential minerals proves that it is really an alternative source of medicine. © JASEM

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Introduction:-

A majority of the world's population in developing countries still relies on herbal medicines to meet their health needs. 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 (WHO, 2014). Even in areas where modern medicine is available, the interest on herbal medicines and their utilization have been increasing rapidly in recent years. Medicinal plants are important sources of pharmaceutical manufacturing. Medicinal plants and herbal medicines account for a significant percentage of the pharmaceutical market (WHO, 2014). Modern medicine recognizes herbalism as a form of alternative medicine, as its practice is not strictly based on evidence gathered using the scientific method. Modern medicine, does, however, make use of many plant-derived compounds as the basis for evidence-tested pharmaceutical drugs, and phytotherapy works to apply modern standards of

effectiveness testing to herbs and medicines that are derived from natural sources (James, 2000).

Many rural communities have great faith in traditional medicine, particularly the inexplicable aspects as they believe that it is the wisdom of their fore-fathers which also recognizes their socio-cultural and religious background which orthodox medicine seems to neglect (Adesina, 2014). However, Proper formulation and dosage are necessary for a safe use of herbs as medicine.

Phytochemicals are chemical compounds that occur naturally in plants (phyto means "plant" in Greek). Some are responsible for color and other organoleptic properties, such as the deep purple of blueberries and the smell of garlic (James, 2000). The term is generally used to refer to those chemicals that may have biological significance, (for example antioxidants) but are not established as essential nutrients (Brown and Arthur, 2001). Phytochemicals are non-nutritive plant chemicals that have protective

or disease preventive properties (Papp, *et al.*, 2007). They are nonessential nutrients, meaning that they are not required by the human body for sustaining life (Brown and Arthur, 2001). There are many phytochemicals and each works differently. Some of the possible actions are via antioxidants, hormonal action, and stimulation of enzymes, interference with DNA replication, antibacterial effect and physical action (Papp, *et al.*, 2007).

Naturally grown herbs and plants also have plenty of phytonutrients which are extremely valuable for our body and good health. The most important and valuable phytonutrients include natural minerals (like zinc, iron, calcium, copper and other elements) and vitamins (including vitamins A, B group, C, D, E, PP and others) (Bongoni, *et al.*, 2013). This study is aimed at evaluating the proximate composition, phytochemical constituents and mineral composition present in *Ficus capensis*.

MATERIALS AND METHODS

Ficus capensis leaves and bark were obtained from the tree in Benson Idahosa University Ugbor, GRA, Benin City, Nigeria and identified in the, Department of Pharmacognosy University of Benin Benin city, Nigeria. The leaves and barks of the plant were rinsed in water, cut into smaller pieces for easy drying. The dried plant parts were ground using a milling machine and the powdery sample was packed into a polythene bag prior to further analysis.

Phytochemical screening (Harbone, 1973): Preparation of Extract: Aqueous extract of the leaves and bark of *Ficus capensis* was processed according to the description of Harbone (1973) 150g of the macerated plant leaves and bark sample of *Ficus capensis* were soaked separately in 1.7L of distilled water and 1L of ethanol for 72hours; while 140g of the bark of *Ficus capensis* were soaked separately in 1L of distilled water and ethanol. The soaked leaves and bark were then filtered using a muslin cloth and concentrated using a rotary evaporator at 50°C and stored in air tight containers in a refrigerator until subsequent use.

Test for Flavonoids: 1ml of extract in a test tube was mixed with 5ml of dilute ammonia and 1ml of concentrated sulfuric acid was added to the mixture. A yellow color indicated the presence of flavonoids.

Test for Tannins: 1ml of extract in a test tube was heated for 5minutes to boil. Thereafter, 2 drops of 15% ferric chloride was added. A blue black coloration indicated the presence of tannins.

Test for Cardiac Glycosides: 1ml of extract in a test tube was mixed with 2ml of glacial acetic acid, after which 1 drop of 15% ferric chloride and 1ml of concentrated sulfuric acid were added to the mixture. A brown coloration formed at the interface confirmed the presence of cardiac glycosides.

Test for Saponins: 1ml of extract in a test tube was mixed with 5ml of distilled water. The mixture was shaken vigorously and observed for frothing which indicated the presence of saponins.

Test for Steroids: 1ml of the extract in a test tube was mixed with 2ml of acetic acid and 2ml of concentrated sulfuric acid. A color change from violet to blue-green indicated the presence of steroids.

Test for Terpenoids: this test was done using Salkowski test. 1ml of extract in a test tube was mixed with 2ml of chloroform and 3ml of concentrated sulfuric acid. A reddish brown coloration at the interface confirmed the presence of terpenoids.

Test for Anthraquinones: 1ml of extract in a test tube was mixed with 5ml of benzene and 2.5ml of dilute ammonia. The mixture was then shaken vigorously. A pink-red color at the lower phase indicated the presence of anthraquinones.

Test for Alkaloids: Hager's Test: 1ml of filtrate in a test tube was mixed with 3 drops of Hager's reagent (picris's). Formation of a yellow precipitate indicated the presence of alkaloids.

Wagner's Test: 1ml of extract in a test tube was mixed with 3drops of Wagner's reagent (2g of iodine and 6g of potassium iodide dissolved in 100ml of distilled water). A reddish brown coloration confirmed the presence of alkaloids.

Test for Reducing Sugar: Fehling's Test: 1ml of extract was added to a boiling mixture of 1ml each of Fehling's solutions A and B in a test tube. A color change from blue to green confirmed the presence of reducing sugars.

Determination of Mineral Composition: 1g of the plant sample was weighed and placed into a digestion tube. 10ml of nitric acid and one tablet of selenium catalyst were added and heated at 350°C until the mixture was clear. The mixture was then allowed to cool and 20ml of distilled water was added and filtered into a 100ml volumetric flask. The filtrate was made up to mark and used for mineral analysis.

Analysis of iron, zinc, manganese and copper was done using Atomic Absorption Spectrophotometer (BUCK 210 VGP Model). Sodium and potassium were analyzed using a Flame Photometer.

The procedure for the analysis of phosphorus is as follows: 5ml of the extract was mixed with 3 drops of p-nitrophenol and drops of 2M NaOH were added until a yellow color was observed (to adjust the pH to 5). 2M HCl was then added in drops until the solution turned colorless (pH between 3 and 5), and 30ml of water and 10ml of ascorbic acid reagent added. The absorbance was read a spectrophotometer at 660nm.

Procedure for manganese: 5ml of the sample was mixed with 2ml of concentrated H₂PO₄ and made up to 10ml with distilled water. 0.02g of KIO₄ was added to and heated in an oven at 100°C for 2hours. The mixture was allowed to cool and made up to 25ml with distilled water. The absorbance was read with a spectrophotometer at 545nm. A standard stock of 1000ppm was prepared in the same manner.

Determination of Proximate Analysis: - The proximate composition (moisture, crude fibre, crude fat. Ash content, protein, carbohydrate) of powdery sample of *Ficus capensis* were determined according to the methods described by AOAC (2005).

RESULTS AND DISCUSSION

The phytochemical content of the leaves and bark of *Ficus capensis* are shown below.

Table 1: Result of Phytochemical Screening of *Ficus capensis*.

| Parameters | <i>Ficus</i> Leaves (Water) | <i>Ficus</i> leaves (Ethanol) | <i>Ficus</i> bark (Water) | <i>Ficus</i> bark (Ethanol) |
|--------------------|-----------------------------------|-------------------------------------|---------------------------------|-----------------------------------|
| Flavonoids | ++ | + | + | + |
| Tannins | ++ | + | + | + |
| Cardiac glycosides | ++ | +++ | ++ | + |
| Saponins | — | + | + | + |
| Steroids | — | + | — | + |
| Terpenoids | + | ++ | + | ++ |
| Anthraquinones | — | — | — | — |
| Alkaloids | | | | |
| Hager's test | — | — | — | — |
| Wagner's test | ++ | — | ++ | + |
| Fehling's test | ++ | + | ++ | ++ |

Table 1 shows that flavonoids, tannins, cardiac glycosides, terpenoids and reducing sugars were present in both the water and ethanol extracts of the

leaves of *Ficus capensis*. Alkaloids (Wagner's) were detected in the water extract of the plants (leaves and bark) but absent in the ethanol extract, while saponins and terpenoids were detected in the ethanol extract but saponins absent in water extract. Flavonoids, tannins, cardiac glycosides, terpenoids and reducing sugars were present in both the water and ethanol extracts of the leaves of *Ficus capensis*. Alkaloids (Wagner's) were detected in the water extract but absent in the ethanol extract of the leaves, while saponins and terpenoids were detected in the ethanol extract but absent in the water extract. Anthraquinones and alkaloids (Hager's) were absent in both the water and ethanol extracts of the leaves and bark.

Flavonoids, tannins, cardiac glycosides, terpenoids, saponins, alkaloids (Wagner's) and reducing sugars were present in both the water and ethanol extracts of the bark of *Ficus capensis*. Steroids were detected in the ethanol extract but absent in the water extract. Anthraquinones and alkaloids (Hager's) were absent in both the water and ethanol extracts.

Anthraquinones were absent in both the water and ethanol extracts of all the sample, this might be because anthraquinones are insoluble in water and cold organic solvents but soluble in hot organic solvents, it is almost completely insoluble in ethanol near room temperature but 2.25g will dissolve in 100g of boiling ethanol (Macleod and Allen, 1934).

Preparations of the leaves of *Ficus capensis* which are used for various medicinal purposes (as a disinfectant, in treating tonsillitis, ophthalmic, stomach and bark pain and as a poison for arrows) was found to contain flavonoids, tannins, cardiac glycosides, saponins, steroids, terpenoids, and alkaloids. These phytochemicals have shown, effectiveness in treatment of cardiac problems, antimicrobial, anti-inflammatory, anti-diarrheal, anti-allergic and anticancer effects. These therefore make the leaves of *Ficus capensis* potential sources of drugs.

Preparations of the bark of *Ficus capensis* are used to treat pain, rheumatism, diarrhea, stomach problems, edema in children, infertility rashes, mouth sores, chest problems and as a galactagogue. These medicinal properties may be due to the presence of flavonoids, tannins, cardiac glycosides, saponins, steroids, terpenoids and alkaloids.

Table 2: Result of Proximate Analysis

| Sample | Moisture % | Protein % | Crude Fat % | Ash % | Crude Fiber % | Carbohydrate % |
|---------------------|------------|-----------|-------------|-------|---------------|----------------|
| <i>Ficus</i> Bark | 10.00 | 3.73 | 2.00 | 10.95 | 20.50 | 52.82 |
| <i>Ficus</i> Leaves | 25.80 | 17.47 | 1.80 | 11.00 | 41.00 | 2.93 |

Table 2 reveals results of the proximate analysis of the leaves *Ficus capensis* yielded the values 25.80% for moisture, 17.47% for proteins, 1.80% for crude fat, 11.00% for ash, 41.00% for crude fiber and 2.93% for carbohydrates. These value for crude fiber is similar to the results obtained by Adebisi and Oyeleke (2009) (moisture-5.77%, fat-12.21%, carbohydrate-30.93%, and crude fiber-37.3%), while the values for crude fat and carbohydrates are close to the results obtained by Isah, *et al.* (2013) (moisture-74.60%, protein-4.96%, crude fat-0.31%, ash-3.75%, crude fiber-7.51% and carbohydrate-8.87%). The results obtained indicate that the leaves of *Ficus capensis* is a good source of fiber, minerals (ash) and proteins, but not a very good source of energy (low carbohydrate and fat content).

The bark of *Ficus capensis* yielded 10.00% - moisture, 3.73%-protein, 2.00%-crude fat, 10.95%-ash, 20.50%-crude fiber, and 52.82%-carbohydrate as the results of the proximate analysis. These values are a little higher than the results obtained by Ojokuku *et al.* (2011) which are moisture-9.8%, protein-3.63%, crude fat-1.92%, ash-15.60%, crude fiber-16.38%, carbohydrate-52.66%; but lower than the results obtained by Isah, *et al.* (2013) which include moisture-86.90%, protein-1.31%, crude fat-0.22, ash-1.34%, crude fiber-6.00% and carbohydrates-5.23%. These values obtained show that the bark of *Ficus capensis* is a good source of minerals (ash) crude fiber and carbohydrate, but a poor source of protein and crude fat. Results gotten from the leaves and bark extracts showed that, the leaves of *Ficus capensis* are a better sources of proteins than the bark; whereas the bark is a better source of carbohydrates than the leaves.

Table 3: Result of Mineral Composition Analysis

| PARAMETERS | <i>FICUS</i> LEAVES (mg/kg) | <i>FICUS</i> BARK (mg/kg) |
|------------|-----------------------------|---------------------------|
| Calcium | 2640.00 | 1772.00 |
| Magnesium | 2383.00 | 1605.00 |
| Sodium | 0 | 97.20 |
| Potassium | 0 | 126.40 |
| Iron | 25.00 | 6.60 |
| Zinc | 29.30 | 4.20 |
| Copper | 14.60 | 6.00 |
| Manganese | 1.10 | 0 |

Table 3 depicts that *Ficus capensis* leaves were found to have high quantities of calcium, magnesium and phosphorus. Iron, zinc, copper and manganese were present but not in very high concentration. Sodium and potassium however, were absent. Calcium, magnesium and phosphorus which are present in high concentrations are essential minerals for life important in the formation of bones and teeth as a cofactor for enzymes and a component of ATP, DNA, RNA and cell membranes respectively. The minerals present in low concentration (iron, zinc, copper and manganese) perform various important functions in humans like the formation of hemoglobin, growth and sexual maturation, facilitating iron intake, as cofactor for enzymes and so many other functions.

The bark of *Ficus capensis* was found to contain all the minerals analyzed except manganese, with calcium and magnesium were present in the highest concentrations.

Conclusion: Plants used have proved to be very important in drug research and development, because of the phytochemicals that are present. This study is another confirmation of the earlier stated facts that these plants are good sources of income for individuals, revenue generation and bioprospecting. I recommend them for further studies on the pharmacological assay.

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