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Phytochemical, Proximate Analysis and Mineral Composition of Aqueous Crude Extract of *Ficus Asperifolia Miq.*

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ABSTRACT

To determine the chemical constituents, proximate, phytochemical analysis and mineral composition of the crude aqueous extract of the leaves of Ficus asperifolia. The extracts were subjected to proximate and phytochemical screening. The mineral contents were determined using standard biochemical methods and equipment. Phytochemical studies carried out on aqueous extract of Ficus asperifolia leaves showed the presence of alkaloid, saponin, phenol, tannin, cardiac glycoside, steroid, cardenolides and phlobatannins while terpenes, flavonoids, anthraquinones and chalcones were not detected. Analyses showed that the sample has high level of Carbohydrate (42.64%), moderate amount of Crude Fibre and Protein (18.41 and 14.73%), respectively and little amount of Ash content (9.78%) and Crude Fat (3.16%). Also a considerable level (11.29%) of moisture was shown. This composition shows that the sample could be a good source of Carbohydrate, Dietary Fibre and Protein. Sodium and Potassium content (0.185±0.002 and 0.367±0.007%), respectively indicates the tendency of Ficus asperifolia to be able to regulate or control the osmotic balance of the body fluid as well as body pH. Ficus asperifolia is also found to be rich in Phosphorus (0.349±0.002%) and Calcium (0.203±0.002%), which is essential for bone formation. Magnesium, (0.428±0.003%) is also present, which could help to lower the blood pressure. Antioxidant minerals Zinc (64.45±0.15 mg/kg), Iron (7.00±0.20 mg/kg), Copper (13.35±0.15 mg/kg) and Selenium (0.0027±0.01 mg/kg) are also present. Our findings therefore, suggest that there is an indication that Ficus asperifolia contains important phytochemicals, proximate and mineral compounds that may be linked to its beneficial effects on health.

Keyword: Phytochemical, Mineral composition, proximate, Aqueous extract, *Ficus asperifolia*,

INTRODUCTION

Medicinal leaves are significant sources of synthetic and herbal medications. In most rural and urban areas of sub-Saharan Africa such as in Southern-Nigeria, medicinal herbs are used as raw drugs, extracts and/or tinctures [1]. The past few decades have witnessed rapid progress in the use of leaf phytochemical and herbal products as popular and alternative treatment remedies [2, 3, 4].The active ingredients of leafs that can provide effective therapeutic potential can occur in all leaf structures but concentration is often higher in one part, such part is preferred. Examples include roots, flower, fruit, leaves and seeds [5]. Phytochemicals may be described as non-nutritive leaf chemicals that have protective or disease preventive properties. They are regarded as non-essential nutrients [6]. They are naturally occurring bioactive molecules produced by leaf for protection from the elements of the earth and the sun's harmful rays. These amazing phyto-compounds provide food resources for the human cells. Consumption of leaf foods containing these compounds have been scientifically validated to help slowdown the aging process and reduce the risk factors of many diseases including cancer, heart disease, stroke, high blood pressure, cataracts, osteoporosis, diabetes and urinary tract infections [7, 8, 9]. Biologically, active compounds from natural sources have always been of great interest to scientists working on infectious diseases. In recent years there has been growing interest to evaluate leaves possessing antibacterial activity for various diseases [10]. A number of studies have been reported, dealing with antimicrobial screening of extracts of medicinal leafs [10, 11, 12]. Today, it is estimated that leaf materials are present in, or have provided the

model for 50% western drugs [1]. Many commercially proven drugs used in modern medicine were initially used in crude form in traditional or folk healing practices, or for other purposes that suggested potentially useful biological activity. *Ficus asperifolia* belonging to the Moraceae family is a small or average size tree, terrestrial or epiphyte which can reach 20 m in height. It is found in Nigeria, Senegal, Uganda, Tanzania, Natal (South Africa), Madagascar and Cameroon. *Ficus asperifolia* is abundant in the savannah regions, especially along river banks and marshy areas at an altitude of up to 1100 m. The leaves are enormous and displayed spirally, the limb is largely oval or has a form of ellipse and the roots are most often fibrous [13]. In many traditional medicines of Africa, the leaf extract of *F. asperifolia* is used as an anthelmintic and a purgative [14]. This study intends to determine the chemical constituents, proximate, phytochemical analysis and mineral composition of the crude aqueous extract of *Ficus asperifolia* Miq.

MATERIALS AND METHODS

Collection of leaf material and Preparation of leaf extract

Fresh samples of the leaves without stalk were collected from the local population in Ado town, Ekiti state, Nigeria. The leaf was identified and authenticated at the Department of Plant Sciences, Ekiti State University, Nigeria. The aqueous extract of the powered *Ficus asperifolia* Miq. was air-dried in the laboratory at ambient temperature (30 ± 2°C) for 10 days, pulverized using a laboratory mechanical grinder (Christy and Norris limited, machine type 8) and the fine powders obtained stored until further use. 50g of the powdered sample was extracted with distilled water of 500ml for 48hrs. The mixture was decanted and filtered using sterile whatman paper No1. The filterate measured up to 425ml and evaporated to dryness using a freeze dryer to obtain 12 % yield. The crude extract was later subjected to bioassay analyses. From the stock solution, concentration 10mg/ml was obtained by serial dilution. These were stored at 15°C until further use.

Phytochemical Analyses

Phytochemical analyses; tannin, alkaloid, saponin, steroid, phenol, phlobatannin, terpenoid, flavonoids, anthraquinones, chalcones, cardenolides and cardiac glycoside were determined using standard procedures [15, 16, 17].

Proximate Analyses

The parameters determined for proximate analyses include ash, moisture, crude protein, fat, fiber and carbohydrate. All of these were carried out using the method of analyses described by [18].

Mineral Analyses

The atomic absorption spectrophotometer (AAS) was used for the analyses of the following metals: Mg, Zn, Fe, Co, Cu, Se, Al, Ca and P while the Flame Photometer was used in the analyses of K & Na. Using AAS, a known amount of the sample was placed in a dish and heated with burnsen burner in a fume cupboard until there was no smoke emitted. This was transferred to the dessicator in other for it to cool after which 0.1m HCl solution was added to the ash. The resulting solution was filtered and diluted. Suitable salts of the metals in questions were used to make their standards, lamps were fixed and the analyses were done. Using the flame photometer, the diluents of sample was aspirated into the jenway Digital flame photometer using the filter corresponding to each mineral element. All of these were carried out using the method of analyses described by [19].

RESULTS AND DISCUSSION

The results of proximate analyses are shown in table 1.

Parameter	(%)
Crude Protein	14.73
Crude Fibre	18.41
Crude Fat	3.16
Ash	9.78
Moisture	11.29
Carbohydrate	42.64

Table 2 Phytochemical Screening of Leaf Extracts of *Ficus asperifolia*.

Phytochemical	Extract Content
Alkaloids	+++
Tannin	+
Phlobatannins	+
Saponin	+++
Flavonoids	-
Anthraquinones	-
Steroids	+
Terpenes	-
Cardenolides	+
Phenol	+++
Chalcones	-
Cardiac Glycosides	++

+ = Trace amount ++ = Moderate amount, +++ = Appreciable amount - = Completely Absent

Phytochemical analyses conducted on the *Ficus asperifolia* leaf extracts revealed the presence of constituents which are known to exhibit medicinal as well as physiological activities similar to the study done by [20]. Analyses of the leaf extracts revealed the presence of phytochemicals such as phenols, tannins, steroids, saponins, glycosides, alkaloids, phylobatannins and cardenolides (table 2). However, flavonoids, anthraquinones, terpenes and chalones are absent. The leaf extracts to produce inhibitory effect on inflammation [21]. Saponins have the property of precipitating and coagulating red blood cells. Some of the characteristics of saponins include formation of foams in aqueous solutions, hemolytic activity, cholesterol binding properties and bitterness [22]. Steroids have been reported to have antibacterial properties, [23, 24] and they are very important compounds especially due to their relationship with compounds such as sex hormones [25]. Alkaloids have been associated with medicinal uses for centuries and one of their common biological properties is their cytotoxicity [26]. Several workers have reported the analgesic [27], antispasmodic and antibacterial properties of alkaloids. Glycosides are known to lower the blood pressure according to many reports [28]. The results obtained in this study thus suggest the identified phytochemical compounds may be the bioactive constituents and this leaf is proving to be an increasingly valuable reservoir of bioactive compounds of substantial medicinal merit. The results of mineral analysis are shown in table 3.

Table 3 Mineral Composition of *Ficus asperifolia*

Element	Concentration
Sodium (Na)	0.185±0.002 %
Potassium (K)	0.367±0.007 %
Calcium (Ca)	0.203±0.002 %
Magnesium (Mg)	0.428±0.003 %
Phosphorus (P)	0.349±0.002 %
Zinc (Zn)	64.45±0.150 mg/kg
Copper (Cu)	13.35±0.150 mg/kg
Iron (Fe)	7.00±0.200 mg/kg
Cobalt (Co)	3.55±0.150 mg/kg
Aluminum (Al)	0.485±0.250 mg/kg
Selenium (Se)	0.0027±0.010 mg/kg

The average carbohydrate content (42.64%), which is the highest parameter, will be a good source of Carbohydrate. Carbohydrates provide readily accessible fuel for physical performance and regulate nerve tissue [29]. Average crude fibre (18.41%) was the second highest parameter noted and this implies that they can serve as a source of dietary fibre [30] and can be employed in the treatment of diabetes, obesity and gastrointestinal tract diseases. It is also an indication that it contains a proportion of Cellulose, Hemicellulose and Lignin [31]. Average moisture content (11.29%) was the fourth highest Parameter noted. Too much of moisture in any sample has been proved to cause caking especially in flour and can also determine the Storage or shelf life and the viability of microorganisms' growth [32]. The lowest parameter noted was average crude fat content (3.16%), which are universally stored forms of energy in living organisms. They are major structural elements of biological membranes as phospholipids and sterols [33]. Average ash content (9.78%) is a reflection of the mineral contents preserved in the leaves. Minerals are essential for the proper functioning of tissues and act as second messengers in some biochemical cascade mechanisms [34]. Average crude protein (14.73%), would serve as enzymatic catalyst, mediate cell responses, control growth and cell differentiation [29]. The elemental analysis revealed the presence of phosphorus, magnesium, calcium and sodium in appreciable quantities. This precludes that the leaf could be a good source of nutrition for body building and a booster to immune system. Phosphorus has been reported to be good for bones and teeth formation. It contributes to energy production by participating in the breakdown of carbohydrates, protein and fats. It is needed for growth, maintenance and repair of tissues and cells and for the production of DNA and RNA [35]. Phosphorus is also needed to balance, and metabolize vitamins and minerals such as vitamin D, Calcium, Iodine, Magnesium and Zinc. Magnesium is an essential mineral involved in various metabolic reactions [36]. The presence of calcium explains why the leaf is important in blood clotting, muscle contraction and in the metabolic processes of certain enzymes. The concentration of iron is also of significance in the leaf. Most studies indicated that iron deficiency leads not only to behavioral changes but also to biochemical changes in the brain [37]. Iron plays a pivotal role in erythropoiesis and in many intracellular reactions of oxygen transport. It facilitates the oxidation of carbohydrate, proteins and fats. Calcium in conjunction with phosphorus and magnesium are activator of many enzyme systems and maintains the electrical potential in the nerves [37, 38]. Phosphorus assists calcium in many body reactions although it also has independent functions. Sodium and potassium are required to maintain osmotic balance of the body fluids, pH of the body, regulate muscle and nerve irritability and control of glucose absorption [39].

CONCLUSION

From the research, it has been established through the proximate screening that Ficus asperifolia can be used as a good source of carbohydrate and protein. Also, a good source of minerals plays important roles in metabolic activities in the body. The results further revealed the presence of medicinally important constituents in the leaf Ficus asperifolia, and several studies carried out by numerous authors are supportive of this view. The traditional medicine practice is recommended strongly for these leaf as well as it is suggested that further work should be carried out to isolate, purify, and characterize the active constituents responsible for the activity of these leafs. Also additional work is encouraged to elucidate the possible mechanism of action of new constituents in the extract.

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