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Phytochemical Analysis of Acqueous Extract of Leaf of *Luffa Aergyptiaca Mill*

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ABSTRACT

The medicinal plant investigated in this study was *Luffa aergyptiaca Mill*. The leaves of the plants were collected from their natural habitat in Khana Local Government Area of Rivers State, Nigeria.The plant sample was identified by a Herbarium, in the department of Plant Science,University of Port Harcourt, Choba, Nigeria.The harvested leaves were washed with water while still fresh and cut into small portions. The materials were then air –dried under a tree shade at room temperature for one week, but in the sun when the humidity was too high. Phytochemical screening was carried out. Aqueous extract of the leaves of *Luffa aegyptiaca* was screened with the aim of assessing the presence of some biologically active compounds. Pulverized leaves sample of *Luffa aegyptiaca* was extracted with water; the filtrate was concentrated on water bath and then air-dried at 25°C. The plant was found to contain, saponins , tannins, flavonoids , triterpenes ,Caridiac glycosides, carbohydrates and reducing sugar. The significance of this plant in traditional medicine and the importance of the distribution of these constituents were discussed with respect to the role of these plants in ethnomedicine.

Key Words:*luffa aegyptiaca mill*, phytochemical analysis

INTRODUCTION

The plant *Luffa Aegyptiaca Mill* commonly known as Luffa is a climbing herb from the botanical kingdom: Plantae, Order: Cucurbitales, Family: Cucurbitaceae, Genus: Luffa.Its common names include: Loofah, luffa, lufah, dishrag gourd, rag gourd, smooth loofah, sponge gourd, vegetable-sponge, Vietnamese gourd. In the European botanical literature, the plant was first described by Johann Veslingius who called it "Egyptian Cucumber" [1]. Veslingius was also introducer of the name "Luffa". The leaves are alternate, large (6-25 cm x 6-27 cm) ovate and dark green. The seeds are numerous, dull black, elliptic-ovoid, c. 10-12 mm long x 6-8 mm broad. The *Luffa* genus encompasses 7 species among which two are domesticated: *Luffa aegyptiaca* and *Luffa acutangula*[1]. Luffa is thought to have originated from Asia though some authors have also suggested a West African origin. Luffa is now widely spread in tropical and subtropical areas worldwide. Naturalized luffa occurs in forest, woodland, thickets and grasslands and from sea level to (1500 -1800 m) altitude. It requires lots of heat and lots of water to thrive

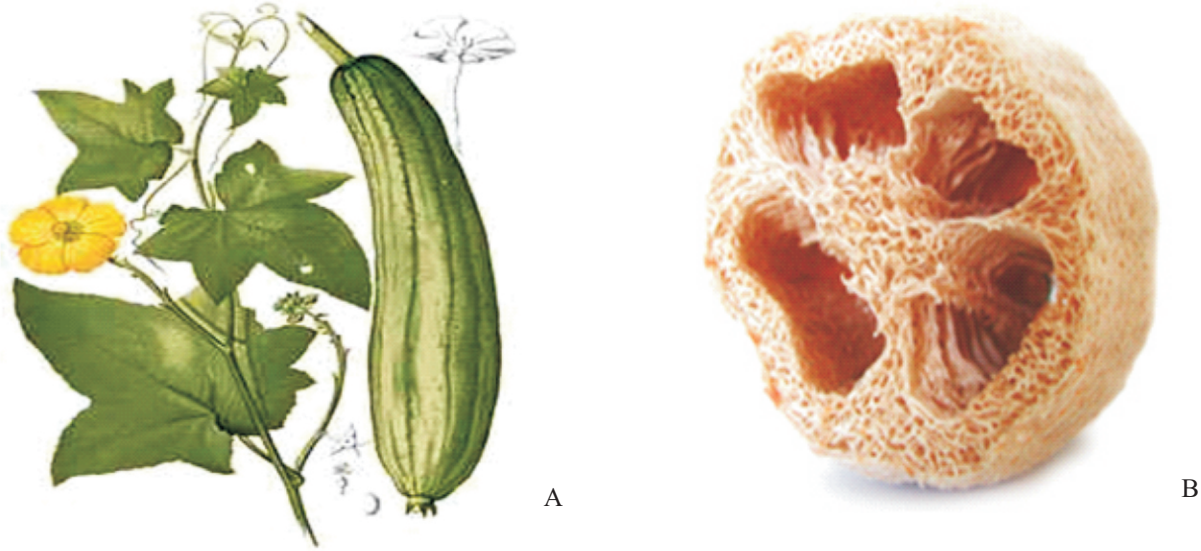

Figure1: Leaves and fruit of Luffa Aegyptiaca Mill (A) and the dry LuffaAergyptiacaMill(B).

The main uses of Luffa are in dyslipidemia, anti – diabetic, hepatoprotective, anti-hypertensive, anti-anxiety, anti-convulsive and diuretic conditions.

In many settings, it is used as an exfoliating plant, it has found relevance also as pasture for livestock, but more particular is its use as a tranquilizer for anxiety, agitation and related issues.

There is an increasing interest toward the potential health benefits of medicinal plants. Many indigenous plants have been found to be useful in managing epilepsy. This has prompted the need to explore and experiment on the possible effects of one of these medicinal plants: Luffa Aegyptiaca, with the main focus being on the leaves.

MATERIALS AND METHODS

Collection of Plant Material: The leaves of *Luffa aegyptiaca* mill was collected from several Luffa plants in khana Local Government Area of Rivers State in the month of October, 2014. This plant: *Luffa egyptiaca mill* was identified by a Herbarium in the University of Port Harcourt, Choba, Nigeria.

PHYTOCHEMICAL SCREENING OF LUFFA AEGYPTIACA LEAVES

The phytochemical screening was conducted on the leaves of Luffa Aegyptiaca mill according to Sofowora[3] and Harborne[4] methods.

Aqueous extract of the leaves of *Luffa aegyptiaca* was preliminarily screened with the aim of assessing the availability of some biologically active compounds. Pulverized leaves sample of *Luffa aegyptiaca* was extracted with water; the filtrate was concentrated on water bath and then air-dried at 25°C.

The aqueous crude extract (1 g) was completely dissolved in 100 ml of distilled water the stock solution. The stock solution was then used for the phytochemical screening following standard methods[3,4].

Test for Alkaloids

Hager's Test:Test solution was treated with few drops of Hager's reagent (saturated picric acid solution). Absence of yellow precipitate would show a negative result for the presence of alkaloids.

Test for Saponins

Foam Test: One ml of the stock solution was transferred into a test tube and diluted with 20 ml of distilled water. The mixture was shaken for 15 min and observed for the formation of froth. A foam layer was obtained on the top of the mixture in the test tube indicating the presence of saponins.

Test for Tannins

Chloroform Test: Three ml of the stock solution was transferred into a test tube and diluted with chloroform and then one ml of acetic anhydride was added. Finally, one ml of sulphuric acid was added carefully by the side of the test tube to the solution. A green colour was formed which showed the presence of tannins.

Test for flavonoids

Alkaline reagent Test: One ml of the stock solution was transferred into a test tube and few drop of dilute NaOH solution added. An intense yellow colour was observed. It became colourless on addition of a few drop of dilute HCl. This indicated the presence of flavonoids

Test for combined anthraquinones:

1 g of powdered sample of each specimen was boiled with 2 ml of 10 % hydrochloric acid for 5 minutes. The mixture was filtered while hot and filtrate was allowed to cool. The cooled filtrate was partitioned against equal volume of chloroform and the chloroform layer was transferred into a clean dry test tube using a clean pipette. Equal volume of 10 % ammonia solution was

added into the chloroform layer, shaken and allowed to separate. The separated aqueous layer was observed for any colour change; there was no colour change indicating absence of an anthraquinone.

Test for Cardiac glycoside

Keller Killiani Test: 5 gm of plant extract was placed in a test tube with 2 ml of glacial acetic acid containing a drop of ferric chloride solution. 1ml concentrated sulphuric acid was added, and observed for the formation of two layers. Lower reddish brown layer and upper acetic acid layer which turn bluish green indicate a positive test for glycosides. A brown ring at the interface indicated the deoxysugar characteristics of cardenolides. A violet ring appears below the ring while in the acetic acid layer, a greenish ring formed shows the presence of glycosides.

Test for Triterpenes

Liebermann Burchard test - Crude extract was mixed with few drops of acetic anhydride, boiled and cooled. Concentrated sulphuric acid was then added from the sides of the test tube and observed for the formation of a brown ring at the junction of two layers. Green coloration of the upper layer and the formation of deep red color in the lower layer were observed which indicate a positive test for steroids and triterpenoids respectively.

Test for Carbohydrate

Benedict's test: Test solution was mixed with few drops of Benedict's reagent (alkaline solution containing cupric citrate complex) and boiled in water bath. Formation of reddish brown precipitate was observed which shows a positive result for the presence of carbohydrate.

Test for Reducing Sugar

To about 1 g of each sample in the test tube was added 10 ml distilled water and the mixture boiled for 5 minutes. The mixture was filtered while hot and the cooled filtrate made alkaline to litmus paper with 20 % sodium hydroxide solution. The resulting solution was boiled with an equal volume of Benedict qualitative solution on a water bath. The formation of a brick red precipitate depicted the presence of reducing compound.

The physical properties of the aqueous extract of *Luffa aegyptiaca* leaves observed were its colour (light greenish) and texture (sticky powdered).

RESULTS

The phytochemicals screened from the aqueous extract of *Luffa aegyptiaca* showed positive result for flavonoids, saponins, tannins, cardiac glycoside compounds, triterpenes, carbohydrates and reducing sugar. These compounds found in the aqueous extract of *Luffa aegyptiaca* leaves may have a wide range of biological activities which could be of pharmaceutical importance.

RESULT OF PHYTOCHEMICAL SCREENING OF LUFFA AEGYPTIACA LEAVES

SUBSTANCE		PRESENCE(+) ABSENCE(-)
1.	Alkaloids	□
2.	Saponin	+
3.	Tannins	+
4.	Flavonoids	+
5.	Anthraquinones	□
6.	Triterpenes	+
7.	Caridiac glycosides	+
8.	Carbohydrate	+
9.	Reducing sugar	+

Key: - = (Absent) + = (Present).

DISCUSSION

The phytochemical screening tests may be useful in the detection of the bioactive principles and subsequently may lead to the drug discovery and development. Further, these tests facilitate their quantitative estimation and qualitative separation of pharmacologically active chemical compounds[5].

The photochemical screening of Luffa aegyptiacaleaves reveals the presence of saponins, tannins, flavonoids, triterpenes, glycosides, carbohydrates, and reducing sugar. The leaves did not show the presence of, anthraquinones, resins and alkaloid. The presence of these secondary metabolites suggests that the plant might be of industrial and medicinal importance.

Cardiac glycosides are known to work by inhibiting the Na+/K+ pump. This causes an increase in the level of sodium ions in the myocytes and then lead to a rise in the level of Ca2+. This inhibition increases the amount of Ca2+ ions available for contraction of the heart muscle which improves cardiac output and reduces distention of heart; thus are used in the treatment of congestive heart failure and cardiac arrhythmia [6].

Terpenes are very important group of organic compounds that have been reported as potent drugs used in treatment of wide range of ailments. They can be simple essential oils to the more complex triterpenes and teraterpenes. The most rapidly acting anti-malarial, artemisinin and its derivatives are terpenes [7]. The presence of terpenes will encourage further research for possible new drugs leads.

Saponins from plants have long been employed for their detergent properties. They are used as mild detergents and in intracellular histochemistry staining to allow antibody access to intracellular proteins.

Seigler [8] reported that saponins have anticarcinogens properties, immune modulatory activity and cholesterol lowering activity. It has also been reported to have anti-fungal properties [14]. Some saponins glycosides are cardiotonics while others are contraceptives and precursors for other sex hormones [7]. In medicine, it is used in hypercholesterolaemia, hyperglycaemia, antioxidant, anti-cancer, anti-

inflammatory and weight loss [6].

The steroidal saponin possesses potential neuroprotective effect in diabetic peripheral neuropathy with respect to neuropathic analgesia, improvement in neuronal degenerative changes, and significant antioxidant activity [9].

Tannins sacs are known to exhibit antiviral, antibacterial and anti-tumor activities. It was also reported that certain tannins are able to inhibit HIV replication selectively and is also used as diuretic. Plant tannins are also source of commercial tannic acids and tanning agents [7].

Flavonoid has been referred to as nature's biological response modifiers because of strong experimental evidence of their inherent ability to modify the body's reaction to allergen, virus and carcinogens. They show anti-allergic, anti-inflammatory, anti-microbial and anti-cancer activities. Some flavonoids have also be reported to behave like some coumarins in the inhibition of giant cell formation in HIV infected cell cultures [10].

The presence of flavonoids in Luffa Aergypyiaca Mill concurs with the findings of Abdel-Fatta [11]. He added that the family is rich in flavonoids, particularly flavones and flavonols. Kokwaro [12] and Harborne [4] have reported oils, favonoids and anthraquinones associated with plants to have medicinal value. Others are tritepenoids, which include: cardiac glycosides, sterols, saponins and tritepenes. Mode of action of compounds present in the extracts indicates that the extracts from these plants have the potential of solving the problem of multi-drug resistance. Therefore, the presence of these secondary compounds validates the use of the plants as herbal drugs. Thus, further research is needed to work out the actual active compounds for commercialization.

The volatile oil may be useful analgesic and in industry as fragrance. Some volatile oils are used as antiseptics, sedatives, emollient and demulcents [13]. More work is however necessary to determine the yield and biological activity of the oil content of the leaves of *Luffa aegyptiaca.*

The plant's leaves in its dried form may have a good shelf-life with reduced chance of microbial growth due to its relatively low moisture content of 9.90%. Total ash value of 4.62%, which is low, implies that the plant has good or high organic components and low inorganic or mineral constituent.

Tetracyclic triterpenes and pentacyclic triterpenoids has been known to have properties such as immunomodulatory, anticancer, anti-inflammatory, anti-anxiety, antidepressant, memory enhancer, antinociceptive, neuroprotective and other CNS actions. Several structural groups of triterpenes have demonstrated specificity against transcriptional factors which can be promising candidates for treating inflammation, cancer, and immune diseases [9].

Phytochemical screening showed that the leaves were rich in chemical constituents. Saponins, glycosides, phenolics, terpenoids and flavonoids have been documented in this study. These compounds have been known for many years to exhibit biological activity, such as effects on the central nervous system, and antibacterial, antiturmour, and anthehelmintic activity (Harborne, 1973).

CONCLUSION

This study have shown that the leaves of Luffa Aergyptiaca Mill contain saponins,tannins, flavonoids, triterpenes, glycosides, carbogydrates and reducing sugar which have anxiolytic, anti-epileptic, anti-convulsive, anti-inflammatory properties and also shows, improvement in neuronal degenerative changes, and significant antioxidant activity. It can be used for the treatment of central nervous system disorders.

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