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Full Length Research Paper

Phytochemical constituents of some leaves extract of *Aloe vera* and *Azadirachta indica* plant species

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Chloroform and water extractions of Aloe *vera* and Neem *Azadirachta indica* leaves were carried out so as to quantify the phytochemical yields in such samples, and to identify their main constituents of active compounds.. The percentage yields obtained through the soxhlet (chloroform) extraction for the *A. vera* and neem plants were 8.6% and 14.3%, while the percentage yields for the aqueous extracts of the two plants were 5.4% and 6.2%, respectively. The result of the phytochemical screening showed the presence of tannins, flavonoids, terpenoids, carbohydrates, and alkaloids for the *A. vera* plant with saponins, glycosides phlobatannins, antiquinones carbohydrates, and steroids been absent, while the neem plant contains flavonoids, steroids, carbohydrates, glycosides, antiquinone, terpenoides and alkaloids, with saponins, tannins, phlobatannins been absent. The occurrence of these biologically active chemicals in Neem and *A. vera* plants may justify their wide usage in traditional medicine.

Keywords: Phytochemials , neem, *Aloe vera*, extraction yields, bioactive compounds.

INTRODUCTION

Aloe vera L. (Liliaceae) is a semi tropical plant that has been used by herbalists for the treatment of different human diseases (Mccouley, 1990; Shellon,1996; Davis and Robson, 1999). It is related to other members of the Lily family such as onion and garlic. The *A. vera* plant is made up of fibrous roots, short stem and a spiral greenish leaves. The leaf is made of a gel, which is colourless, viscous liquid consisting primarily of water and ploysaccharides and has a bitter taste (Brinelon, 1995). Over 250 species of the genus *Aloe* are existing, with only two species grown on commercial basis (*Aloe barbadensis* and *Aloe arborescens*). Regarding chemical constituents, *A. vera* contains amino acids, lipids, sterols, tannins, enzymes chromones (flavonoids) and mannose –6–phosphate (Brinelon, 1995; Davis and Robson, 1999; Santrel International, 1998; Davis and Robson, 1999). Therefore, this plant had been found useful in the treatment of wound, burns, skin disorders and anti-inflammatory activity (Mccouley, 1990; Shellon, 1996; Davis and Robson, 1999).

The Neem (*Azadirachta indica* A. Juss) is an evergreen robust tree, belongs to the family Meliaceae . It is mostly found in tropics and sub-tropical areas of the world (Africa and Asia). Occur in medium to large size and have brown to dark grey bark and a dense rounded eronw of pinnate leaves (Ogbuewu, 2008). Have an extensive deep root system which is responsible for their survival in arid and semi arid area of the world.

The chemical constituent of the neem plant is a blend of 3 to 4 actively related compounds, with over 20 lesser ones. Presently over 250 compounds has been identified. The important classes included triterpenoids and limonoids: saladucin, valassin, meliacin, Nimbin Nimbicin, geducin, Azadirachtin etc. (Koul et al., 1989; Uko and Kamalu, 2001; Lale, 2002). Accordingly, all parts of this plant are useful and have been used in treatment of diseases ranging from teeth decay, ulcers, swollen liver, malaria, dysentery, diarrhea etc. (Ogbuewu, 2008; Allameh et al., 2002; Mossini et al., 2004; Sofowora, 1993; Haller, 1990).

The aim of the study was to quantify the chloroform and water extracts of *Aloe vera* and *Azadirachta indica*

leaves, and to identify their constituents of bioactive compounds (viz., glycosides, antiquinones, phlobatannins, carbohydrates, alkaloids, terpenes, saponins, tannins, steroids, flavonoids), which believed to be responsible for their medicinal uses.

METHODS USED

a. Sample Collection

The leaves of *Aloe vera* and neem (*A. indica*) were obtained from Lokoja area in Kogi State, Nigeria. They were washed to remove dirts and impurities. The gel in the leaves were removed and kept in the refrigerator. Some of the leaves were dried for two weeks under low sun intensity, crushed in a mortar and further ground into a coarse powder by using an automated grinder. They were stored in polyethene bag, imbedded and kept in the oven to be used as samples for the extraction.

b. Procedures used for the extraction

Two methods of extraction were adopted as follows:

- Soxlet extraction method using chloroform as the solvent.
- Aqueous extraction method using water as the solvent (Ojo et al., 2005; Sofowora, 1993).

c. Procedure for phytochemical test

Phytochemical screening for alkaloids, steroids, triterpenoids, glycosides, carbohydrates, flavonoids, tannins, phlobatannins, antiquinones and saponins were carried out as described below (Sofowora, 1993; Harborne, 1973; Ogbuewu, 2008).

Test for tannins

About 2ml of the aqueous extract was stirred with 2ml of distilled water and few drops of $FeCl_3$ solution (5%w/v) were added. The formation of a green precipitate was an indication for the presence of tannins.

Test of saponins

5ml of aqueous extract was shaken vigorously with 5ml of distilled water in a test tube and warmed. The formation of stable foam, honey comb in shapes, was taken as an indication for presence of saponins.

Test for phlobatannins

About 2ml of aqueous extract was added to 2ml of 1% HCl and the mixture was boiled. Deposition of a red precipitate was taken as an evidence for the presence of phlobatannins.

Test for flavonoids

To 1ml of aqueous extract, 1ml of 10% lead acetate solution was added. The formation of a yellow precipitate was taken as a positive test for flavonoids.

Tests for anthraquinones

(a) Borntrager's test: 3ml of aqueous extract was shaken with 3 ml of benzene, filtered and 5 ml of 10% ammonia solution was added to the filtrate. The mixture was shaken and the presence of a pink, red or violet colour in the ammonical (lower) phase indicates the presence of free anthraquinones.

(b) 3 ml of the aqueous extract was boiled with 3ml of aqueous sulphuric acid and filtered while hot. 3 ml of benzene was added to the filtered and shaken. The benzene layer was separated and 3 ml of 10% HN_3 added. A pink, red or violet colouration in the ammonical (lower) phase indicates the presence of anthraquinone derivatives.

Test for terpenoids

2ml of the organic extract was dissolved in 2 ml of chloroform and evaporated to dryness. 2 ml of concentrated sulphuric acid was then added and heated for about 2 min. A grayish colour indicates the presence of terpenoids.

Tests for steroids

(i) A red colour produced in the lower chloroform layer when 2 ml of the extract dissolved in 2 ml of chloroform and 2 ml concentrate sulphuric acid added in test tube indicates the presence of steroids.

(ii) The development of a greenish colour when 2 ml of the organic extract was dissolved in 2 ml of chloroform and treated with sulphuric and acetic acids indicates the presence of steroids.

Test for alkaloids

3ml of aqueous extract was stirred with 3 ml of 1% HCl on a steam bath. Mayer's and Wagner's reagents were

Table I. The results of chloroform and aqueous extraction yields for *Aloe vera* and the neem leaves.

Plant species	Chlorophorm leaves extract (%)	Aqueous leaves extract (%)
Aloe vera	8.6	5.4
Neem	14.3	6.2

Table 2. Results of phytochemical analysis of the *Aloe vera* leaves and the neem leaves.

Variable tested	*Aloe vera* leaves	Neem leaves
Alkaloids	+	+
Tannins	+	-
Steroids	-	+
Flavonoids	+	+
Saponins	-	-
Glycosides	-	+
Terpenoids	+	+
Carbohydrates	+	+
Phlobatannins	-	-
Antiquinones	-	+

then added to the mixture. Turbidity of the resulting precipitate was taken as evidence for the presence of alkaloids.

Tests for carbohydrates

(a) Molisch's test: 3 ml of the aqueous extract was added to 2 ml of Molisch's reagent and the resulting mixture shaken properly, then 2 ml of concentrated H_2SO_4 was poured carefully down the side of the test tube. A violet ring at the interphone indicates the presence of carbohydrate.

(b) 3 ml of the aqueous extract was measured into test tube and1 ml of iodine solution was added. A purple coloration at the interphone indicates the presence of carbohydrates.

Tests for Glycosides

(a) Liebermann's test

2 ml of the organic extract was dissolved in 2 ml of chloroform, where 2 ml of acetic acid was added carefully. A color change from violet to blue to green indicates the presence of a steroidal nucleus (i.e. a glycone portion of glycoside.)

(b) Salkowski's test

2 ml of each extract was dissolved in 2 ml of chloroform. 2 ml of sulphuric acid was added carefully and shaken gently. A reddish brown colour indicates the presence of a steroidal ring (i.e., a glycone portion of glycoside).

(c) Keller-kiliani test

2 ml of each extract was dissolved in 2 ml of glacial acetic acid containing 1 ml of concentrated H_2SO_4 characteristic of cardenolides.

RESULTS AND DISCUSSION

The results of extraction yields of chloroform and water extracts of *A. vera* and *A. indica* leaves were presented in Table 1. Accordingly, the soxhlet extraction procedure using the chloroform solvent showed that the crude extract of the *A.loe vera* leaves (8.6%) was lower than that obtained by the neem leaves extract (14.3%). On the other hand, the aqueous extraction method gave a value of 5.4% for the *A. vera* leaves and 6.2% for the neem leaves, with little outweigh of the latter plant. The reasons why chloroform extraction gave superior yields may be attributed to the followings: (i) The use of organic solvent that can easily be evaporated than water, (ii) The high temperature used (heating) (iii) most components of this plant are organic compounds which easily dissolves in an organic solvent. However, percentage yield of the crude extract was observed to be generally low, and might even be smaller when these bioactive agents are to be obtained in their pure form, this situation give an evidence that are at low concentration is very low in the

plant.

It is clear that chloroform extracts gave higher yield percentages than water extracts in both plant samples.

The phytochemical screening results from table 2 show that the *A. vera* leaves contains alkaloids, tannins, flavonoids, carbohydrates, and terpenoids while the neem plant contain alkaloids, steroids, flavonoids, carbohydrates, glycosides and terpenoids.

These compounds may be responsible for their medicinal uses.

CONCLUSION

Bioactive compounds such as alkaloids, flavonoids, steroids, terpenoids glycosides, carbohydrates and tannins were detected to be present in the leaves of *Aloe vera* and *Azadirachta indica* plants. Since these two plants had been used in the treatment of different ailment such as malaria, dysentery, diarrhea, skin burn etc, the medicinal roles of these plants could be related to such identified bioactive compounds. Efforts should be geared up at characterizingthe entire bioactive agents present, in the two plants for their full utilization.

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