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Phytochemical Analysis of Fruit and Leaf Extracts of *Balaniteaegyptiaca*

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Abstract:- The Phytochemical Screening of Aqueous and Ethanolic Extracts of Fruit and Leaf of the *Balaniteaegyptiaca*plant was carried out using standard method to investigate the presence of secondary metabolites. The main objective of this study is to determinethe phytochemicalsof the aqueous and ethanolicextracts of *B. aegyptiaca* plant parts. The leaf and fruit of the plant were screened using ethanol and water as a solvents. The results revealed the presence of some major compounds including, alkaloids, anthraquinones, flavonoids, glycosides, phenolic, reducing sugar, resins, saponins and tannins. The results of the phytochemical screening of *B. aegyptiaca*leaf and fruit extracts using ethanol as a solvent showed that the extract of the plant parts revealed the presence of anthraquinonessaponins and tannins in both leaf and fruit extracts respectively. The ethanolic extract of the plant parts revealed the presence of alkaloids and phenolic in the leaf. While, flavonoid, reducing sugar and resins were detected only in the fruit extract. But glycosides were found to be absents in both the leaf and fruit respectively. Similarly, when water was used as a solvent the phytochemical screening of *B. aegyptiaca* leaf and fruit extracts revealed the presence of alkaloid, anthraquinones, flavonoids, glycosides, phenolic, reducing sugar, saponins and tannins. The present study indicated that the fruits was the only part among the tested plant parts that contained resins compound. However, among the phytochemical compounds screened, saponins were found to be in excess in both ethanolic and water extract. But, none of the chosen solvent (water and ethanol) was able to extract resins out from the leaf. This indicated that the resins are not presence in the leaf of *B. aegyptiaca*, or may be the used solvents cannot extract it.

Keywords:- *Balaniteaegyptiaca, Phytochemicals, Ethanolic Extracts, Aqueous Extracts.*

I. INTRODUCTION

Balaniteaegyptiaca (Delile), known as desert date, and *Aduwa* in Hausa northern part of Nigeria. It belongs to the family *Zygophyllaceae*. This tree is native to much of Africa and part of the Middle East. In Africa, it is particularly found in Sahel savanna and northern Sudan savannah zones of West Africa; in Nigeria the tree is more common in northern Nigeria. In these main areas of the tree range, there is annual rainfall of between 400 and 800 millimeters (Edwin, 1991). The tree grows up to 10 meters in height with spiny multi branches shrubs or trees (Daya*etal*., 2011), compound leaves and greenish yellower flowers, double root systems, and pale brown date like fruits. The fruit is usually narrow and has a length between 2.5 to 7 cm and a diameter between 1.5 to 4 cm. Leaves from *B. aegyptiaca* plants are good sources of minerals, vitamins as well as protein supplements (Ogari*etal*., 2017). *Balanites* leaf and fruit have been utilized for many generations in both rural and peri-urban communities (Okia, *et al*., 2013). It is highly resistant to stresses such as sandstorms and high day time temperature (40^{o}C). However, it does not tolerate extreme cold, and grows with minimal available moisture.

Literature has revealed antifidant, antidiabeticmollusicidal, anthelmenthic and contraceptive activities in various *B. aegyptiaca* (Gupta *et al*., 2012). It is rich in carbohydrates, alkaloids, saponnins, flavonoids and vitamin C in particular (Daya*etal*., 2011). The seeds are particularly rich in oil and protein. The kernel is traditionally used in the treatment of various ailments such as jaundice, intestinal worm's infection, malaria syphilis, epilepsy, dysentery, constipation, haemorroid among others (Alhassan*etal*., 2018). The usefulness of the plant include, bread, soup, paste, utensils, furniture, tablets, soap, shelter, protection and fodder. It is good for firewood and high quality charcoal and also biologically active phytoconstituents (Edwin, 1999). It also traditionally used for the treatment of diseases i.e jaundice, intestinal worm, wound, malaria, diarrhea, stomach aches, asthma and fever (Daya*etal*., 2011). A chemical extracted from the fruits and bark is used as a pesticide and for water sterilization. There are some reports however, in some places similar chemical extract is used for catching fish, by poisoning them (Edwin, 1991). It has been reported that *B. aegyptiaca* parts contains some important chemical compounds like polyphenols, coumarins, alkaloids, saponins among others. Hence, this study have been carried out to investigate the phytochemical

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constituents of *B. aegyptiaca* leaves and fruits for the purpose of nutritional and pharmaceutical uses.

II. MATERIALS AND METHODS

A. Collection of Sample

Fresh leaves and fruits of *B. aegyptiaca* were hand-picked from Hotoro district area of Kano state, north western Nigeria. The collected plant parts were washed with tap water to remove soil, dust or dirt and air dried at room temperature in the laboratory for approximately three days. Exposure to sunlight was avoided to prevent the loss of active components. The dried samples were ground into fine powder using mortar and pestle and sieved with 0.5mm sieve into fine powdered as described by Yusha'u*etal*., (2009) and Audu*et al*., (2018). The samples powdered were stored in airtight containers until extraction.

B. Extracts Preparation

The grounded dried plant parts of *B. aegyptiaca* were extracted using the method described by Asa'adi*etal*. (2010) and Yunusa*et al*., (2016) with slight modifications. About 50 g of grounded leaves and fruit powdered were measured using sensitive scale and then placed carefully into 500ml cleaned and labeled conical flask of the respective extracting solvents. The mixtures were shaken properly, and then the flasks were covered and left for 3 days at room temperature. Thereafter the extracts were decanted and filtered through 2 mm mesh sieved to remove debris and finally filtered using Whatman No. 1 filter pepper. The extract were then transferred into cleaned labeled bottle containers and kept in the laboratory for later used.

C. Phytochemical Screening of the Extracts

a) Phytochemical analysis
Phytochemical analyses of the two different plant extracts were carried out using prepared extracts following standard procedure (Kumar *etal*., (2009), Yusha'u*et al*., (2009) Reena*et al*., (2010) and Audu*etal*., (2018)). The plant extracts were screened for the presence or absence of phytoconstituents, such as saponins, alkaloids, tanins, phenolics, reducing sugars, glycosides, flavonoids, resins and anthraquinones.

b) Test for anthraquinones
Five milliliter (5ml) of the extract solution was hydrolysed with diluted H_2SO_4, extracted with benzene, one milliliter (1ml) of dilute ammonia was added to it. Rose pink coloration suggested the positive response for anthraquinones (Kumar *etal*., 2009).

c) Test for alkaloid
0.1ml of the filtrate extract was placed in a test tube, and 3 drops of Dragendrops added.
An orange red precipitate with turbidity was observed (Yusha'u*etal*., 2009)

d) Test for flavonoid
Four milliliter (4ml) of the extract sample was added to 5 drops of concentration HCl and 1.5 ml of methanol solution. Pink tomato red color was observed.

- To 2 ml of the filtrate 0.5 ml of conc. HCl and few magnesium turnings was added. Color changes to pink or red indicate a presumptive evidence of the presence of flavonoids.
- To 3 ml of the filtrate 4 ml 1% KOH was added. A dark yellow color indicates the presence of flavonoids compounds.
- To 3 ml of the filtrate in a test tube, 4 ml 1% $AlCl_3$ was added. Formation of yellow color indicates the presence of flavonoids compound (Isam, *et al*., 2016).

e) Test for phenolics
Two milliliter (2ml) of ethanol was placed into the test tube containing extract samples and few drops of ferric chloride solution was added. A change in the resultants mixture to deep blue coloration was observed.

f) Test for saponnins
Two milliliter (2ml) of the extract sample was placed into the test tubes and 2 ml of distilled water added and shake. A frothing was observed (Reena*etal*., 2010).

g) Test for tannins
One milliliter (1ml) of the extract was treated with few drops of 1% ferric chloride solution. Blue - black coloration was observed. Again few drops of 10% Ferric chloride ($FeCl_3$) were added to 2ml each of the leaves and fruits extracts using dropper. A deep bluish or greenish colour indicates the presence of tannins.

h) Test for glycosides
Ten milliliters (10ml) of 50 % H_2SO_4 was added to 1 ml of the filtrate extract in separate test tubes and the mixture heated for 15 minutes followed by addition of 10 ml feelings solution and boiled. A brick red precipitate was observed (Yusha'u*etal*., 2009).

i) Test for Reducing Sugar
One milliliter (1ml) of extract solution was placed in a test tube, 2.0 ml of distilled water was added followed by addition of fehlings solution (A+B) and the mixtures were warmed at 40^{o}C. A brick red precipitate at the bottom of the test tube was observed (Yusha'u*etal*., 2009).

j) Test for Resins
A measured 2ml of acetic anhydride and drops of H_2SO_4 were added to each of the leaves and fruits extracts. A formation of violet coloration indicates the presence of resins.

III. RESULTS

The phytochemical investigation of *B. aegyptiaca* leaves and fruits extracts revealed the presence of some major compounds including, alkaloids, anthraquinones, flavonoids, glycosides, phenolic, reducing sugar, resins, saponins and tannins (Table 1 and 2).

The results of the phytochemical screening of *B. aegyptiaca* leaf and fruit extracts using ethanol as a solvent showed that the extract of two plant parts revealed the

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presence of anthraquinonessaponins and tannins in both leaf and fruit extracts respectively. The ethanolic extracts of the plant parts also revealed the presence of alkaloids and phenolic in the leaf. But flavonoids, reducing sugar and resins were obtained from the fruits. However, alkaloids and phenolic were observed present in both leaf and fruit extracts when water used as a solvent, but the compounds were found to be partially presents in both plant parts. The formation of pink tomato, brick red and violet colours indicated the presence of flavonoid, reducing sugar and resins in the fruit extract only. Glycosides were found to be absent in all the plant parts using salkowskis test (Table 1). Similarly, when water was used as a solvent the phytochemical screening of *B. aegyptiaca* leaf and fruit extracts revealed the presence of alkaloids, anthraquinones, flavonoids, phenolics, reducing sugars, saponins and tannins (Table 2). The results showed that high saponins contents were found to be presents in both leaf and fruit extracts respectively. Brick red precipitate confirmed the presence of glycosides in the leaf extract. However, the fruit extract was the only extract of the plant parts that formed violet colour when violet test was used, this indicated the presence of resin compounds.

Phytochemical	Plant Parts of *B. aegyptiaca*		Tests	Colours
	Leaf	Fruit		
Alkaloids	+	–	Dragendoffs	Orange red
Anthraquinones	+	+	Hydrolysed	Rose pink
Flavonoids	–	+	Lead acetate	Pink tomato
Glycosides	–	–	Salkowskis	–
Phenolics	+	–	Ferric chloride	Deep blue
Reducing Sugar	–	+	Fehlings	Brick red
Resins	–	+	Violet	Violet colour
Saponins	+	++	Foam test	Froothing
Tanins	+	+	Ferric chloride	Deep bluish

Table 1: Phytochemical Screening of *B. aegyptiaca* Leaves and Fruits Extracts Using Ethanol as Solvent

Phytochemicals	Plant Parts of *B. aegyptiaca*		Tests	Colour
	Leaf	Fruits		
Alkaloids	+	+	Dragendoff's	Orange red
Anthraquinones	+	+	Hydrolysed	Rose pink
Flvonoids	+	+	Lead acetate	Pink tomato
Glycosides	+	+	Salkowkis	Brick red ppt
Phenolics	+	+	Ferric chloride	Deep blue
Reducing Sugar	+	++	Fehlings	Brick red
Resins	-	+	Violet	Violet colour
Saponins	+++	+++	Foam test	Froothing
Tanins	+	+	Ferric Chloride	Deep bluish

Table 2: Phytochemical Screening of *B. aegyptiaca* Leaves and Fruits Extracts Using Water as Solvent

IV. DISCUSSION

The findings of this study confirmed the presence of phytochemical compounds in fruit and leaf extracts of *B. aegyptiaca*. Altogether, nine phytoconstituents were analyzed presents as presented in table 1 and 2. The results revealed the presence of common phytoconstituents like alkaloids, anthraquinones, flavonoid, glycosoides, phenolics, reducing sugar, resins, saponins and tannins in test plant parts. Among the phytochemical compounds identified, saponins were found to be in excess fallowed by reducing sugar in both leaf and fruit aqueous extracts. This is in line with the finding of Alhassan, *et al.*, (2018) who reported that saponins were found in high concentration in *B. aegyptiaca* plant extracts. This results also agrees with Audu, *et al.*, (2018) who reported similar result on *B. aegyptiaca* plant parts. However, when ethanol used as a solvent saponins were found in high concentration in fruit only, while low concentration were recorded in leaf extract. The variation in concentrations, it may be due to the variations in types of solvents used. This is because, saponins have been reported to be more soluble in water than ethanol. However, from the results obtained, anthraquinones, saponins and tanins were identified both in aqueous and ethanol extracts of the leaf and fruit of *B. aegyptiaca* respectively. Similar results has been obtained by Audu, *et al*., (2018) who recorded saponins and tanins in aqueous and ethanol extracts. But the results differ with regard to the anthraquinones which has been detected in this study. None of the chosen solvent (water and ethanol) was able to extract resins out from the leaf. This indicates that the resins are not presence in the leaf of *B. aegyptiaca*, or may be the solvents are not able to extract it. However, glycosides and reducing sugar were detected in both leaf and fruit of *B. aegyptiaca* when water used as solvent. But no significant change of colour was observed when using ethanol as a solvent, which proved the absence of glycosides and reducing sugar. The presence of glycosides and reducing sugar in the aqueous extract and not in the ethanol extract is due to the fact that water is the best solvent to attract glycosides and reducing sugar for extraction more than ethanol, therefore it can easily be extracted by water and not by ethanol. Water and ethanol are solvents that have a common features of undergoing autoionzation, but water is found to have high autoionization concentrate than ethanol. This also explain why glycosides and reducing sugar were presents in the aqueous extracts not in the ethanol extract. However, the aqueous and ethanol extracts of *B. aegyptiaca* confirmed the presence of flavonoid and phenolic compounds. According to

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Soobratteeet *al*., (2005) described that these metabolites have redox properties that allow them to act as antioxidant because of their free radical scavenging ability is facilitated by the presence of free hydroxyl groups. Among all the phytochemical compounds detected by this study saponins and tannins are the only compounds which were detected in the extracts of test plant parts as reported by many previous study in regard to saponins compound, Islam, *et al*., (2016), Dubey, *et al*., (2011) and Kumar, *etal*., (2014). But it differs from the results of all the above researchers in regard to tannins which were detected in this study but not detected by the previous researchers.

V. CONCLUSION

The present study showed that *B. aegyptiaca* leaf and fruit extracts possess several phytochemical compounds, namely alkaloids, anthraquinones, flavonoids, glycosides, phenolic, reducing sugar, resins, saponins and tannins. The phytochemical screening of *B. aegyptiaca*leaf and fruit extracts using ethanol as a solvent showed that the extract of two plant parts revealed the presence of anthraquinonessaponins and tannins in both leaf and fruit extracts respectively. Phytochemical screening of *B. aegyptiaca* leaf and fruit extracts also revealed the presence of alkaloids, anthraquinones, flavonoids, phenolics, reducing sugars, saponins and tannins when water used as a solvent.

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