Phytochemical Screening of Aqueous Extracts of *Abelmoschus esculantus* Leaf and Root

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Abstract: *Abelmoschus esculantus (L.)* is also known as ladies` fingers, Okra, or bhendi. It belongs to the family Malvaceae. Traditionally, it is widely useful against genitor-urinary disorders, dysuria, chronic dysentery, spermatorrhoea, ulcers and relief from haemorrhoids. *Abelmoschus esculantus* Leafs are sometimes used as a base for poultices, as an emollient, sudorific or antiscorbutic and to treat dysuria. It chiefly possesses many biological activities including antimicrobial, mitochondrial adhesion inhibition, antiulcer, antiarthritic, antiangiogenic, anticancer, protein kinase inhibition, etc. In this work, the dried powders of *Abelmoschus esculantus* leaf and root (100g) were placed in the thimble of Soxhlet apparatus. 500 ml of distilled water was used as a solvent. The extract was concentrated using Rotavapor. Then the extract was dried in a digital water bath till a dried residue of extracts was obtained. The percentage yield was 8%w/w. The test sample was subjected to phytochemical analysis in order to find out the presence of phytochemical constituents. The phytochemical tests were performed for alkaloids, carbohydrate, glycosides, saponins, phenol, flavonoids, protein, terpenoides, and tannins contents. Critical study of the results of preliminary screening of aqueous extract shows that leaves of *Abelmoschus esculentus* contain four phytochemicals, namely, carbohydrates, glycosides, flavonoids and terpenoids, whereas, out of these four, only two phytochemicals, viz., carbohydrates and terpenoids, are present in root. In contrast, saponins, phenols, protein and tannins are absent in both the parts of *Abelmoschus esculentus*. In addition, interestingly, alkaloids are also present in root. Accordingly, it may be concluded that leaves and roots of *Abelmoschus esculantus (L.)* can be used as potential sources of respective aforementioned phytochemicals from the corresponding parts.

Key Words: *Abelmoschus esculantus*, phytochemical, screening, soxhlet extraction.

I. INTRODUCTION

Okra (*Abelmoschus esculentus* (*L.*) Family-Malvaceae), also known as ladies` fingers, bhendi, bhindi, bamia ochro or gumbo, is an important vegetable crop grown mainly in the tropical or sub-tropical regions during summer and rainy season [1, 2]. It is widely grown in Africa, America, Asia and Southern Europe [3]. *Abelmoschus esculentus* is widely used for many purposes having many industrial, domestic uses and also exhibit medicinal properties. *Abelmoschus esculentus* plants are used in manufacture of jaggery, ripe seeds are used as a substitute for coffee, matured fruits and stems containing crude fibre are used in the paper industry and the roots and stems of *Abelmoschus esculentus* are used for clearing cane juice [4]. *Abelmoschus esculentus* is eaten as food vegetable. It is a healthy vegetable with lots of fibres and folate. Okra is a highly prized vegetable crop that has been used since ancient times for its good quality oil and protein, also supplying carbohydrates, minerals and vitamins; K, Na, Mg and Ca being the major elements, also contains Fe, Zn, Mn and Ni [3].

The phytochemicals compounds present in *Abelmoschus esculentus* confer it with antioxidant, anti-ulcer, anticancer, antimicrobial, hypoglycaemic, hypolipidemic and antidiabetic properties [5, 6, 7, 8].

The medicinal properties and other properties of some plants have been recognized by various researchers [9, 10, 4, 11]. Such properties are due to the bioactive compounds in the plants such as Steroid, Terpenoids, Tannins, Carotenoids, Flavonoids, Alkaloids, Glycosides and Phenolic compounds [12, 8, 13]. This study investigated the phytochemical components and the antibacterial activity of *Abelmoschus esculentus* against some selected gram-negative and gram-positive bacteria of public health importance, using disk diffusion assay.

II. MATERIALS AND METHODS

2.1. Survey and collection of plant parts

Leaves and root of *Abelmoschus esculentus* family Malvaceae were collected from Jabalpur region (Madhya Pradesh). The plant parts material was washed in running tap water, dried in shade, cut, crushed and kept in airtight bottle for experimental purpose.

2.2. Preparation of Aqueous extract

The shade dried 100 gm powdered material of *Abelmoschus esculentus* leaves and root were placed in a porous bag or “thimble” (filter paper) which is placed in a beaker containing 250ml water solvent. It was well-closed and kept at 4ºC for 24 hour. After that “thimble” was kept in chamber and solvent in the flask of the Soxhlet apparatus [14]. The flask was heated at 25ºC. Its

vapour passed through condensation. After condensing it dript into the thimble containing the dry *Abelmoschus esculentus* leaves and root powder. When the level of solvent in chamber reached to the top of siphon tube, the liquid contents of chamber sink into the flask. This process continued until a drop of solvent from the siphon tube dose not leave and root residue when evaporated. After 4 hour extract were collected from flask of the Soxhlet. Liquid plants parts extract were dried to evaporate solvent at 20ºC. After that it was kept in water bath at 20ºC, where semi solid extract became solid. The solid was stored in well- closed dark bottle at 1 for further experimental work.

2.3. Phytochemical Screening

Phytochemical Screening Chemical tests were carried out on the aqueous extracts to identify the constituents using standard procedures as described by Harborne [15] and Tiwari [16]. The aqueous extracts of *Abelmoschus esculentus* leaves and root were tested to determine the presence of secondary metabolites like alkaloids, carbohydrate, glycosides, saponins, phenol, flavonoids, protein, terpenoides, and tannins.

1. Test for alkaloids:

Dragendroff's Test: Filtrates were treated with Dragendroff's reagent (solution of Potassium Bismuth Iodide). Formation of red precipitate indicates the presence of alkaloids.

Hager's test: Extracts were dissolved individually in dilute hydrochloric acid and filtered. Filtrates were treated with Hager's reagent. Formation of yellow coloured precipitates indicated the presence of alkaloids.

2. Tests for carbohydrates:

Fehling's test: Filtrates were mixed with equal volume of Fehling's A and Fehling's B solutions and heated. Formation of brick red precipitate of cuprous oxide indicated the presence of reducing sugars.

3. Test for cardiac glycosides:

Legal's Test: Extracts were treated with sodium nitropruside in pyridine and sodium hydroxide. Formation of pink to blood red colour indicated the presence of cardiac glycosides.

Keller Killiani test: To the test solution, 2ml of glacial acetic acid containing a few drops of $FeCl_3$ solution was added. 1ml of conc. H_2SO_4 was added along the side of the test tube carefully. A brown ring at the interface indicated the presence of deoxysugar of cardenoloides. A violet ring may appear beneath the brown ring, while in the acetic acid layer, a greenish ring may also form just gradually throughout the layer.

4. Test for saponins:

Froth test: Extract was added to 2-3 ml of distilled water. The mixture was shaken vigorously. Formation of foam indicated the presence of saponins.

5. Test of phenols:

Ferric Chloride Test: Extracts were treated with 3-4 drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenols.

6. Test for flavonoids:

Alkaline reagent test: To the test solution, a few drops of sodium hydroxide solution were added. Formation of intense yellow colour which turns to colourless by addition of few drops of dilute acetic acid indicated the presence of flavonoids.

Lead acetate Test: Extracts were treated with few drops of lead acetate solution. Formation of yellow colour precipitate indicated the presence of flavonoids.

7. Test for proteins:

Xanthoproteic test: The extracts were treated with a few drops of conc. nitric acid. Formation of yellow colour indicated the presence of proteins.

8. Test for terpenoides

Crude extract was dissolved in 2ml of chloroform and evaporated to dryness. To this, 2ml of concentrated H_2SO_4 was added and heated for about 2 minutes. A greyish colour indicated the presence of terpenoids.

9. Test for tannins:

Ferric chloride test: To the test solution, a few drops of ferric chloride solution were added. An intense green, purple, blue or black colour indicated the presence of tannin.

III. RESULTS AND DISCUSSION

The results of phytochemical analysis conducted on the aqueous extract of *Abelmoschus esculentus* leaves and root are summarised in Table 1. Critical study of the results of preliminary screening of aqueous extract [Table 1] shows that leaves of *Abelmoschus esculentus* contain four phytochemicals, namely, carbohydrates, glycosides, flavonoids and terpenoids, whereas, out of these four, only two phytochemicals, viz., carbohydrates and terpenoids, are present in root. In contrast, saponins, phenols, protein and tannins are absent in both the parts of *Abelmoschus esculentus*. In addition, interestingly, alkaloids are also present in root. Accordingly, it may be concluded that leaves and roots of *Abelmoschus esculantus (L.)* can be used as potential sources of respective aforementioned phytochemicals from the corresponding parts.

Table1: Preliminary phytochemical screening of aqueous extract of *Abelmoschus esculentus.*

Phytochemical	Tests	Aqueous extract *Abelmoschus esculentus*	
		Leaves	Root
Alkaloids	Dragendroff's test	-	+
	Hager's test	-	-
Carbohydrates	Fehling test	+	+
Glycosides	Legal's test	-	-
	Keller- Kilani test	+	-
Saponins	Froth test	-	-
Phenol	Ferric Chloride test	-	-
Flavonoids	Alkaline reagent test	-	-
	Lead Acetate test	+	-
Protein	Xanthoproteic test	-	-
Terpenoids	_	+	+
Tannins	Ferric Chloride test	-	-

(+) Indicates presence of phytochemicals. (-) Indicates absence of phytochemicals.

IV. CONCLUSION

The phytochemical screening of the aqueous leaves and root extracts of *Abelmoschus esculentus* showed the presence of phytochemical constituents, namely, alkaloids, carbohydrate, glycosides, saponins, phenol, flavonoids, protein, terpenoides, and tannins in various proportions in aqueous extracts which have great medicinal and pharmacological properties. However, further evaluation is needed to isolate the bioactive substances which can be used for welfare of the mankind.

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