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RESEARCH ARTICLE

Phytochemical Screening of Flowers from *Moringa oleifera* Lam.

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ABSTRACT

Plants serve as vast source for varied phyto-constituents exhibiting varied pharmacological properties. It is one of the richest plant sources of Vitamins A, B (Ramachandran, 1980; Odee, 1998; Jahn et al, 1986; Palada et al, 1995; Gilani et al, 1994) Vit. C, D, E and K. The vital minerals present in *Moringa* include Calcium, Copper, Iron, Potassium, Magnesium, Manganese and Zinc. Leaves, flowers and pods are common vegetables in the Asian diet. The chemical constituents of the Hexane and Ethanol extract of *Moringa oleifera* Lam. Flowers were investigated. Different chemical constituents were identified in the extract; unsaturated fatty acids, especially oleic acid, alkaloids, steroids, flavonoids, tannins, saponins, carbohydrates and minerals are present in the extract. This work aims to identify the main constituents from *Moringa oleifera* Lam. flower extract.

Keywords: *Moringa oleifera* Lam., Phytochemistry, Chemical constituents, *Moringa* flower extract

INTRODUCTION

Moringa oleifera Lam. is a cosmopolitan in distribution, fast-growing, deciduous tree belonging to the Moringaceae family (Ramachandran, 1980). The species *Moringa oleifera* Lam. is known worldwide by several popular names such as "resedá", "árbol de rábano", horse radish tree, drumstick tree, "ângela", "árbol de los espárragos", white-lily,"quiabo de quina" and many others (Ramachandran, 1980; Morton, 1991). *Moringa oleifera* Lam., also known as the 'drumstick tree,' it can reach a height of 10–12 m and the trunk can reach a diameter of 45 cm. The bark has a whitish-grey color and is surrounded by thick cork. Young shoots have purplish or greenish-white, hairy bark. The tree has an open crown of drooping, fragile branches and the leaves build up feathery foliage of tri-pinnate leaves. It is mostly found in areas having warm and dry and moist (Odee, 1998).

Moringa is a tree of many names and uses, however, the name "Miracle Tree" has commonly been used (Palada, 1995). *Moringa* plant widely used in folkloric medicine for the treatment of ailments such as Ulcer, wound, inflammation, heart problem, cancer, stroke, obesity, anemia and liver damage. *Moringa* can prevent up to 300 diseases, and aside from preventative measures, its leaves are capable of curative properties as well (Palada,1995). Extracts from all parts of the plant show pharmacological properties such as show hypocholesterolaemic (Mehta et al , 2003), hypotensive, bradycardic (Gilani, et al, 1994) and anti-ulcerative activity (Pal et al 1995). The dry pods are adequate to use as a substratum for laboratory animal bedding (Farias, 2004). The seeds show antimicrobial activity against fungi (Eiler et al, 1981; Donli et al, 2003) and bacteria (Eiler et al, 1981; Madsen et al, 1987; Ghebrenmichael et al, 2005), antitumor (Dharali et al, 2003), anti-inflammatory, and diuretic (Carceres et al, 1992) activity as well as against the mosquito that transmits dengue and yellow fever (Ferreira, 2004). Gupta et al. (1999) showed that the roots were able to depress the central nervous system. Due to *Moringa's* ability to improve the Immune system, treatment of HIV and AIDS symptoms is also possible (Leone et al 2015). All parts of *Moringa* have been utilized, for even the seeds are capable of purifying water (Fahey, 2005). *Moringa* contains glucosinolates and isothiocyanates, both of which have great ability for cancer prevention, for glucosinolates are the naturally occurring precursor of isothiocyanates. While the exact mode of action is unknown, research has shown that isothiocyanates are a cancer-killing agent (Bao et al, 20014; Sakao et al, 2005).

Beside this there is important research work published on removal of Heavy Metal (copper, lead, cadmium and chromium) from Water using *Moringa oleifera* Lam. Seed. *Moringa oleifera* Lam. is an environmentally-friendly natural coagulant. It is an eco-friendly technology that is economically more advantageous than other treatment alternatives (Ravikumar et al, 2013).

With this vast list of traditional medicinal properties, it comes as no surprise that *Moringa* is packed with chemical components probably to give it an amazing phytochemistry.

MATERIAL AND METHODS

Collection of Plant Material

Fresh healthy flower of *Moringa oleifera* Lam. were stripped from the plants and placed in a specimen bag to dry in a vented chamber for one week from the local area of Omerga Dist. Osmanabad, Maharashtra, (India) and authenticated by taxonomy experts from Department of Botany, Shri Chhatrapati Shivaji College Omerga, Dist. Osmanabad (Plate I: A-D). After drying, the flowers (250g) were grinded into powder using electric grinder.

Preparation of Crude Extracts

The powder (10g) was extracted by Soxhelet apparatus soaking in solvent (Hexane and Ethanol), separately for 24 hours. Clear supernatant was collected and dried at 45°C in rotary evaporator. (Büchi Rotary Evaporator Model R-200) to prevent contamination and to sure that it is completely evaporated. Each residue was weighed. The different extracts were poured in to screw capped glass sample bottles and kept in refrigerator until used. The different tests for phytochemical analysis was performed using standard procedures.

The extracts of *Moringa oleifera* Lam. were screened for the presences of major phytochemicals such as phenolics, anthraquinone, flavonoids, alkaloids, terpenoids, tannins, steroids, glycosides, saponins, carbohydrates, proteins, amino acids and vitamin-C. The details of qualitative tests are as follow

Phenolic Compounds:

To 1mL of extract, add 4 drops of ethanol and 3 drops of 0.1% FeCl3. The appearance of red color indicated the presence of phenolic compounds.

Anthraquinone:

To 2mL of plant extract, 1mL of diluted 10% ammonia was added. The absence of pink red coloration in ammonical (lower) layer showed the absence of anthraquinone.

Flavonoids

The 1ml of extract was diluted with water to 5 ml. Then, 2ml of 10% NaOH was added to develop yellow color. The change from yellow color to colorless solution by the addition of diluted HCL indicated the presence of flavonoids, but this test is negative for ethanol extract.

Alkaloids

The 1ml of extract was diluted with 1% HCL up to 5ml. To the 1ml of the diluted extract, few drops of Dragendorff's reagent were added. The orange red precipitates indicated the presence of alkaloids.

Terpenoids

To 1ml of extract, 2ml of chloroform was added. Then, 2ml of H_2SO_4 was added. The reddish brown color at interface confirmed the presence of terpenoids in Extract.

Tannins

Few drops of 1% $FeCl_3$ were added to the 1ml of extract. The presence of brownish green precipitates indicated the presence of tannins.

Glycoside

To 1ml of extract, 2mL of glacial acetic acid and a drop of 5% FeCl3 were added. The development of brown ring indicated the presence of glycoside.

Steroids

To 1ml of extract, few drops of concentrated H_2SO_4 were added. The appearance of red color indicated the Presence of steroids.

Saponins

Crude extract was mixed with 5ml of distilled water in a test tube and it was shaken vigorously. The formation of stable foam was taken as an indication for the presence of saponins.

Carbohydrates

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, there was no reddish brown precipitate indicates a negative result for the presence of carbohydrate.

Proteins

Millon's test: Crude extract when mixed with 2ml of Millon's reagent, white precipitate appeared which turned red upon gentle heating that confirmed the presence of protein.

Free Amino Acids

Ninhydrin Test – Test solution when boiled with 0.2% solution of Ninhydrin, would result in the formation of purple color suggesting the presence of free amino acids.

Vitamin C

DNPH Test – Test solution was treated with Dinitrophenyl hydrazine dissolved in concentrated Sulphuric acid. The formation of yellow precipitate would suggest the presence of vitamin C.

Besides this other qualitative tests for Carboxylic acid, test for NH_2, Halogen test, test for Unsaturation, aromaticity was performed (Clarke, 2007; Sethi, 2003).

RESULTS AND DISCUSSIONS

The preliminary phytochemical screening tests may be useful in the detection of the bioactive principles and subsequently may lead to the drug discovery and development. Analysis of the plant extracts revealed the presence of different phytochemicals. Qualitative results of the floral extract of Moringa oleifera Lam. are mentioned in the Table –I. Several studies have described the antioxidant properties of medicinal plants which are rich in phenolic compounds (Brown et al, 1998; Krings et al, 2001), the plant extracts were also revealed to contain saponins which are known to produce inhibitory effect on inflammation (Just et al, 1998). Saponins has the property of precipitating and coagulating red blood cells. Flavonoids and tannins are phenolic compound and plant phenolic are a major group of compounds that act as primary antioxidants or free radical scavengers. Since these compounds were found to be present in the extracts, it might be responsible for the potent antioxidant capacity.

CONCLUSION

The flowers of plant Moringa *oleifera* Lam. possess broad spectrum of phytochemistry. Also, most of the parts of plant like seeds, leaves, flowers and roots are used for treatment of various diseases. In future the active constituents can be extracted, isolated and formulated into suitable dosage form and delivery system. Also, in future *in-vivo* studies based on animal models can be done for better results. The popular dissemination of this plant could constitute an alternative and have ample scope for different medicinal purposes.

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Table 1: Qualitative analysis and their results

Sr. No.	Tests	Hexane Extract	Ethanol Extract
1	Phenolic compounds	+	+
2	Anthraquinones	-	-
3	Flavonoids	+	-
4	Alkaloids	+	+
5	Terpenoids	-	+
6	Tannins	+	+
7	Glycosides	-	+
8	Steroids	+	+
9	Saponins	+	+
10	Carbohydrates	-	-
11	Proteins	+	+
12	Amino acids	+	+
13	Vitamin C	+	+
14	Carboxylic acid	+	+
15	Amide	+	+
16	Halogen	-	-
17	Test for unsaturation	+	+
18	Aromaticity	+	-
19	Ester test	+	+

Note: The sign "+" indicates "Detection" and the sign "-" indicates "No Detection" of compound in the extracts.

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PLATE I: *Moringa oleifera* Lam.

A- Habit of Plant

B- Leaves of Plants C- Flowers of Plant D- Fruits of PLant