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Investigation of *Moringa oliefera* leaf hydroalcoholic extract's pharmacognostic, phytochemical, and antioxidant effects

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ABSTRACT:

Background and Objectives: *Moringa oleifera*, which is in the Moringaceae family, is thought to be one of the most useful plants for medicine. *M. oleifera* has pods, flowers, leaves, and seeds that are all useful parts. The study's goal was to find out how many and what kind of bioactive chemicals were in *M. oleifera*.

Material and Methods: After being meticulously cleansed under running tap water, the plants that were selected for the study were rinsed with distilled water. The next step was to let them air dry for a bit at room temperature. After that, the plant parts were left to dry out in the shade for three to four weeks to make sure they didn't get contaminated. The powdered botanical material was tested for its color, taste, consistency, and smell.

Results: The high amounts of phytoconstituents may help us learn more about the plant's possible healing value in treating and preventing disease. Different chemical compounds in plants have different physiological effects on humans. This is how they get their healing qualities. It also backs up claims that the plant has been used historically as a medicine and has healing benefits as a treatment method.

Conclusion: Therefore, we are in favor of conducting additional research to isolate and study the bioactive components found in *M. oleifera's* stem, leaves, flowers, and seeds so that they can be developed into efficient chemotherapeutic medicines.

Keywords: *Moringa oleifera*, pharmacognostic, phytochemical, and antioxidant.

INTRODUCTION:

Plant-based chemicals like phenols, flavonoids, terpenes, and alkaloids have been getting a lot of attention lately because they have a wide range of medical uses. A very important part of any study of a medical

plant is figuring out what kind of phytochemicals are in the plant. To correctly identify the parts of a plant, chromatographic methods can be used [1-3]. Three Quantification usually uses spectroscopic and gravimetric methods, but there are now more advanced methods available. Four types of reactive oxygen species (ROS) have been linked to heart disease, cancer, and other health problems that come with getting older. These include hydrogen peroxide, superoxide anion, and hydroxyl radical. Five antioxidants that get rid of free radicals are helpful in these cases because they keep cell proteins, lipids, and carbohydrates from getting damaged [2-4].

The plant *Moringa oleifera (M. oleifera),* which is in the Moringaceae family, is one of the most hopeful species for medicine. The flowers, pods, leaves, and seeds of *M. oleifera* are all good for you. *M. oleifera* has been shown to help with a number of health problems in humans, including cholesterol, high blood pressure, asthma, diabetes, infections, rheumatoid arthritis, cancer, and wound healing [3-5]. A number of investigations, both in living organisms and in laboratory settings, have demonstrated that *M. oleifera* can inhibit the development of scar tissue, decrease inflammation, protect cells from harm, and kill bacteria. Flavonoids, kaempferol, quercetin, vanillin, and glucosinolates were found to be the most common substances in *M. oleifera* plant sections that were tested for antinutritional metabolites. Because they are so good at getting rid of free radicals, flavonoids lower the risk of getting sick [4-6].

Names such as horseradish, marvel, drumstick, ben oil, and horseradish tree are all applied to this species. Nutrient density is extremely high in the food plant *Moringa oleifera*. It is rich in essential amino acids, proteins, minerals, vitamins, and polyphenols. Alkaloids, flavonoids, anthocyanins, isothiocyanates, anthraquinone, tannic acid, saponins, steroids, terpenoids, and cardiac glycosides are among the many phytochemicals found in it [5-7].

People use it for its psychoactive effects and to help people who are severely malnourished. *M. oleifera* is used to help nursing women breastfeed longer after giving birth. People with headaches put the leaves and buds of *M. oleifera* on their temples to feel better. As an antiscorbutic, roots and root leaves were used. People with eye problems used the juice from the leaves mixed with honey to treat them. People used the dried seeds of *M. oleifera* as a tonic, an anti-inflammatory, a laxative, and in eye drops [7-9]. The goal of this study was to find out how many and what kind of bioactive chemicals are in *M. oleifera.*

Materials and Methods:

All of the plants used in the research were thoroughly washed in distilled water and then rinsed under running tap water. The next step was to let it air dry for a little. Then, to ensure it wasn't contaminated, the plant waste was allowed to dry in the shade for three to four weeks. An electric grinder was used to break up the dried plant matter into small pieces. The powdered botanical material was tested for its color, taste, consistency, and smell. For biological and phytochemical studies, dried plant matter was kept in a container that wouldn't let air in.

Plant material Defatting:

The leaves of *M. oleifera* were air-dried in a shaded area until they became a powder. The plant material was shade-dried, then ground into a coarse powder. Then, the Soxhlet equipment was used to extract it using petroleum ether. The separation method kept going until the material had lost enough fat [9-11].

Extraction:

A hydroalcoholic mixture was used to fully extract 300 grams of dried plant material at temperatures between 60°C and 70°C for 24 hours. This is called the Soxhlet extraction method. The extract vanished when it reached its boiling point. We measured the dry crude concentrated extract to find the extractive yield. Following that, it was refrigerated in glass jars until analysis [11-13].

Macroscopical Analysis:

We learned that the leaves have the correct size, color, scent, and appearance through the macroscopic examination, which details the parts of the leaves that are visible to the naked eye [12-14].

Physicochemical Analysis:

Loss on drying:

Ten grams of the powdered medicine were carefully put into a Petri dish that had already been weighed. Prior to its subsequent weighing, it underwent drying in a hot air oven set at 105°C for one hour. The original and final weights made it easier to figure out the drying loss [13-15].

Total ash, Water soluble, Acid insoluble ash value:

Five grams of powdered medicine were burned in a muffle furnace on a silicon dish at 450°C until there was no more carbon in the mixture. After it had cooled down, it was weighed. It was found out how much ash was in the drug's weight. Five minutes of 25°C hydrochloric acid treatment were given to one gram of ash. The next step was to place the crucible in a water bath and cover it with a watch glass to allow it to cool. The watch glass was cleaned with five milliliters of hydrochloric acid before being placed in the crucible. Prior to filtering, the material was passed through weighted filter paper [14–16]. The next step was to dry and quantify the filtrate. After subtracting the weight of the filter paper, the acid-insoluble ash value was estimated by estimating the amount that remained. To heat 1g of ash with 25ml of pure water for 5 minutes, place the crucible in a water bath and cover it with a watch glass. The next step was to allow the mixture to cool. The watch glass was rinsed with five milliliters of pure water prior to being placed in the crucible. The water-soluble ash value was calculated by subtracting the residual content percentage from the original ash percentage of 100% [15-17].

Phytochemical screening:

Phytoconstituents such as proteins, amino acids, alkaloids, carbohydrates, glycosides, phytosterols, saponins, tannins, and flavonoids were qualitatively examined in the *M. oleifera* extract [16–20].

Total phenol determination:

The total phenolic content was measured using the method established by Olufunmiso et al. 24. The Folin-Ciocalteu solution was first diluted in distilled water to a 1:10 v/v ratio, and then two milliliters of each standard or extract were combined with one milliliter of sodium carbonate. The liquid was vortexed for 15 seconds before being allowed to settle for 10 minutes in order to achieve the desired color. To determine the intensity at 765 nm, a UV/visible spectrophotometer was employed. In order to determine the total phenol content, the gallic acid standard curve was utilized. Milligrams per 100 milligrams of gallic acid is the unit of display for the results [21-25].

Total flavonoids determination:

The reaction mixture was measured at 420 nm using a UV/visible spectrophotometer after 1 ml of a 2% AlCl3 solution was mixed with 3 ml of the extract or standard. The mixture was then allowed to settle at room temperature for 15 minutes. We found the flavonoid concentration as quercetin equivalent by using the quercetin standard curve [26-29].

Antioxidant activity:

The DPPH scavenging action was tested using an alternative approach. Twenty-four To determine the DPPH scavenging activity, a spectrophotometer was employed. To obtain a starting absorbance, 1.5 ml of the stock solution was combined with 1.5 ml of methanol. Various concentrations of the sample extract reduced absorption after 15 minutes. Immediately after adding 1.5 ml of DPPH solution to 3 ml of total volume with methanol, the absorbance measurement for the control was recorded at 517 nm [30-34]. The test sample and DPPH were applied to 1.5 ml of each volumetric flask at varying concentrations. The remaining volume was reduced to 3 ml by adding methanol. There were three samples taken for testing, and each one was handled in the same manner. At last, the average was determined. The amount of each

concentration was determined by calculating the absorption at time zero. After fifteen minutes, a final decrease in DPPH absorbance at 517 nm was seen for the substance at various concentrations. The proportion of free radical DPPH inhibition was determined using the following method: The level of inhibition is equivalent to. Scavenging a certain amount of DPPH radicals served as a measure of activity. It was with this that the 50% inhibitory concentration was determined. A decrease in IC50 values is associated with an increase in antioxidant activity [35–39].

Results and Discussions:

Macroscopical evaluation:

To determine the true extraction yield, the solvents were completely evaporated and the residual crude extracts were concentrated in a water bath. A yield of 6.4% w/w was achieved by the hydroalcoholic extract of *M. oleifera*. See Table 1 for a breakdown of the various leaf sizes and shapes found in *M. oleifera*.

Table 1: *M. oleifera* leaf morphology

Sr. No.	Plant	Texture	Smell	Color
1.	*M. oleifera*	Smooth	Characteristic	Green

Physicochemical Analysis:

The 20–70 cm long, glossy, dark green leaves of these plants are quite striking. They smell and taste quite different. Several physical and chemical parameters were investigated by drying and grinding *M. oleifera* leaves in the shade. These characteristics included the following: total ash value, foaming index, alcohol-soluble extractives, water-soluble extractives, and loss on drying (Table 2).

Table 2: Physiochemical analysis of *M. oleifera* leaf powder

Sr. No.	Test Name	Results (% w/w)
1	LOD	3.9
2	Total Ash	5.8
3	Acid insoluble	1.8
4	Water soluble	3.12

Phytochemical screening:

The findings of a qualitative phytochemical examination of still-green *M. oleifera* leaves are displayed in Table 3. A wide variety of compounds, including glycosides, tannins, amino acids, carbohydrates, and flavonoids, were detected in hydroalcoholic solutions.

Table 3: Phytochemical Analysis

Sr. No.	Compounds	Test Name	+/-
1	Flavonoids	Shinoda	-
		Heat	-
2	Alkaloids	Dragendorff's	+
		Mayer's	+
		Hager's	+
3	Glycosides	Bontrager	+
4	Protein	Biuret	+
		Millon's	+
5	Tannins	Ferric chloride	+
6	Tannins	Ferric chloride	+
7	Carbohydrates	Molisch	+

Phenol and flavonoids content:

Equating the calibration curve with y = 0.035x + 0.009, we obtained the total flavonoid concentration, which is expressed as quercetin equivalent, and the correlation coefficient (R^2) was 0.999. Here, Y represents absorbance and X is the quercetin equivalent. Table 4 shows that the hydroalcoholic leaves of *M. oleifera* had a total phenolic content of 1.107 and a flavonoid content of 0.913.

Table 4: Chemical composition of phenols and flavonoids

Sr. No.	Extract	Flavonoids	Phenol
1	*M. oleifera* Extract	1.107	0.913

Antioxidant activity:

The DPPH radical scavenging experiment was used to test how well the extracts could donate hydrogen. The *M. oleifera* hydroalcoholic extract had an IC50 value of 80.21 g/ml for its ability to remove DPPH radicals, while ascorbic acid had an IC50 value of 18.30 g/ml. Table 5 shows an effect that changes with amount in relation to concentration.

Table 5: % DPPH ascorbic acid and extract inhibition

Sr. No.	Conc. (µg/ml)	Inhibition (%)	
		Hydroalcoholic Extract	**Ascorbic acid**
1	10	45.13	21.13
2	20	49.55	27.34
3	40	66.62	38.36
4	60	70.34	43.55
5	80	78.66	51.66
6	100	85.27	58.14
	IC50	18.30	80.21

CONCLUSION:

There are a lot of secondary metabolites, like flavonoids, alkaloids, and phenolics, in the leaves of the plant being studied, which suggests that it could be used to make useful medicines. The high amounts of phytoconstituents may help us learn more about the plant's possible healing value in treating and preventing disease. The therapeutic benefits of plants come from the chemicals they contain, which have specific effects on the body. It also backs up claims that the plant has been used historically as a medicine and has healing benefits as a treatment method.

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Conflict of Interest:

None

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