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# Phytochemical analysis of *Moringa oleifera* leaves collected from the adjoining areas of Durg district of Chhattisgarh, India

**Neetu Sonkar, Nishma Singh, AK Santra, Sharad Mishra, Manju Roy, Rupal Pathak, Anupam Soni, Lok Prakash Verma and Manisha Verma**

## Abstract
*Moringa oleifera* is a rich source of essential nutrients protein, minerals, vitamins and essential amino acids containing comparatively low amount of antinutritional factors. It is also accomplished by bioactive compounds including phenolic and flavonoid compounds. Qualitative phytochemical analysis of *Moringa oleifera* leaves was conducted on the biochemistry laboratory of College of Veterinary Science & A.H., Anjora, Durg (C.G). Various extract of *M. oleifera* leaves powders were prepared in different solvent media viz. aqueous, aqueous methanol, acetone and chloroform extract and analysis were done by various methods. Phytochemical analysis revealed the present of different phytochemicals such as alkaloids, tannins, saponins, flavonoids and glycosides in *M. oleifera* leaves extracts. Presence of different phytochemicals provide an evidence that *M. oleifera* leaves may be used as traditional medicine of various diseases however, extensive researches in this areas are needed to prove their medicinal and health promoting properties.

**Keywords:** Phytochemicals, extract, flavonoids, medicinal property

## Introduction
*Moringa oleifera* is used as a rich source of human and livestock feed because of its latent nutritional, antioxidant and phytochemical properties, in many tropical and sub-tropical areas. *Moringa oleifera* is able to sustain in diverse climatic conditions and can survive in less fertile soils and slightly affected by drought. The plant is known to be a fast growing multi-functional plant with different uses in agriculture, medicine, livestock, human and other biological systems [14]. With regards to its nutritional composition, *M. oleifera* leaves have been reported to contain higher amount of vitamins C than orange, higher vitamin A than carrots, more amount of calcium than milk, higher potassium than banana and higher iron than spinach [7]. Apart from its nutritional value, *Moringa oleifera* tree is well known for its medicinal properties such as anticancer, anti-inflammatory, anti-diabetic, anti-microbial and antioxidant are reported by same author. In addition, *M. oleifera* leaf has been reported to contain about16–19 amino acids, of which 10 are classified as essential amino acids viz. threonine, tyrosine, methionine, valine, phenylalanine, isoleucine, leucine, histidine, lysine and tryptophan. Research findings reported that *Moringa oleifera* had higher antioxidant than well known fruits and vegetables. For example strawberries, carrots, soybean and hot pepper [1]. Moreover, the total phenolics content of *Moringa oleifera* leaves was about twice of the vegetables viz. broccoli, spinach, and cauliflower and total flavonoids were three times of the same vegetables mentioned above [16]. The phytochemical compounds of moringa have several biological actions including antidiabetic, hypocholesterolemic and hypertensive. It also regulates thyroid hormone, central nervous system and digestive system. Finally, it can conclude that *Moringa oleifera* is rich in phytochemicals and have significant medicinal properties. Due to all these advantages, it is popularly known as “Miracle Tree”. Many researchers investigated the presence of different phytochemicals in different types of *Moringa oleifera* leaves extracts [15, 3] promoting its beneficial uses in human as well as veterinary medicine.

## Materials and Methods
For the purpose of experiment, the leaves were harvested from *Moringa oleifera* trees from the adjoining areas of Durg (C.G.). The harvested leaves were washed in water properly and allowed to dry under shed for 4-5 days. After drying *M. oleifera* leave powder was prepared by grinding in mixer grinder.

**Preparation of extracts:** Aqueous extract: Aqueous extract was prepared by adding 3g of *Moringa oleifera* leaves powder in 30 ml of Distilled water.
Aqueous methanol extract: Aqueous methanol extract was prepared by adding 3g of *Moringa oleifera* leaves powder in 15ml of distilled water and 15 ml of methanol.
Acetone extract: Acetone extract was prepared by adding 3g of *Moringa oleifera* leaves powder in 30 ml of Acetone.
Chloroform extract: Chloroform extract was prepared by adding 3g of moringa powder in 30 ml of Chloroform.
Each extract was incubated for overnight and filtered by using Whatman No 1 filter paper into conical flasks. The filtrates were concentrated by placing the flasks into water bath at 100 ˚C. The resulting filtrate were cooled to room temperature, qualitative test were then performed in the cool filtered extracts (solution). Phytochemicals were analysed by using different methods.
Extracts were tested for the presence of alkaloids as per method given by Evans, 1997 [4] and Wagner, 1993 [18]. Tests for the presence of tannins, saponins, flavonoid and glycosides were done by following standard methods as per method described by Harborne, 1998 [8] and Kokate, 2005 [10].

**1. Test for Alkaloids**
**1.1 Mayer's Test:** 2ml of each extract was mixed with 2-3 drops of Mayer's reagent (1.36g mercuric iodide in 60 ml of water mix properly with 5g of potassium iodide in 20 ml of water). A white or a creamy precipitate confirmed the test as positive.

**1.2 Wagner's Test:** 2ml of each extract was mixed with 0.2ml of diluted HCl solution. Then 1ml of Wagner's reagent was added (1.27 g of iodine and 2g potassium iodide along with 100 ml distilled water). There was reddish brown precipitate that indicated the positive test.

**2. Test for Tannins**
Ferric chloride Test: 2ml of each extract mixed with few drops of 5% ferric chloride solution. Formation of blue color indicated the presence of tannins.

**3. Test for Saponins**
Foam Test: 5ml of each extract shaken vigorously with 5ml of distilled water in a test tube and warmed. Formation of stable foam indicated the test as positive.

**4. Test for Flavonoids**
Lead acetate test: 1ml of each extract mixed with 1ml of 10% lead acetate solution. Formation of yellow precipitate indicated the test as positive.

**5. Test for Glycosides**
Keller -Killiani test: 2ml of each extract was dissolved in glacial acetic acid and 5% ferric chloride solution were added. The contents were heated and cooled then transferred to a test tube containing 2ml concentrated sulphuric acid. Pale green colour appear in the upper layer indicated the presence of glycoside.

**Results and Discussion**
Findings indicated the presence of different phytochemical constituent in *Moringa oleifera* leaves extracts such as Alkaloids, Tannins, Saponins, Flavonoids and Glycosides. Aqueous and aqueous methanol extract contained alkaloids, tannins, saponins, flavonoids and glycosides whereas chloroform extract contained saponins and glycosides. However, acetone extract didn't contained any type of phytochemical compounds (Table1).

**Table 1:** Qualitative phytochemical analysis of dried *Moringa oleifera* leaves

| Particulars | Name of test | Aqueous Extract | Aqueous methanol Extract | Acetone Extract | Chloroform Extract |
|---|---|---|---|---|---|
| Akaloids | Mayer's Test | + + | + | - | - |
| | Wagner's Test | + + | + | - | - |
| Tannins | Ferric chloride test | + + | + | - | - |
| Saponins | Foam test | + | + | - | + + |
| Flavonoids | Lead acetate test | + + | + | - | - |
| Glycosides | Keller -killiani test | - | - | - | + + |

++, + Presence – Absence

Flavonoids act as an antioxidant and enhances the effect of Vitamin C. They are also known for their biological activity against liver toxins, carcinogens, viruses and other microbes (patel pate). According to many researches flavonoids basically acts on bacteria by inhibiting its protein synthesis and also posses anti-microbial [6], anti-allergic and anti-inflammatory properties [19]. Moreover, they are active in reducing high blood pressure [2]. Flavonoid is suggested as health promoting phytochemical for animal production because they are known for improving gut health and activity, mucosal and cellular immunity and amelioration of heat stress in farm animals. Furthermore, flavonoids may create the synergisms with each other and other organic and synthetic growth promoters. Therefore, these flavonoidal compounds, both in purified and phytoextracts–form might be the potential elements to improve the Farm animal production [9].
Tannins also appears to be a good potential anti-viral, anti-bacterial and anti-parasitic agents [11]. Tannins are used for cure of intestinal disorder, such as diarrhoea and dysentery in animals. In forages presence of tannins in moderate level (4%) may have favourable responses in ruminants, ensuring higher growth rates and milk yield, however, if levels of tannins exceeds 6% of the diet in ruminants results in negative effect on growth rate and milk production [12].
Saponins are used as an adjuvant in the production of vaccines. Due to presence of saponins in *M. oleifera* leaves form froth and act as soap. Saponins are used medically for the treatment of increased blood cholesterol and are beneficial for the patient suffering with arteriosclerosis and hypertension [15]. Saponins found in *M. oleifera* have antioxidant, anti-inflammatory, antiapoptosis and immunostimulant properties [6].
*M. oleifera* leaves have alkaloids which are nitrogen-containing naturally occurring compound reported to have antimicrobial properties due to their ability to intercalate with DNA of the microorganisms. They have pharmacological effect and may be used in the treatment of many diseases such as malaria, cold, cough, hypertension, diabetes and cancer [15].
*M. oleifera*, due to presence of thiocarbamite glycosides contributes its use in hypertension [5]. On the other hand, they

are able to inhibit carbohydrate-mediated tumor growth [13], induced apoptosis in human breast cancer cells.

Similar results was also reported by earlier authors Belay and Sisay (2014) [3] and Ojiako (2014) [15]. They reported presence of different phytochemicals in different types of *Moringa oleifera* leaves extracts.

## Conclusion

Presence of phytochemicals indicates possible preventive and curative properties of *M. oleifera* leaves. However, there is need to carried out more qualitative as well as quantitative pharmacological analysis of *M. oleifera* leaves to prove the use of *M. oleifera* as a medicinal plant.

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