



RESEARCH ARTICLE

MICROWAVE ASSISTED EXTRACTION OF *MORINGA OLEIFERA* LEAVES AND THEIR
PHYTOCHEMICAL ANALYSIS

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ABSTRACT

Plants have been used for a long time for their bioactive constituents which have medicinal properties. Phytochemicals like flavanoids, phenolic constituents, alkaloids, tannins etc are considered to be responsible for increasing the immunity of any individual. Moringa oleifera is one of the richest source of phytochemicals and is abundantly used in south India. This study is based on microwave assisted extraction method using two different solvents, methanol and chloroform. Dried leaves of Moringa oleifera were suspended in methanol and chloroform and exposed to microwave radiation (800W). The extract was filtered and dried using rotavapour. The crude extract was subjected to phytochemical analysis. Microwave assisted extraction of leaves in methanol showed the presence of proteins, flavanoids and glycosides in more quantity as compared to Chloroform extract. More phytochemicals in methanol can be attributed to its polar nature which disrupts the bonding and helps in dissolution of the phytochemicals.

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INTRODUCTION

In recent years, there has been increasing awareness among people for the use of plant parts as alternative medicine as they are inexpensive and have no side effects. Plants are a big source of bioactive chemicals like alkaloids, tannins, flavanoids and phenolic compounds which can be developed as drugs for different diseases (Doss, 2009). Phytochemicals are found to have specific action against some microorganisms (Cowan, 1999). They also possess antioxidant properties which protects human cells from damage. Moringa oleifera, popularly known as drumstick, is grown in Indian subcontinent and is popular for its medicinal properties. Drumstick leaves are highly nutritious, being a significant source of beta carotene, Vitamin C, protein, iron, phenolic and flavanoid content. It is beneficial in asthma, bronchitis, arthritis, diabetes, and low blood pressure. It is very effective against digestive disorders such as anorexia and flatulence. The drumstick saag also increases lactation (Jed, W. Fahey, 2005). Due to their notable pharmacological effects, the leaves of drumstick have been chosen for extraction with two different solvents and for studying their phytochemical properties.

Extraction is the separation of medicinally active parts of plant using selective solvents. Various methods of extraction have been used for a long time, soxhlet extraction being the most common one. The use of MAE for natural products extraction started in the late 1980s, and has now become one of the popular and cost-effective extraction methods available today. MAE has a number of advantages, e.g. shorter extraction time, less solvent, higher extraction rate and lower cost, over traditional method of extraction of compounds from various techniques, especially natural products. In this study, technique of microwave assisted extraction is used to evaluate and compare the effect of two different solvents. Both the solvents were found to contain carbohydrates, flavonoids and phenolic compounds. The significance of microwave assisted extraction and effect of two different solvents is discussed with respect to the quantity of phytochemicals .

MATERIALS AND METHODS

Leaves of Moringa oleifera were collected from a tree in city of Bhopal. Leaves dried in sunlight were ground into a fine powder in a mixer. The powdered leaves of Moringa (4 g) was extracted in 100 ml conical flask with 25 ml of Methanol solution using a domestic microwave (LG Intellowave, 800W Microwave).

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Table 1. Total flavanoids and total phenolic contents of moringa *Oligera* in Chloroform and methand

Solvent	Total Flavanoid content in $\mu\text{gm/ml}/0.5\text{ml}$ quercetin equivalent	Total Phenolic content in $\mu\text{gm/ml}/0.5\text{ml}$ gallic acid equivalent
Chloroform	4.185	12.931
Methanol	9.404	16.167

Table 2. Qualitative analysis of Phytochemicals in *Moringa Oleifera*

Solvent	Carbohydrate	Protein	Flavanoids	Alkaloids	Glycosides	Saponin
Chloroform	Positive	Negative	Negative	Negative	Negative	Negative
Methanol	Positive	Positive	Positive	Negative	Positive	positive

The microwave power was set to 600 W for 3 min the extracts were separated from the plant material by filtration using Whatmann No.1 filter paper. Then each extract was concentrated under pressure at 30–45 °C on rotary evaporator

Phenolic Content

The total phenolic content of extracts was determined by using the Folin-Ciocalteu reagent (1:10 in deionised water). Solvent extract (0.5 ml), 2 ml of Folin-Ciocalteu reagent and 4 ml of sodium carbonate were incubated at room temperature for 30 min. After 30 min., the absorbance of the sample was measured at 765nm using methanol as blank. Gallic acid was used as the standard for preparing the calibration curve (Nurul Huda Md. Masum, 2012).

Flavonoids

Total flavonoid contents were determined using the method of Ordon *et al.* (2006). To 0.5 ml of sample solution, 0.15ml of 5% NaNO_2 solution was added. A volume of 0.15 ml of 10% AlCl_3 solution was and allowed to stand for 6 min, followed by addition of 2ml of 4% NaOH solution. After 15 min at room temperature, the absorbance was measured at 510 nm. Total flavonoid content were calculated as quercetin equivalent ($\mu\text{g/ml}$).

DISCUSSION

The data in Table 1 and 2 show the presence of various bioactive compounds in two different solvents. *Moringa oleifera* Lam is a plant of high value found in southern parts of India. It has a wide range of medicinal uses and is a good source of protein, vitamins, beta-carotene, amino acids and various phenolics which have high nutritional value (Anwar, 2007). Ethanol extracts of seed and leaves of this plant have shown anti-fungal activities in vitro against some dermatophytes (Chuang, 2002). Antioxidants are known for their scavenging action against free radicals. *Moringa Oleifera* is a natural and rich source of antioxidants which protect the body against oxidative damage (Sreelatha, 2009). Flavanoids are most important group of natural compounds which possess a broad spectrum of chemical and biological activities. Flavanoid and phenolic compounds contribute directly to antioxidant potential (Prakash, 2007b) therefore, it would be valuable to determine the total phenolics content (TPC) and total flavonoids content (TFC) of extracts in chloroform and methanol. Mixtures of chloroform and methanol have already been used to extract natural products from leaves (Stavros Lalas, 2002). Methanol fraction of *M. oleifera* showed to

contain higher total phenol with the value of 16.167 expressed as $\mu\text{g}/\text{ml}/0.5\text{ml}$ Gallic acid equivalents of plant extract. In case of total flavonoids, the methanol fraction contain higher amount 9.404 expressed as $\mu\text{g/ml}/0.5\text{ml}$ of Quercetin equivalents of plant extract. High quantity of phenolic and flavanoids was observed in methanol than chloroform may be due to its polar nature which helps in dissolution of these components in more quantity.

Conclusion

The extraction of phenols and flavanoids was achieved using two solvents of different polarity. Higher concentration of plant extract was observed in polar solvent. Microwave assisted extractions reduces extensive use of solvents and can be achieved in less time. The natural products can be used as alternative therapy for certain disorders. However, more detailed research of this plant is needed to isolate and identify the extracts of medical value.

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