



QUALITATIVE PHYTOCHEMICAL SCREENING AND PERCENTAGE YIELD OF *MORINGA OLEIFERA* LEAVES EXTRACT IN SOLVENTS OF DIFFERENT POLARITY.

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KeyWords

Alkaloids, Ethanol, Flavonoids, *Moringa oleifera*, Polyphenol, Saponins, Tannins

ABSTRACT

Plants have been known to be used in the treatment and management of diseases, and this is due to the presence of phytochemicals. Thus, the screening of plants qualitatively, has got the interest of researchers. *Moringa Oleifera* is a fast growing deciduous tree with its different plant parts commonly used in herbal medicine, also with good socio-economic and industrial values. In this study qualitative photochemical screening was carried on *Moringa oleifera* leaves extract to test for alkaloids, polyphenols, flavonoids, tannins and saponins. The results show the presence of all the tested compounds in the crude extract and the aqueous methanol fraction with the exception of tannins which was absent. In chloroform fraction, alkaloids, polyphenols, tannins and saponins were all present while flavonoids were found to be absent. Polyphenols, flavonoids and tannins were found to be present in the Ethylacetate fraction with exception of alkaloids and saponins which showed negative test. Finally from the result, only polyphenols showed negative test against the n-hexane fraction but all others were found to be present.

INTRODUCTION

Moringa oleifera plant belongs to the Moringaceae family (order Brassicales). The Moringaceae family has a total of 13 species and *Moringa oleifera* is the most widely employed and cultivated species [7]. While *Moringa oleifera* is native to the northeastern regions of India, its ability to thrive in a wide variety of environmental conditions has led to its widespread cultivation across the tropical and subtropical parts of the world [7]. The plant can grow up to 2 meters in its first year and reaches maturity at 12 meters, producing long, drumstick-shaped pods from the start [11]. Natively in Nigeria, the plant is commonly known as Zogale in Hausa, Aweigbale, Igi-igbale or Igi-iyanu (Miracle tree) in Yoruba, and Okwe oyibo or Odudu oyibo in Igbo. It is also called the horseradish tree because of the root's taste and the drumstick tree because of the shape of its fruits pods. The plant earns its title as the "miracle tree" due to its significant

positive influence on livelihoods. Research indicates that each part of the plant, including seeds, flowers, stems, leaves, and roots, is rich in nutrients and contains essential medicinal properties. This has led to its use in treating various ailments, showcasing its versatility and health benefits [4]. For centuries and across diverse cultures globally, Moringa has been utilized medicinally to address a wide array of health issues including skin infections, anemia, anxiety, asthma, blood impurities, blackheads, catarrh, cholera, chest congestion, cholera, bronchitis and numerous other ailments [6]. *Moringa oleifera* also consists of anti-inflammatory, antitumour, anti-oxidant, antipyretic, anti-ulcer, anti-epileptic, anti-spasmodic, anti-hypertensive, diuretic, renal, anti-diabetic, cholesterol lowering, and hepatoprotective activities [5]. The *Moringa oleifera* plant serves various purposes, such as being utilized as a domestic cleaning agent (from crushed leaves), a source of blue dye (from wood), for fencing (using living trees), as fertilizer (from seed-cake), green manure (from leaves), gum (from tree trunks), as a clarifier for honey and sugar cane juice (powdered seeds), honey (flower nectar), medicine (all plant parts), ornamental plantings, bio-pesticide (soil incorporation of leaves to prevent seedling damping off), pulp (wood), rope (bark), tannin for tanning hides (bark and gum), water purification (powdered seeds) [3]. The plant's scientific classification reveals its origin within the Kingdom – Plantae, Sub kingdom – Tracheobionta, Super Division – Spermatophyta, Division – Magnoliophyta, Class – Magnoliopsida, Subclass – Dilleniidae, Order – Capparales, Family – Moringaceae, Genus – Moringa and Species – oleifera. The Moringa tree is renowned for its exceptional nutritional profile, which can be attributed to the diverse array of essential phytochemicals present across its various plant parts. These phytochemicals, also referred to as secondary metabolites, are naturally produced by the plant and exhibit a wide range of pharmacological properties such as antibacterial, antifungal, anti-inflammatory, antioxidative, immunomodulatory, antinociceptive and activities among others. In fact, moringa is generally said to provide 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach [10]. In this study qualitative phytochemical screening and percentage yield of moringa oleifera leaves extract in solvents of different polarity was carried out.

MATERIALS AND METHODS

A. Sample Collection

Fresh leaves of *Moringa oleifera* were obtained from Green roof Estate Lanto Road, FCT Abuja Nigeria. The leaves were transferred to the laboratory where they were washed with distilled water and dried at room temperature. A mortar and pestle was used to grind the dried leaves into powder form.

B. Sample Preparation

A Soxhlet apparatus consisting of a chamber, an extractor and an extraction flask was used to extract 80g of the powdered leaves with 70% ethanol as solvent for the extraction. The extract was evaporated to dryness in a fume cupboard to obtain semi-solid extract. Solvents of different polarity such as methanol (polar solvent), n-hexane (non-polar), chloroform and ethylacetate (medium polar) was used to partition the crude ethanol extract by the use of a separatory funnel. At first the hexane fraction was carefully separated, subsequently, the crude ethanol fraction thereof was partitioned with chloroform followed by ethylacetate and then finally the aqueous methanol fraction left behind the crude ethanol (residual aqueous fraction). The portions were subsequently referred to as n-hexane fraction, chloroform fraction, ethylacetate fraction, aqueous methanol fraction and residual aqueous fraction respectively.

C. Determination of Extraction Yield

The extraction yield (%) was calculated as follows:

Extraction yield (%) = $\frac{\text{weight of extract after evaporating solvent}}{\text{Dry weight of the sample}}$

Dry weight of the sample

D. Qualitative Phytochemical Screening of Different Fractions of Powdered Dry Leaves of *Moringa oleifera* Extracts.

- 1). *Flavonoids (Shinoda test)*: A small amount of magnesium turnings and 5 drops of concentrated hydrochloric acid were slowly added drop by drop to 1 mL of the extract solution. After a few minutes, a pink, scarlet, crimson red or occasionally green to blue color appeared, confirming the presence of flavonoids. UV-Vis spectroscopy is the most important and simplest technique to confirm the formation of nanoparticles. The formation of the reduced iron nanoparticles in the colloidal solution was monitored using a UV-vis spectrophotometer (Lambda 25, PerkinElmer, precisely, UK). The absorption spectra of the supernatants were taken between 200 and 700 nm, using a UV-vis spectrophotometer.

- 2). *Alkaloids (Dragendorff's test)*: To 2 mL of the extract, 1 mL of Dragendorff's reagent was added slowly along the side of a test tube. The Formation of an orange or orange-reddish brown precipitate indicated the presence of alkaloids.
- 3). *Tannins (Ferric chloride test)*: The detection of the compound was based on the formation of a blue colour upon the addition of a few drops of a 5% ferric chloride solution to 2 mL of the extract solution.
- 4). *Saponins (Foam test)*: 5 mL of the extract was taken in a test tube and shaken vigorously for five minutes. The formation of a stable foam indicates the presence of saponins
- 5). *Polyphenols (Puncal-D test)*: In attest tube, 2 mL of the extract solution was combined with 1 mL of puncal-D reagent. The presence of polyphenols was confirmed by the appearance of a fluorescent blue colour.

RESULT AND DISCUSSION

TABLE I

WEIGHT AND % YIELD OF ORGANIC EXTRACT OBTAINED FROMTHE 80g POWDERED LEAVES OF *Moringa oleifera*

Solvent	Weight of Extract (g)	Percentage Yield (%)
70% Ethanol (Crude extract)	20.24	25.298
Aqueous methanol fraction	6.48	8.100
Chloroform fraction	2.50	3.125
Ethyl acetate fraction	1.20	1.500
n-hexane fraction	2.80	3.500
Residual aqueous fraction	5.40	6.750

TABLE II.

PHYTOCHEMICAL ANALYSIS OF DIFFERENT FRACTIONS OF *Moringa oleifera* CRUDE EXTRACT

Solvents/ Compounds	Alkaloids (Dra-gendroff's test)	Polyphe-nols (Puncal-D test)	Flavo-noids (Shinoda test)	Tannins (Ferric chloride test)	Saponins (Foam test)
70% Ethanol (Crude extract)	+	+	+	-	+
Aqueous methanol fraction	+	+	+	-	+
Chloroform fraction	+	+	-	+	+
Ethylacetate frac-tion	-	+	+	+	-
n-hexane fraction	+	-	+	+	+

E. Weight and % Yield of Organic Extract Obtained from the 80g Powdered Leaves of *Moringa oleifera*

Amount of the compounds extracted by aqueous ethanol (70%) was found to be appreciably high with about 20.24g obtained from 80g of the powdered leaves used. The crude extract was subjected to partitioning using solvents of different polarity values such as methanol, chloroform, ethyl acetate and n-hexane for polar, moderately polar, less polar and non-polar respectively.

The crude extract was found to contain 6.48g aqueous methanol fraction, 2.50g as chloroform fraction. Others are 1.20g was found to dissolve in ethyl acetate, 2.80g in n-hexane and finally the residual aqueous fraction was found to be 5.40g. This result revealed that the aqueous ethanolic extract contains more of polar compounds than non-polar. Earlier studies showed that dry leaves of *Moringa oleifera* extracts contain higher percentage of poly phenolic compounds which are polar compounds than the other non-polar compounds [9].

F. Phytochemical Analysis of Different Fractions of *Moringa oleifera* Crude Extract

Moringa plants contain various phytoconstituents such as alkaloids, saponins, tannins, steroids, phenolic acids, glucosinolates, flavonoids, and terpenes. The diversity of these phytochemicals in the plant species contributes to its numerous pharmacological uses. From the literature about 110 compounds were identified from various *Moringa* species. Some of these compounds showed positive results when tested for various biological activities. In addition to these 110 compounds, the genus contains more compounds as detected by GC-MS [1]. Regardless of the high phytochemical contents of this plant, the constituents of only specific species had been explored, namely *M. concanensis*, *M. peregrina*, *M. stenopetala*, and *M. oleifera*, and most of the studies focused on the leaves of the plants.

Also, in this research we focused on the leaves extract of *Moringa oleifera* and some selected phytochemicals were studied. The presence or absence of phytochemical compounds in the extracts of powdered dry leaves of *Moringa oleifera* were qualitatively studied by adopting the procedure indicated in table 2 above. The results showed the presence of all the tested compounds in the crude extract and the aqueous methanol fraction with the exception of tannins which was absent. In chloroform fraction, alkaloids, polyphenols, tannins and saponins were all present while flavonoids were found to be absent. Polyphenols, flavonoids and tannins were found to be present in the Ethylacetate fraction with exception of alkaloids and saponins which showed negative test. Finally, from the result, only polyphenols showed negative test against the n-hexane fraction but all others were found to be present. The result obtained is in good agreement with report by [8] which established the existence of these phytochemicals (alkaloids, polyphenols, flavonoids, tannins and saponins) within the leaves extract of *Moringa oleifera*.

CONCLUSIONS

The result from the Weight and percentage Yield of Organic Extract Obtained from the 80g Powdered Leaves of *Moringa oleifera*, revealed that the aqueous ethanolic extract contains more of polar compounds than non-polar. The results from the Phytochemical Analysis of Different Fractions of *Moringa oleifera* Crude Extract showed the presence of all the tested compounds in the crude extract and the aqueous methanol fraction with the exception of tannins which was absent. In chloroform fraction, alkaloids, polyphenols, tannins and saponins were all present while flavonoids were found to be absent. Polyphenols, flavonoids and tannins were found to be present in the Ethylacetate fraction with exception of alkaloids and saponins which showed negative test. Finally, from the result, only polyphenols showed negative test against the n-hexane fraction but all others were found to be present.

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