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Research Article

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Phytochemical screening and GC-MS analysis of active compounds in methanolic extract of *Morinda tinctoria Roxb* leaf

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Abstract

Background: plants are the rich sources of the traditional medicines in several countries and they are used several types of medicinal systems such as, unani, siddha and ayurveda. The medicinal plants are used as healing as well as curing of several human diseases because of presence of phytochemical constituents. **Methods:** the aim of the study was carried out for identification of bioactive compounds from the methanolic extract of *Morinda tinctoria* leaf by gas chromatography. **Results**: the phytochemical test of methanolic leaf extract of *Morinda tinctoria* shows the presence of alkaloids, steroids, flavonoids, saponins, phenols. The components present in the GC-MS are scopolamine, ecgonine, minaprine, orientin. **Conclusion:** the results revealed that the leaves were harmless and enriched with potent bioactive principles, which is further used for food and pharmacological applications.

Keywords: *Morinda tinctoria*, phytochemical, GC-MS analysis.

1. Introduction

Since humans have been so dependent on "mother nature," plants have served as the foundation for complex traditional medical systems that date back thousands of years. This has sparked intense interest in science and resulted in the isolation of numerous chemical agents with potential for use in a variety of therapeutic contexts. Plants can be used for both environmental and economic purposes, depending on their inherent qualities. Certain species constitute part of the human diet, while others provide therapeutic benefits and are excellent sources of vitamins and minerals.

Many countries rely heavily on plants as a source of traditional remedies, and various medical systems, including ayurveda, siddha, and unani,

use them. Because medicinal plants include phytochemical elements, they are utilized to both treat and prevent a variety of human illnesses. Components of phytochemistry found naturally in plants' leaves, roots, and plants [1]. Bioactive molecules are substances produced by plants that have toxicological and pharmacological properties. Secondary metabolites of plants are what are known as bioactive chemicals. It is necessary to use extraction, separation, and measuring techniques in order to find bioactive chemicals in plants. [2,3]. standardizing herbal remedies and their formulations may benefit from the application of contemporary techniques that describe the identification and measurement of active ingredients in plant material. The method to identify bioactive substances is GC-MS. [5,6].

Morinda tinctoria Roxb is a wild plant that grows throughout Southeast Asia and is a member of the rubiaceae family. It is native to tropical nations and is marketed under the name nunna. *M. tinctoria* is regarded as a traditional remedy. Leaves and roots are used as an astringent, analgesic, anti-inflammatory, and anti-diabetic in traditional medicine. It is also used as a deobstent and to ease gout discomfort. [4]. it has been observed that the ashes of m. Tinctoria leaves function as biosorbents to reduce ammonia contamination in waste waters. the main ingredients found in the nunna plant, which also include linoleic acid, morindone, alizarin, terpenoids, scopoletin, flavones, and rubiadin.

2. Materials and Methods

Carbohydrates Test:

Molisch'stest:

1 g *M. tinctoria* powder was extracted with 10 mL ethanol for 15 min in a boiling waterbath and filtered. Appearance of purple color in addition of napthol and concentrated H_2SO_4 tothe filtrate indicates the presence of carbohydrates.

Tests for sterols and triterpenoids

Salkowski reaction (Robinson,1964)

To the 2 mL of extract, 2 mL chloroform and 2 mL concentrated H2S04 were added andshake well. Presence of sterol(s) and triterpenoid(s) indicated if chloroform layer appeared red and acid layer showed greenish yellow fluorescence.

Saponins Test

Froth test (Fishcer, 1952)

0.1 g of powdered *M. tinctoria* was vigorously shaken with 5 mL of solvents for 30 seconds and was left undisturbed for 20min. Persistent froth indicated the presence of saponin(s).

Flavonoids Test

Hinoda test (Geissman, 1954)

1g of powdered *M.tinctori*a was extracted with 10 mL of solvents for 15 min in a boiling water bath and filtered. To the filtrate was added a small piece of magnesium ribbon and 3 to 4 drops of concentrated H_2SO_4. Red coloration formation indicated the presence of flavonoid(s).

Proteins Test

Millon's test

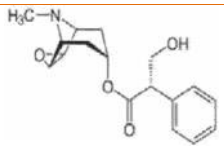
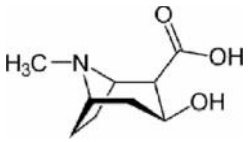
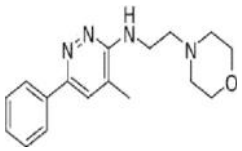
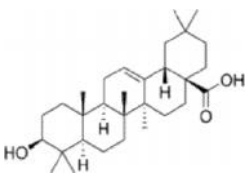
A small amount of each extract was separately dissolved in about 5 ml of distilled waterand filtered. To 2 ml of the filtrate, 5-6 drops of Million's reagent (solution of mercury nitrateand nitrous acid) were added and observed in the formation of red precipitates as an indication of the presence of proteins.

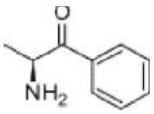
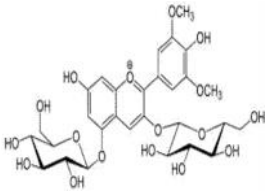
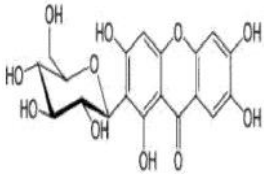
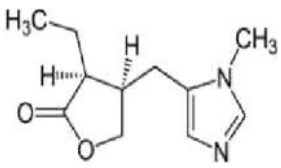
3. Results

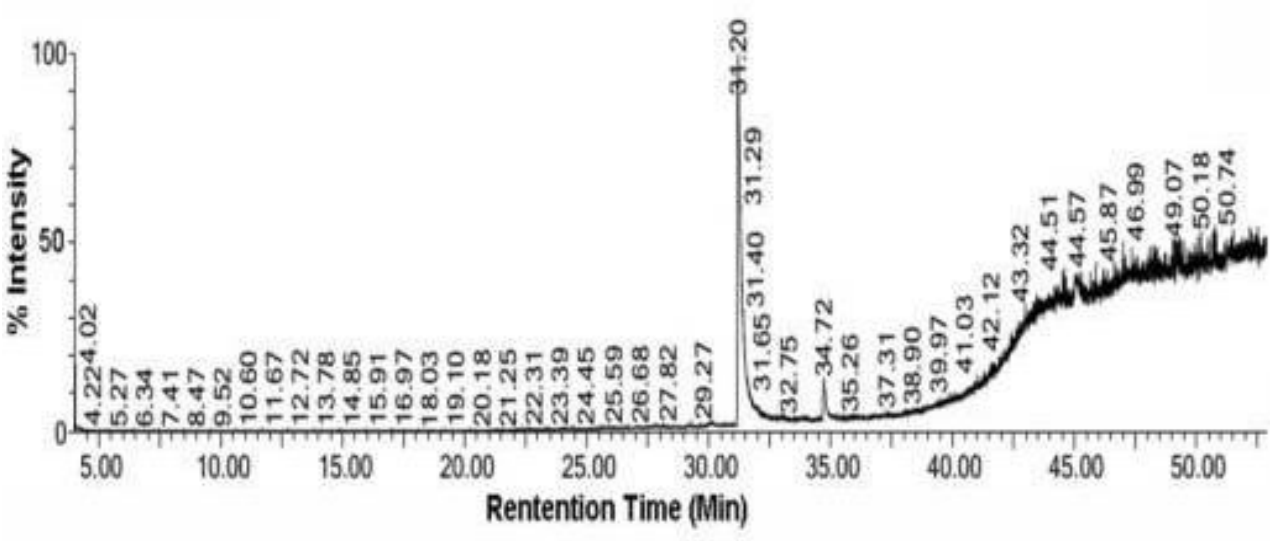
Table: 1 Qualitative analysis of phytoconstituents in the methanolic extract of *M.tinctoria* leaves.

S.No	Phytoconstituents	Methanol extract
1.	Carbohydrates	+
2.	Protein	-
3.	Alkaloids	+
4.	Flavonoids	+
5.	Terpenoids	+
6.	Phenol	+
7.	Saponin	+
8.	Tannins	+
9.	Anthraquinone	+
10.	Coumarin	+
11.	Steroids	+

GC-MS profile of the Identified Compounds in *Morinda tinctoria*

S. No.	Retention Time	Compound	Structure	Molecular formula/wt.	Nature and uses
1.	31.214	**Scopolamine**		$C_{17}H_{21}NO_4$ (303.35g/mol)	Secondary metabolite-Used in the treatment of motion sickness, Postoperative nausea and vomiting.
2.	31.214	**Ecgonine**		$C_9H_{15}NO_3$ (185.22g/mol)	Tropane alkaloid-it is both a metabolite and precursor
3.	32.054	**Minaprine**		$C_{17}H_{22}N_4O$ (298.383 g/mol)	Heterocyclic organic compound-Used as anti depressant.
4.	43.729	**Oleanoicacid**		$C_{30}H_{48}O_3$ (456.70g/mol)	Naturally occurring triterpenoid -Used as male Contraceptive

5.	43.729	**Cathinone**		$C_9H_{11}NO$ (149.19g/mol)	Monoamine alkaloid, cathinone induces the release of dopamine creating a stimulant effect.
6.	44.169	**Malvidin-3,5diglucoside**		$C_{29}H_{35}C_lO_{17}$ (691.0g/mol)	Anthocyanin-its glycosides also responsible for the color of primroses, and Anticancer
7.	44.169	**Mangiferin**		$C_{19}H_{18}O_{11}$ (422.34g/mol)	Xanthonoid – it has antioxidant, antimicrobial, gatroprotective and antidiabetic .
8.	44.399	**Pilocarpine**		$C_{11}H_{16}N_2O_2$ (208.25g/mol)	Parasympathomimetic alkaloid-used to treat Sjogrens syndrom A condition that affect immune system and causes dryness of eyes and mouth.



GC-MS Result

GC-MS is the ideal method used for the resolution of volatile compounds. This technique has been frequently used method for examining the plant samples. In general GC-MS analysis provides the chemical structure, molecular formula functional group present in the compound.

GC-MS results of an methanolic extract of *M.tinctoria* leaf reveals that the appearance of an number of bioactive compounds. The chromatogram of methanolic extract of *M.tinctoria* leaf is shown in figure 1**.**

Conclusion

The phytonutrients also known as phytochemicals are organic products has natural defense mechanism against disease and infection. Morinda leaves contains several essentials metabolites such as carbohydrates, lipids and numbers of secondary metabolites such as flavonoids, alkaloids, steroids, saponins, tannins and phenolic compounds. The present study has been formulated with the objective to establish the preliminary phytochemical, analysis of methanolic extract of morinda leaves and isolation of active phytocomponent by GC-MS analysis. The phytochemical analysis of methanolic extract shows highly active phytoconstituents as carbohydrates, proteins, alkaloids, flavonoids, phenols, saponins, tannins, cardiac glycosides. The results confirm the presence of constituents which are known to exhibit medicinal properties.

Saponins, flavonoids, phenols as antioxidants neutralize or inactivate highly unstable reactive molecules called free radicals that attack the cells of our body. Free radical damage is believed to contribute to a variety of pharmacological properties like anti-allergic, anti-inflammatory, hepatic-protective, antimicrobial, anti - carcinogenic, antithrombotic, cardioprotective, and vasodilator.

GC-MS result of the methanol extract of dried morinda leaves exaggerate the manifestation of more than 8phytocompounds.It explore the persistence of numerous bioactive constituents which have the ability to act as a prospective substance of drugs in the pharmaceutical industry.

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