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Phytochemical Screening of *Mentha arvensis* L

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Abstract: *Mentha arvensis* L. is well known important medicinal and aromatic plant widely used in several indigenous systems of medicine for various therapeutic powers viz. analgesic, anesthetic, antiseptic, astringent, carminative, decongestant, expectorant, nervier, stimulant, inflammatory disease, ulcer and stomach problems. In the present study was to investigate the presence of various phytochemical from different solvents (methanol, ethanol, ethyl acetate, petroleum ether, hexane and aqueous) extracts of *Mentha arvensis* L. Among them methanol and ethanol solvent extracts were found with rich secondary metabolites (flavonoids, glycosides, phenols, terpenoids, alkaloids) due to highest number of various metabolites compounds

Keywords: *Mentha arvensis* L, *Phytochemicals, Solvents, Extraction, Screening.*

1. INTRODUCTION :

Plants are active organisms as well biochemical factories to carry out specific oriented processes to produce useful compounds. Phytochemicals make the plant useful for treating different ailments and have a potential of providing useful drugs of human use. The chemical constituents of plants can be categorized into primary and secondary metabolites. The primary metabolites are basic biological molecules also called biochemist molecules, which are functional compounds found almost in all plants and organisms. Secondary metabolites are varieties of simple to sophisticated strange molecules also called natural products. They are fascinating chemical molecules, very useful and of great importance in nature, as well as highly diversified in structures, properties, uses, chemistry etc. Secondary metabolites are not necessary for direct survival of cells or organisms. They are essential by plants as weapons against competitors, herbivores, or pathogens. As a self-defense strategy, plants started to develop biosynthesis pathways for noxious compounds during evolution of life to discourage predators, as well protect other chemical constituents of plants from degradation by oxidative processes, or they safeguard plants from the detrimental effects of UV light from sun.

2. MATERIALS AND METHODS :

Plant material was washed under the running tap water. 10 gm of plant material (shade dried powder) was extracted separately with 100 ml of each solvents i. e. water, ethanol, methanol, ethyl acetate, petroleum ether and hexane and allowed to stand for 24 hours soaked in air tight Erlenmeyer flask. Later it filtered through a whatman filter paper no. 1 (Souri *et al*, 2008; Khan and Nasreen, 2010). The filtrate was evaporated for drying to yield a dark-residue and % yield of extracts were calculated. Each sample was then transferred to glass vials and kept in refrigerator at 4ºC for their future use in phytochemical analysis.

Phytochemical Screening

The phytochemical screening of the plant extract using carried out by testing of different class of compounds using standard methods (Harborne, 2005 and Raman, 2006). Phytochemical screening assay is a simple, quick, and inexpensive procedure that gives the researcher a quick answer to the various types of phytochemicals in a mixture and an important tool in bioactive compound analyses **(**Sethi, 1996**)**.

Test of Alkaloids

Mayer's test- Crude extract was mix with mayer's reagent (potassium mercuric iodide solution) after few minutes alkaloids give cream colour precipitate which indicate presence of alkaloid.

Wagner's test- Crude extract was mix with mayer's reagent (solution of Iodine in potassium Iodide) after few minutes alkaloids give reddish brown precipitate which indicate presence of alkaloid.

Dragendorff's test- Crude extract was mix with mayer's reagent (Potassium bismuth iodide solution) after few minutes alkaloids give reddish brown precipitate which indicate presence of alkaloid.

Test for Flavonoids
Shinoda Test (Magnesium hydrochloride reduction test)

Crude extract was mix with few fragments of magnesium ribbon and concentrated hydrochloric acid drop wise, pink scarlet, colour appears after few minutes which indicated the presence of flavonoids.

Ferric Chloride Test**:** Crude extract was mixed with few drops of ferric chloride solution; intense green colour was formed to show the presence of flavonoids.
Alkaline reagent test

Crude extract was mixed with 2 ml of 2% solution of NaOH. An intense yellow colour was formed which turn colourless on addition of few drops of diluted acid which indicated the presence of flavanoids.

Test for Phenolics
Ferric chloride test- crude extract mixed with few drops of neural 5% ferric chloride solution a dark green colour indicated the presence of phenolic compounds.

Lead Acetate test- crude extract mixed with few drops of 10% lead acetate solution. White precipitate indicated the presence of phenolics compounds.

Test for Terpenoids
Libermann-Burchard Test: Extract treated with few drops of acetic anhydride, boil and cool, concentrated sulphuric acid is added the side of test tube, shows brown ring at the junction of two layer and the upper layer turns green which shows the presence of sterols and formation of deep red colour indicate the triterpenoids./ A reddish brown coloration at the interface indicates the presence of the terpenoids.

Salkowski's Test: Treat extract in chloroform with few drops of concentrated sulphuric acid, shaken well and allow to stand for some time, red colour appear in the lower layer indicate the presence of sterols and formation of yellow coloured lower layer indicate the presence of triterpenoids.

Saponins: 5 ml of extract was mixed with 20 ml of distilled water and then agitated in a graduated cylinder for 15 minutes. Formation of foam indicates the presence of saponins.

Coumarins: 3 ml of 10% NaOH was added to 2 ml of extract formation of yellow colour indicates the presence of coumarins.

Test for Glycosides
Borntrager's Test: To 3 ml of test solution, dilute sulphuric acid was added, boiled for 5 minutes and filtered. To the cold filtrate, equal volume of benzene was added and shake it welled. The organic solvent layer was separated and ammonia was added to it. Formation of pink to red colour in ammonical layer indicates presence of anthraquinone glycoside.

Keller-Killiani Test: To 2 ml of test solution, 3 ml of glacial acetic acid and 1 drop of 5% ferric chloride were added in a test tube. Add carefully 0.5 ml of concentrated sulphuric acid by the side of the test tube. Formation of blue colour in the acetic acid layer indicates the presence of Cardiac glycosides. (A brown ring at the interphase indicated the presence of cardiac glycosides).

3. RESULTS AND DISCUSSION :

The preliminary phytochemical analysis of *Mentha arvensis* L. is summarized in (Table-1). Phytochemical results revealed the presence of various bioactive secondary metabolites in the different solvent extracts. The maximum secondary metabolites were observed in ethanolic and methanolic extracts which were rich in flavanoids, phenols, glycosides, alkaloids and terpenoids. In ethyl acetate extract presence of phenols, flavanoids, terpenoids, glycosides and alkaloids was observed. Petroleum ether extracts showed terpenoids, phenols, very less alkaloids and absence of glycosides. Hexane extracts was rich in terpenoids, flavanoids, alkaloids, saponins. Water extract was recorded high amount of alkaloids, phenols, flavanoids and glycosides. Essential oil was rich in phenols, terpenoids and flavanoids. Hydrosol sample (aroma) was high content of flavanoids, terpenoids, saponins and glycosides. The similar findings were also reported by John *et al*., (2012), Suresh (2012) and Rachel and Meera Bai (2011). In addition Singh *et al*.

(2011), Naidu *et al.* (2012) who observed in essential oil contain most of the phytoconstituents including flavonoids, saponins, cardiac glycosides, reducing sugars and steroids, alkaloids.

TABLE-1 QUALITATIVE PHYTOCHEMICAL SCREENING

Phyto constituents	Aqueous extract	Methanol extract	Ethanol extract	Ethyl acetate extract	Petroleum ether extract	Hexane extract	Essential oil	Hydrosol
Alkaloids								
1. Mayer's test	+	++	+++	+	+	-	+	+
2.Dragendore's test	+	++	++	+	+	+	+	+
3.Wagner's test	+	+	+	-	+	+	-	+
Flavonoids								
1. Alkaline reagent	++	+++	+++	++	++	++	++	++
2. $Fecl_3$ test	+	++	++	++	+	+	+	++
Phenolic compounds								
1. Lead acetate test	+	++	+++	+++	++	+	++	+
2. $Fecl_3$ test	++	++	++	++	++	+	++	+
Terpenoids								
1.Libermann test	-	++	++	-	+++	+++	++	++
2. Salkowaskis test	-	+	+	+	++	++	++	++
Glycosides								
1. Keller-killiani test	+	+	+	+	-	-	+	++
2. Borntrager's test(athraquinone glycosides)	+	+	+	-	-	-	+	+
Saponins								
1. Froth test	+	++	++	+	+	+	++	++

4. CONCLUSION:

The current industrial preparation of manufacturing herbal products requires large quantities of plant materials resulting in over collecting leading to lack of materials, especially the well-known medicinal species that are in great demand. Medicinal and Aromatic plants are living resource, exhaustible if overused. In Corn mint methanol and ethanol extracts showed the high and positive response followed by other solvent such as petroleum ether, ethyl acetate, hexane, and aqueous extracts. The presence of significant amount of bio-active compounds is used in various Pharmaceuticals and Industries.

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