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Qualitative And Quantitative Estimation Of Leave Extract Of Euphorbia Neriifolia And Mentha Spicata

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The present study was undertaken to evaluate the qualitative and quantitative phytochemical profile of the leaf extracts of Euphorbia neriifolia and Mentha spicata, two medicinally important plants widely employed in traditional medicine. Different solvent extracts were prepared and subjected to preliminary phytochemical screening to determine the presence of major secondary metabolites such as alkaloids, flavonoids, tannins, saponins, glycosides, terpenoids, and phenolic compounds. The qualitative analysis confirmed a rich diversity of bioactive constituents in both plants, indicating their therapeutic potential. For quantitative estimation, total flavonoid content (TFC) was determined. Results revealed that pet. ether, chloroform, ethyl acetate and hydroalcolic extract of both plants exhibited significantly higher concentrations of phenolics and flavonoids compared to non-polar extracts, suggesting a direct correlation between solvent polarity and phytoconstituent yield. Among the two plants, Mentha spicata L. showed relatively higher flavonoid content. These findings highlight the importance of solvent selection for efficient extraction and suggest that both E. neriifolia and M. spicata are potential sources of natural antioxidants with promising pharmacological applications.

Key-words: Plant Extract, Total Flavonoid content, Leaves.

Introduction

Medicinal plants have long been recognized as a valuable source of therapeutic agents due to their rich repository of bioactive phytochemicals. Traditional systems of medicine, including Ayurveda, Siddha, and Unani, have utilized various plants to treat a wide range of ailments, and modern pharmacological studies have validated many of these ethnomedicinal claims. The investigation of phytochemical constituents, both qualitatively and quantitatively, is essential for understanding the therapeutic potential of plants and for developing standardized herbal formulations. [1]

Euphorbia neriifolia (family Euphorbiaceae), commonly known as Indian spurge tree, is a xerophytic shrub widely distributed in tropical and subtropical regions of India. It has been traditionally used for the treatment of inflammatory conditions, respiratory disorders, skin diseases, and gastrointestinal problems. Phytochemical studies have revealed that the plant is

rich in terpenoids, flavonoids, tannins, and glycosides, which are responsible for its anti-inflammatory, antimicrobial, and antioxidant activities. [2]

Mentha spicata (family Lamiaceae), commonly known as spearmint, is an aromatic perennial herb widely used in culinary, cosmetic, and pharmaceutical applications. Its leaves are known to contain essential oils, phenolic compounds, flavonoids, and tannins, which exhibit diverse pharmacological activities including antioxidant, antimicrobial, digestive, and carminative effects. The plant has also been used traditionally to manage respiratory ailments, oral health issues, and gastrointestinal disturbances. [3]

Qualitative phytochemical screening provides preliminary information about the presence of bioactive compounds, while quantitative estimation of phytoconstituents such as total phenolics and flavonoids helps in assessing their therapeutic potential and antioxidant properties. Since phenolic and flavonoid compounds play a crucial role as natural antioxidants and free radical scavengers, their estimation is important for correlating the pharmacological efficacy of plants. [4]

The present study was designed to carry out both qualitative and quantitative estimation of leaf extracts of Euphorbia neriifolia and Mentha spicata L. using different solvents. The work aims to provide a comparative account of phytochemical distribution, evaluate the impact of solvent polarity on extraction yield, and establish a baseline for their possible use in the development of herbal formulations and natural therapeutic agents.

Material and Methods

Collection and Authentication of Plant Material

Fresh leaves of Euphorbia neriifolia and Mentha spicata L. were collected from the local region and authenticated by a botanist from the Department of Botany. The collected leaves were washed thoroughly with distilled water to remove dust and foreign particles, shade-dried at room temperature, and coarsely powdered using a mechanical grinder. The powdered samples were stored in airtight containers until further analysis. The collected specimens were thoroughly examined for their morphological features and authenticated by a qualified Botanist Dr. Smruti Sohani, Professor, SAGE University, Indore, Madhya Pradesh and voucher specimens [PA-ENL-012 & PA-MSL-013] were deposited for future reference.

Preparation of Extracts

The powdered leaf material of each plant (250 g) was subjected to successive extraction using solvents of increasing polarity—petroleum ether, chloroform, ethyl acetate,and hydroalcoholic solvent through Soxhlet extraction method. Each extraction was carried out for 6–8 hours until a clear solvent was obtained. The extracts were concentrated under reduced pressure using a rotary evaporator and stored in desiccators for further analysis. [5]

Qualitative Phytochemical Screening

The preliminary phytochemical analysis of all extracts was carried out as per following standard procedures to detect the presence of various secondary metabolites. [6]

Quantitative Estimation of Phytoconstituents

Total Flavonoid Content (TFC): The aluminum chloride colorimetric method was used. Extracts (0.5 mL) were mixed with aluminum chloride and potassium acetate solution, incubated for 30 minutes, and absorbance was measured at 415 nm. Quercetin was used as the

standard, and results were expressed as mg of quercetin equivalents (QE) per gram of extract. [7]

Statistical Analysis

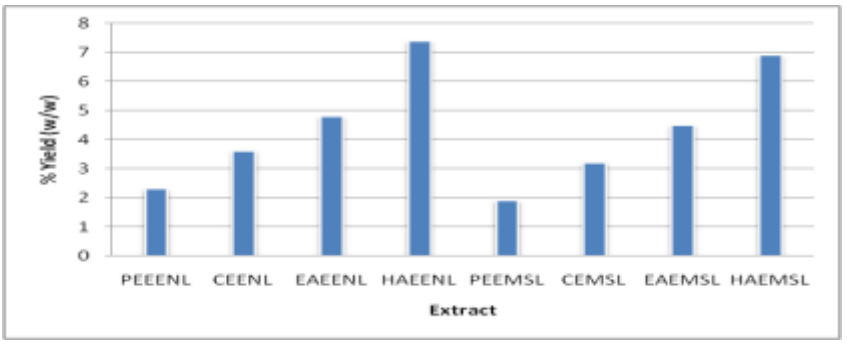
All experiments were performed in triplicates, and the results were expressed as mean ± standard deviation (SD). Data were statistically analyzed using one-way ANOVA to compare differences between extracts and between the two plant species.

Results and Discussion

The various leaf extracts of the plant Euphorbia neriifolia and Mentha spicata L. were determined and were reported in table 1. The preliminary phytochemical analysis given in table 2 revealed the presence of diverse secondary metabolites in varying concentrations depending on the polarity of the solvents used. Both plants were found to contain alkaloids, flavonoids, tannins, phenolics, saponins, glycosides, terpenoids, and steroids. Hydroalcohlic extracts showed a maximum presence of phytoconstituents, while petroleum ether, chloroform extracts and ethyl acetate exhibited comparatively fewer compounds. In Euphorbia neriifolia, terpenoids and phenolics were prominently detected, whereas Mentha spicata demonstrated a higher abundance of flavonoids and tannins. The flavonoid content given in table 3, expressed as mg quercetin equivalents (QE) per gram of extract, was also found to be dependent on the solvent system. The hydroalcoholic extracts of Mentha spicata contained the highest flavonoid content, which was greater than that of Euphorbia neriifolia.

Table 1: Percentage Yield of Plant Extract

S/No.	Extract	% Yield (w/w)
1.	PEEENL	2.3
2.	CEENL	3.6
3.	EAEENL	4.8
4.	HAEENL	7.4
5.	PEEMSL	1.9
6.	CEMSL	3.2
7.	EAEMSL	4.5
8.	HAEMSL	6.9



Graph 1: Yield of Plant Extract

Table 2: Preliminary Phytochemical Screening of the Plant Extract

Extract	**Carbohydrates**	**Alkaloids**	**Flavonoids**	**Phenolic Compounds and Tannins**	**Saponins**	**Glycosides**	**Terpenoids**	**Steroids**	**Proteins and AA**	**Oils**
PEEENL	-	-	-	-	-	-	+	+		+
CEENL	-	+	-	-	-	+	+	-	-	-
EAEENL	-	-	+	+	-	-	-	-	-	-
HAEENL	+	+	+	+	+	+	-	-	-	-
PEEMSL	-	-	-	-	-	-	+	-	-	+
CEMSL	-	+	+	-	-	-	+	-	-	-
EAEMSL	-	-	+	+	-	-	-	-	-	-

HAE MSL	+	+	+	+	+	-	-	-	-	-

Note: - = Absent; + = Present

Table 3: Total Flavonoid content of isolated compounds

Plant Source	Extract	Flavonoid Content (mg QE/g dry extract)
Euphorbia neriifolia leaves	HAEENL	40.3 ± 1.11
Mentha spicata leaves	HAEMSL	51.41 ± 1.01

Values are expressed as mean ± SD (n=3)

Conclusion

The present investigation on the qualitative and quantitative estimation of leaf extracts of Euphorbia neriifolia and Mentha spicata L. highlights the rich phytochemical diversity and therapeutic potential of these two medicinal plants. The qualitative analysis confirmed the presence of key secondary metabolites such as alkaloids, flavonoids, tannins, phenolics, glycosides, terpenoids, and saponins, which are known to contribute significantly to pharmacological activities. Quantitative estimation revealed that extract were most effective in yielding bioactive compounds. The findings provide a scientific basis for the traditional uses of these plants and suggest their potential applications in the development of herbal drugs and nutraceuticals. Further studies focusing on isolation, characterization, and pharmacological validation of specific compounds are warranted to establish their clinical relevance and therapeutic efficacy.

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