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Qualitative and Quantitative Estimation of *Cucumis melo* Linn. and *Claytonia perfoliata* Donn ex Willd. Leaves Extract

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Abstract

The present study was undertaken to carry out the qualitative and quantitative estimation of the leaves extract of *Cucumis melo* Linn. and *Claytonia perfoliata* Donn ex Willd., two medicinally important plants traditionally employed for their anti-inflammatory, antioxidant, and therapeutic properties. Preliminary phytochemical screening was performed to identify major classes of secondary metabolites, including alkaloids, flavonoids, tannins, phenols, glycosides, and saponins. Quantitative estimations of total phenolic content, total flavonoid content, and other bioactive constituents were carried out using standard spectrophotometric methods. The results revealed that both extracts are rich in phenolics and flavonoids, suggesting their potential as natural sources of antioxidants. The findings provide a scientific basis for the ethnomedicinal use of these plants and pave the way for further pharmacological investigations to establish their therapeutic efficacy.

Keywords: Leaves, Screening, Phytochemicals

Introduction

Medicinal plants have long been recognized as a vital source of bioactive compounds with significant therapeutic potential. Among them, *Cucumis melo* Linn. (family: Cucurbitaceae), commonly known as muskmelon, has been traditionally valued for its seeds and fruit, while recent reports highlight the pharmacological importance of its leaves, which contain diverse phytoconstituents with anti-inflammatory, antioxidant, and antimicrobial activities. Similarly, *Claytonia perfoliata* Donn ex Willd. (family: Montiaceae), commonly referred to as miner's lettuce, is an edible leafy plant rich in vitamins, minerals, and phytochemicals that contribute to its antioxidant and medicinal properties.

Phytochemical profiling through qualitative and quantitative analysis is an essential approach to identify and estimate the bioactive metabolites responsible for pharmacological actions. Secondary metabolites such as flavonoids, phenolics, alkaloids, and tannins play a crucial role in preventing oxidative stress and managing various diseases. The evaluation of these phytoconstituents not only provides insight into the therapeutic potential of plants but also aids in developing standardized herbal formulations.

The present investigation aims to qualitatively screen and quantitatively estimate the phytoconstituents in the leaves extract of *Cucumis melo* and *Claytonia perfoliata*. The study will provide scientific validation for their traditional claims and highlight their potential as natural sources of bioactive compounds for future drug development. [1-2]

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Material and Methods

Selection, Collection and Authentication of Medicinal Plants

Based on the folklore and traditional claims the leaves of *Cucumis melo* Linn. and *Claytonia perfoliata* Donn ex Willd. were selected for the present investigation and were collected in the month of August-2024 from local areas of Bhopal and Dehradun. The collected plant materials were authenticated by the Botanist and Voucher specimen J/Bot./CML-15 & J/Bot./CPL-16 were allocated.

Drying of Powdered Plant Material

The collected plant material i.e., leaves of *Cucumis melo* Linn. and *Claytonia perfoliata* Donn ex Willd. was dried under sun.

Successive Extraction of Plant Material

250 gm of shade dried coarsely powdered plant materialwere loaded in Soxhlet apparatus and was defatted using petroleum ether (60-62°C), after defatting it was extracted using ethanol in soxhlet apparatus untill extraction was completed. After completion of extraction, the solvent was removed by distillation. The extracts were dried using rotator evaporator. The residue was then stored in dessicator and percentage yield were determined. [3-4]

Qualitative Phytochemical Test of Extract

The various extracts obtained after extraction were subjected for phytochemical screening to determine the presence of various phytochemical present in the extracts. The standard procedures were adopted to perform the study. [5-7]

Quantitative Estimation of Extract

Estimation of Total Flavonoid content

Total flavonoid content was determined by Aluminium chloride method using quercetin as a standard. 1ml of test sample and 4 ml of water was added to a volumetric flask (10 ml volume). Add 0.3 ml of 5 % Sodium nitrite, 0.3 ml of 10% Aluminium chloride was added after 5 minutes. After 6 minutes incubation at room temperature, 1ml of 1 M Sodium hydroxide was added to the reaction mixture. Immediately the final volume was make upto 10 ml with distilled water. Absorbance of sample was measured against the blank at 510 nm using a spectrophotometer. All the experiment was repeated three times for precision and values were expressed in mean ± standard deviation in terms flavonoid content (Quercetin equivalent, QE) per g of dry weigh.

Estimation of Total Phenolic content

The total phenol content was determined with the Folin- Ciocalteu's assay [13] using gallic acid as standard. In the procedure, 0.5 ml of plant extracts were mixed with 1.5 ml Folin- Ciocalteu's reagent (FCR) diluted 1:10 v/v than after 5 minutes 1.5 ml of 7% sodium carbonate solution was added. The final volume of the tubes was make upto 10 ml with distilled water and allowed to stand for 90 minutes at room temperature. Absorbance of sample was measured against the blank at 750 nm using a spectrophotometer. All the experiment was repeated three times for precision and values were expressed in mean + standard deviation in terms of phenol content (Gallic acid equivalent, GAE) per g of dry weight. [5-7]

Results and Discussion

Successive extraction of the leaves of *Cucumis melo* Linn. and *Claytonia perfoliata* Donn ex Willd. involves the sequential use of solvents with increasing polarity—petroleum ether, chloroform, ethanol, and water—to efficiently isolate a broad range of phytoconstituents. The process begins with petroleum ether, which extracts non-polar compounds such as lipids, fatty acids, and waxes. Chloroform follows, targeting moderately polar constituents like terpenoids and some alkaloids. Ethanol, a polar solvent, extracts a wide array of bioactive compounds including flavonoids, glycosides, and tannins, while the final aqueous extraction yields highly polar substances such as mucilage, polysaccharides, and certain phenolic compounds. This method ensures a comprehensive phytochemical profile of the leaves, aiding in the identification of therapeutic components and supporting further pharmacological investigations. The percentage extract was mentioned in table 1. Qualitative phytochemical tests of the petroleum ether, chloroform, ethanolic, and aqueous extracts of *Cucumis melo* Linn. and *Claytonia perfoliata* Donn ex Willd. were conducted to identify the presence of various bioactive constituents. The petroleum ether extracts of both plants primarily showed the presence of fats, oils, and sterols, while the chloroform extracts revealed moderate amounts of terpenoids and alkaloids. The ethanolic extracts were rich in flavonoids, tannins,

saponins, and glycosides, indicating their potent therapeutic potential. Aqueous extracts of both species showed positive tests for carbohydrates, phenolic compounds, and mucilage. The variation in phytochemical presence across different solvents highlights the importance of solvent polarity in extracting specific classes of phytoconstituents and supports the traditional medicinal applications of these plants. The results were mentioned in table 2 and 3.

Table 1: Percentage yield of various extracts of leaves of *Cucumis melo* Linn. and *Claytonia perfoliata* Donn ex Willd.

S./No.	Extract	Estimated percentage (%w/w)	Color of extract	Nature of extract	pH
1.	PEECML	1.89	Light Green	Semi Solid	7.12
2.	CECML	1.32	Green	Semi Solid	7.09
3.	EECML	9.32	Dark green	Solid Powder	6.99
4.	AECML	18.29	Green	Solid Powder	7.01
5.	PEECPL	1.10	Light Green	Solid	7.05
6.	CECPL	1.24	Dark Green	Semi solid	7.10
7.	EECPL	11.46	Light green	Solid Powder	7.01
8.	AECPL	16.29	Dark green	Solid Powder	7.0

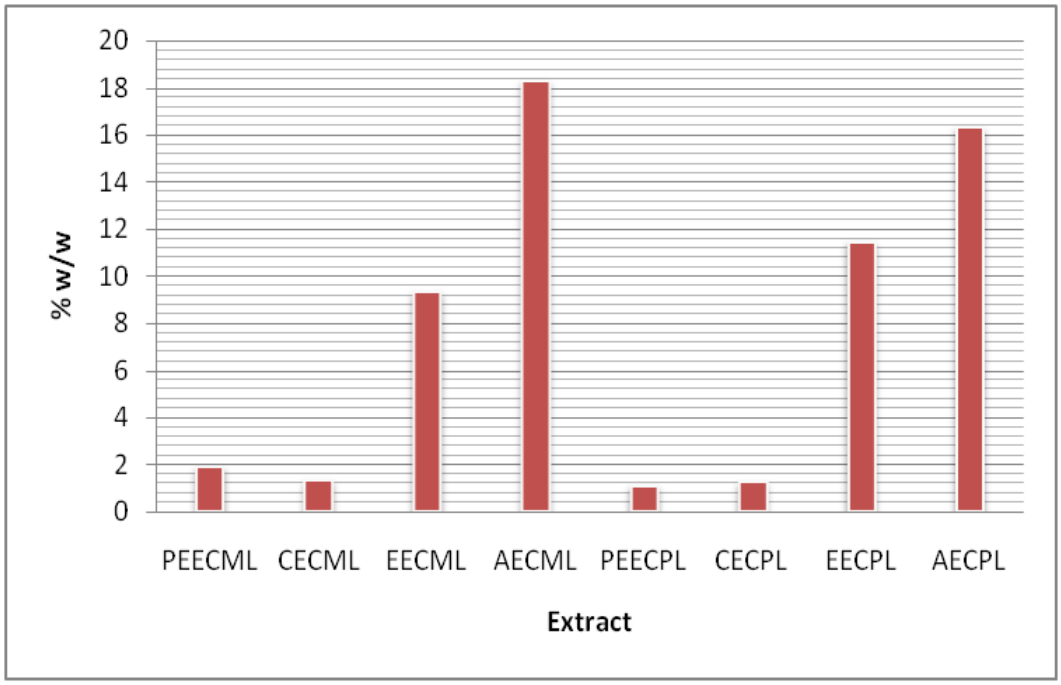

Fig. 1: Percent Extract of Selected Plant Material

Table 2: Preliminary phytochemical screening of leaves of *Cucumis melo* Linn.

S/No.	Constituents	CM Leaves Extract			
		PEECML	CECML	EECML	AECML
1.	Carbohydrates	-	-	+	+
2.	Glycosides	-	-	+	+
3.	Alkaloids	-	+	+	+
4.	Protein & Amino acid	-	-	-	-
5.	Tannins & Phenolic compounds	-	-	+	+
6.	Flavonoids	-	-	+	+
7.	Fixed oil and Fats	+	+	-	-
8.	Steriods & Triterpenoids	+	+	+	+
9.	Waxes	+	-	-	-
10.	Mucilage & Gums	+	-	-	-

Abbr. - = Absent, + = Present
PEECML = Pet. Ether extract of leaves of *Cucumis melo* Linn.
CECML = Chloroform extract of leaves of *Cucumis melo* Linn.
EECML = Ethanolic extract of leaves of *Cucumis melo* Linn.
AECML =Aqueous extract of leaves of *Cucumis melo* Linn.

Table 3: Preliminary phytochemical screening of leaves of *Claytonia perfoliata* Donn ex Willd.

S/No.	Constituents	CP Leaves Extract			
		PEECPL	CECPL	EECPL	AECPL
1.	Carbohydrates	-	-	+	+
2.	Glycosides	-	-	+	+
3.	Alkaloids	-	+	+	+
4.	Protein & Amino acid	-	-	-	-
5.	Tannins & Phenolic compounds	-	-	+	+
6.	Flavonoids	-	-	+	+
7.	Fixed oil and Fats	+	+	-	-
8.	Steriods & Triterpenoids	+	+	+	+
9.	Waxes	+	-	-	-
10.	Mucilage & Gums	+	-	-	-

Abbr. - = Absent, + = Present
PEECPL = Pet. Ether extract of leaves of *Claytonia perfoliata* Donn ex Willd.
CECPL = Chloroform extract of leaves of *Claytonia perfoliata* Donn ex Willd.
EECPL = Ethanolic extract of leaves of *Claytonia perfoliata* Donn ex Willd.
AECPL =Aqueous extract of leaves of *Claytonia perfoliata* Donn ex Willd.

Total flavonoids content was calculated as quercetin equivalent (mg/100mg) using the equation based on the calibration curve: **$Y=0.032X + 0.018$, $R^2=0.998$**, where X is the quercetin equivalent (QE) and Y is the absorbance.

Table 4: Calibration Curve of Quercetin

S/No.	Conc. in µg/ml	Abs
1.	5	0.193
2.	10	0.347
3.	15	0.512
4.	20	0.650
5.	25	0.813

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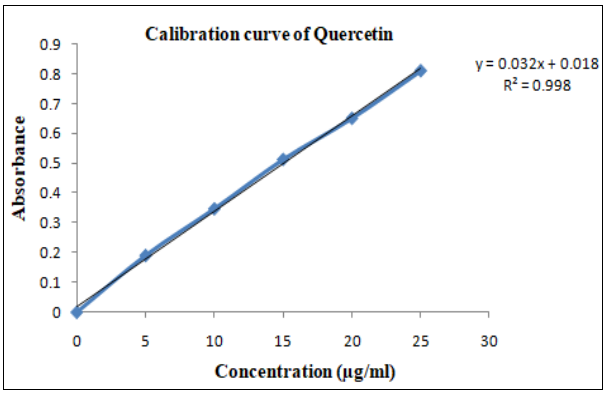

Fig. 2: Graph of calibration curve of Quercetin

Table 5: Total Flavonoids Content of Selected Plant Material

S/No.	Extract	TFC (mg of Quercetin equivalent/g of dry weight)
1.	EECML	40.39±0.32
2.	AECML	18.17±0.28
3.	EECPL	29.41±0.18
4.	AECPL	14.48±0.17

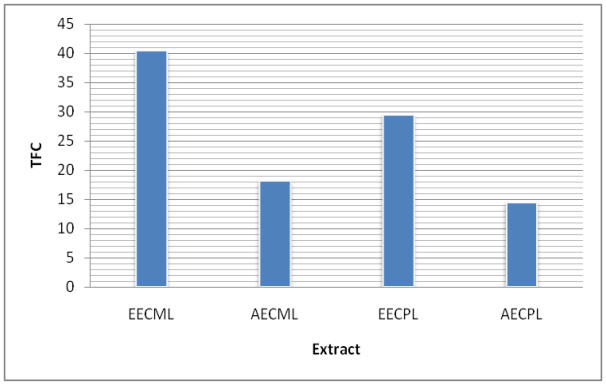

Fig. 3: TFC of Selected Plant Material

Total phenolic compounds (TPC) was expressed as mg/100mg of gallic acid equivalent of dry extract sample using the equation obtained from the calibration curve: **Y = 0.011X+0.011, R^2= 0.998,** where X is the gallic acid equivalent (GAE) and Y is the absorbance.

Table 6: Calibration Curve of Gallic acid

S/No.	Conc. in µg/ml	Abs
1.	10	0.131
2.	20	0.242
3.	30	0.362
4.	40	0.470
5.	50	0.584

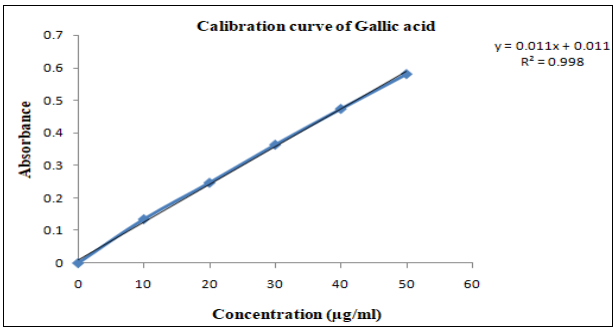

Fig. 4: Calibration curve of Gallic acid

Table 7: Total Phenolic Content of Selected Medicinal Plants

S/No.	Extract	TPC (mg of Gallic acid equivalent/g of dry weight t)
1.	EECML	60.38±0.18
2.	AECML	32.49±0.47
3.	EECPL	52.29±0.36
4.	AECPL	29.49±0.45

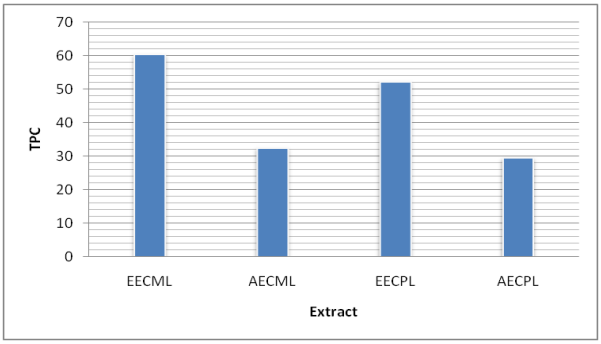

Fig. 5: TPC of Selected Plant Material

Conclusion

The findings revealed the presence of significant bioactive constituents, including flavonoids, alkaloids, phenols, tannins, saponins, and glycosides, which are well known for their therapeutic potential. Quantitative estimation further highlighted appreciable levels of phenolic and flavonoid content, indicating strong antioxidant capacity and pharmacological relevance. These results justify the traditional use of both plants in herbal medicine and suggest that their extracts could serve as promising candidates for the development of natural remedies and nutraceutical formulations.

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