Evaluation Of Bioactive Compounds and In Vitro Antiinflammatory Activity of Leaf and Seed Extracts of *Coriandrum sativum* L

Kavitha R[1 *], Christy Mettilda J[1‡], Rajasree S[2], Alagendran S[3*], Kowsalya R[4], Ayyadurai Thirumurugan[5] Suresh Pullani[6], Arjun P[7]

[1]PG & Research Department of Botany, Holy Cross College (Autonomous), Affiliated to Bharathidasan University, Tiruchirappalli, Tamil Nadu, India – 620 002.
[2]Department of Anesthesiology, Saveetha Medical College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai 602105, TN, India.
[3]Clinical Neuroscience and Phytomedicine Laboratory, Department of Research, Saveetha College of Nursing (SCON), Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai – 602105, Tamil Nadu, India.
[4]Centre for Applied Research, Saveetha School of Engineering (SSE), Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Thandalam, Chennai – 602105, Tamil Nadu, India.
[5]Reproductive Endocrinology Lab, Department of Research Saveetha College of Nursing, Saveetha Institute of Medical and Technical Sciences (SIMATS) Thandalam, Chennai, Tamil Nadu, India
[6]Department of Botany, SVM Degree & PG College, Gadwal, Telangana -509125
[7]Natural Products & Nanobiotechnology Research Lab, Saveetha Institute of Basic Medical Sciences (SIBMS), Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Thandalam, Chennai – 602105, Tamil Nadu, India.

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Abstract

Plants serve as valuable sources of medicines, with medicinal plants being considered a healthy source of life. The current study analyzed the phytochemical properties of coriander extracts using water, ethanol, and petroleum ether. The extracts were tested for phytoconstituents such as alkaloids, flavonoids, steroids, terpenoids, reducing sugars, saponins, tannins, cardiac glycosides, anthraquinones, phenols, and anthocyanins. Alkaloids were present in all three extracts of both seeds and leaves, while flavonoids were available with seeds only. Steroids and terpenoids showed their presence only with water and ethanol extracts. Reducing sugars found in all extracts except aqueous seed extract. Saponins were mostly present in the seed extracts, while tannins were predominantly present in the leaf extracts. UV-VIS and FTIR spectroscopic studies revealed that the plant parts were enriched with many significant compounds, which could be correlated with the medicinal properties of the plant. Free radical scavenging activity on DPPH was studied with all three extracts (aqueous, ethanol, and petroleum ether) at various concentrations. The highest activity was noticed with the ethanolic extract of seeds (92.70%), while leaf extracts also showed high activity. However, extracts with petroleum ether showed poor results compared to aqueous or ethanolic extracts (12.9 and 16.9%). In vitro anti-inflammatory activity was measured in terms of HRBC membrane stabilization. The extracts with water and ethanol showed significant antioxidant and anti-inflammatory activities. Correlating the results of the preliminary phytochemical analysis with biological activities, it is evident that the bioactive compounds might have been a steroid or terpenoids derivative. Compounds with membrane stabilizing properties are known for their ability to interfere with the release of phospholipases that trigger the formation of inflammatory mediators like prostaglandins and leukotrienes.

Keywords: Bioactive compounds, *Coriandrum sativum*, anti-inflammatory activity, phytochemistry.

Introduction

For thousands of years, plants have played a major role in traditional medicine. This has piqued scientific curiosity and led to the discovery of several bioactive chemicals with therapeutic applications, such as antifungal, antibacterial, and anti-inflammatory qualities.

Phytochemicals are essential in the fight against conditions including cancer, arthritic joints, and asthma. In contrast to pharmaceutical compounds, they usually have less adverse effects and help health problems without hurting people. They qualify as "man-friendly medicines"[1]. Phytochemical analysis is an important step in identifying the bioactive components of medicinal plants, which may then help with medication development[2]. In addition to being non-nutritive plant compounds, phytoconstituents also offer disease prevention or protective qualities that shield people from a variety of illnesses. Certain phytochemicals such as tannins, glycosides, saponins, steroids and alkaloids are responsible for the appealing colours and scents that the plants emit. Research on phytochemistry reveals that plants possessing antimicrobial properties have bioactive components such as

flavonoids, tannins, alkaloids and saponins. There have been applications for alkaloids and flavonoids as antiviral, antibacterial, antimicrobial and anticancer drugs[3]. The phenolic compounds are a diverse group of phytochemicals with a broad range of functions that have positive physiological effects [4]. Both plant health and human nutrition depend on plant metabolites. They offer vital vitamins, fibers and antioxidants that support general health and the prevention of disease.

These substances, which have advantages like anti-oxidative, anticancer, anti-inflammatory, antibacterial, and cholesterol-lowering qualities, are also essential for plant growth, stress adaption, and defensive mechanisms[5]. Secondary metabolites improve the flavor, color, and perfume of plants, making them useful for manufacturing medications, dyes, tastes, scents, and pesticides. Alkaloids and flavonoids are examples of compounds that not only shield plants from harm but also provide health advantages like preventing diabetes and cancer. Alkaloids and phenolic compounds in particular are widely valued for their therapeutic qualities[6]. Antioxidants are a class of substances that can impede or postpone the oxidation of lipids or other molecules, preventing or repairing oxygen-induced cellular damage[7, 8]. Research emphasize the use of plant antioxidants in the food chain to stop oxidation. Despite the effectiveness of synthetic antioxidants such as butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) in food, their use is decreasing because of their instability and possible carcinogenic effects[9]. This has led to growing interest in studying natural, non-toxic additives as potential antioxidants[10]. Numerous health-promoting properties, including antioxidant, anti-inflammatory, antihepatotoxic, anticancer, and antibacterial properties, are demonstrated by phenolic phytochemicals[11, 12 & 13]. As the body's line of defense against infections, wounds, and dangerous substances, inflammation is seen as a normal reaction to illnesses or disruptions. It is known to play both an aggressive and therapeutic role, and it can be localized or widespread.

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The production of prostaglandins, protacyclins, and thromboxanes—which are implicated in inflammation, pain, and platelet aggregation—requires the presence of cyclooxygenase (COX) enzymes. Anticipate both acute and chronic inflammation. NSAIDs are currently used to relieve inflammation, but they also raise the risk of blood clots, heart attacks, and strokes. As a result, there is rising interest in creating effective anti-inflammatory medications using natural sources. Because conventional medications can have a number of negative effects, herbal treatments made from medicinal plants are being utilized more and more to treat ailments related to inflammation[14].

Proven natural herbal anti-inflammatory medications do not accelerate the degradation of cartilage, promote intestinal erosion, or produce toxicities that are harmful to the kidneys or liver. Making their use safer as a result numerous phytochemical substances with anti-inflammatory properties can be synthesized by plants as secondary metabolites[15,16].

Native to southern Europe, North Africa, and southwest Asia is *Coriandrum sativum* L. It is a member of the Umbelliferae (Apiaceae) family. It is mostly grown for its seeds, which are collected all year round [17]. With an annual production of almost three lakh tons, India is the world's largest producer, user, and exporter of coriander. All parts of this herb are used in various forms as a flavoring agent and in traditional medicine for treating various disorder [18].

Due to their apparent similarities, coriander and flat-leaf parsley are sometimes confused. However, coriander has a stronger perfume than parsley. Although it may grow in a range of soil conditions, including light, well-drained, moist, loamy soil, and even light to heavy black soil[19], coriander is best suited for a dry environment. Its seeds are practically ovate and globular, and they have a flavor that is moderate, sweet, and slightly spicy, with a note of sage and citrus. The fatty oil [20] and essential oil are the two most significant components of its seeds. The seeds are frequently added to a variety of dishes as a spice or condiment. In India, it is a well-known ayurvedic medicinal herb that is referred to as "Dhanya." For thousands of years, this intensely aromatic substance has been used in food and other industries, playing a crucial role in preserving human health and elevating the standard of living[21].

The medical benefits of coriander are widely recognized, particularly in the treatment of respiratory, urinary, and digestive illnesses. It is used to treat cough, bleeding disorders, headaches, conjunctivitis, and localized swelling and pain. Its essential oils, including as linalyl acetate and linalool, are well-known for having anti-inflammatory properties[22]. Coriander is a rich reservoir of micronutrients, low in saturated fat and high in linoleic acid, a powerful source of α-tocopherol and vitamin K. The leaves are rich in polyphenols and essential oils. Coriander's unique flavor is derived from its essential oil, which contains a large amount of furano coumarins (coriandrine and dihydro coriandrine) and linoleic coumarins. According to the reference, coriander is widely recognized for its analgesic, antioxidant, anti-diabetic, anti-mutagenic, anti-anxiety, and hormone-balancing qualities. This resulted in the choice of this plant for a more thorough investigation of these advantages.

The research focuses on: screening the phytochemical compounds in various leaf and seed extracts of coriander qualitatively, analyzing the phytoconstituents present using UV-VIS and FTIR spectroscopy, assessing the anti-oxidant activities of the plant extract and evaluating their anti-inflammatory properties.

Materials And Methods

COLLECTION OF SAMPLES AND EXTRACTION

Coriandrum sativum L. was the plant chosen for the current study. Fresh leaves and seeds of *Coriandrum* were purchased from the local market in Trichy (Plate 1). After giving the plant parts a thorough wash under running water to get rid of any dirt or debris that had stuck to them, they were rinsed with distilled water. Following that,

they were weighed, shade dried, milled into a fine powder, and kept in storage at 20°C until extraction.

Plant Description

Coriandrum sativum is a member of the Umbelliferae (Apiaceae) family. This soft plant can reach a height of 50 cm (20 in). At the base of the plant, the leaves are extensively lobed; higher up on the flowering stalks, the leaves are slender and feathery. The leaves vary in shape. Small, asymmetrical umbels of white or very pale pink flowers are carried in these umbels, with the petals pointing away from the center of the umbel measuring 5.6 mm (0.20–0.24 in) longer than the petals pointing towards it, which are just 1-3 mm (0.039–0.118 in) long. The fruit is a dry, spherical schizocarp with a diameter of 3-5 mm (0.12–0.20 in).

Preparation of plant extracts

Using aqueous, ethanolic, and petroleum ether solvents, the leaves and seeds of *Coriandrum sativum* were extracted using a sequential extraction approach. 25 g of powdered plant parts, such as leaves and seeds, were obtained and extracted at a 1:4 ratio using 100 ml of the aforementioned solvents. After 48 hours of nonstop shaking to acquire the extractions, Whatman No. 1 filter paper was used to filter them.

PRELIMINARY PHYTOCHEMICAL ANALYSIS

Preliminary Phytochemical screening for phytoconstituents like alkaloids, flavanoids, steroids, terpenoids, reducing sugar, saponins, tannins, glycosides, anthraquinones, phenols and anthocyanins was carried out by the standard procedures given by [23,24,25,26,27].

Test for Alkaloids (Wagner's Reagent): Two milliliters of the various coriander extracts were treated with Wagner's reagent, which is composed of iodine and potassium iodide in 100 ml of water. The formation of a reddish-brown precipitate indicated the presence of alkaloids.

Test for Flavonoids (NaOH Test): Two milliliters of the extracts were placed in separate test tubes. A few drops of aqueous NaOH and HCl were added to each tube. The development of a yellow-orange color signified a positive test for flavonoids.

Test for Steroids (Salkowski Test): Five milliliters of the plant extract were shaken with two milliliters of chloroform. Concentrated sulfuric acid was then carefully added along the side of the test tube to the chloroform layer. The presence of steroids was confirmed by the formation of a reddish-brown ring at the interface.

Test for Terpenoids (Salkowski Test): Five milliliters of different extracts were combined with two milliliters of chloroform. Concentrated sulfuric acid was cautiously added to form a distinct layer. A deep red coloration at the interface indicated the presence of terpenoids.

Test for Reducing Sugars (Benedict's test): One milliliter of the samples was combined with one milliliter of Benedict's reagent and boiled for five minutes in a hot water bath. The appearance of an orange color confirmed the presence of reducing sugars.

Test for Saponins (Foam Test): Five milliliters of the plant extracts were heated with five milliliters of distilled water. The presence of saponins was indicated by the formation of persistent froth.

Test for Tannins (Braymer's Test): Two milliliters of the extracts were treated with two milliliters of distilled water, followed by 2-3 drops of $FeCl_3$. The formation of a green precipitate indicated the presence of tannins.

Test for Glycosides (Liebermann's Test): Two milliliters of plant extracts were mixed with two milliliters of chloroform, and two milliliters of acetic acid were added to the mixture. The presence of glycosides was suggested by the appearance of a violet to blue to green coloration.

Test for Anthraquinones (Borntrager's Test): Three milliliters of the plant extract were combined with three milliliters of benzene and five milliliters of ammonia in a test tube. The change in color to pink, violet, or red in the ammoniacal layer indicated the presence of anthraquinones.

Test for Phenols (Lead Acetate Test): A small amount of the extract was treated with lead acetate. The presence of phenols was confirmed by the observation of a white precipitate.

Test for Anthocyanins: Two milliliters of the plant extract were mixed with two milliliters of hydrochloric acid and two milliliters of ammonia. A color change to pinkish-red or bluish-violet indicated the presence of anthocyanins.

CHARACTERIZATION OF BIOACTIVE COMPOUNDS

UV and FTIR analysis

Ultraviolet (UV) and visible absorption spectroscopy are valuable techniques for characterizing plant compounds. UV-Visible spectrophotometry, widely employed in pharmaceutical analysis, measures the reduction in light intensity after it passes through or is reflected by a sample surface[29]. This method is particularly useful for assessing the absorption, transmission, and reflectivity of critical materials, including pigments and plant compounds [30].

Fourier Transform Infrared Spectroscopy (FTIR) is an analytical technique that identifies functional groups in gases, liquids, and solids, and it is also used to analyze organic, polymeric, and certain inorganic materials[31]. This technique measures the absorption of infrared radiation by sample materials, with the resulting absorption bands providing information on molecular vibrations and structure[32].

The extracts were analyzed under visible and UV light. For UV and FTIR spectrophotometric analysis, the extracts were centrifuged at 3000 rpm for 10 minutes and then filtered using Whatman No. 1 filter paper. The samples were diluted in a 1:10 ratio with the same solvent. The extracts were scanned over a wavelength range of 300-1100 nm using a Perkin Elmer Spectrophotometer, and the characteristic peaks were identified. FTIR analysis was also conducted using a Perkin Elmer Spectrophotometer to detect the characteristic peaks and their corresponding functional groups. The peak values for both UV and FTIR spectra were recorded, and each analysis was repeated twice to confirm the spectral results.

ANTIOXIDANT ACTIVITY

The free radical scavenging activity of the extracts was assessed using 1,1-diphenyl-2-picrylhydrazyl (DPPH)[33]. In brief, 1 ml of the extract solution at an appropriate concentration was combined with 2 ml of a 10 mg/L methanolic DPPH solution. The mixture was shaken thoroughly and left to sit at room temperature for 5 minutes. The absorbance (ΔA) was then measured at 517 nm using a spectrophotometer. A lower absorbance value indicated greater free radical scavenging activity. A control solution, consisting of methanol and reagent without the extracts, was also prepared. The scavenging ability (SA) was calculated using the following formula:

$$\text{DPPH scavenging effect (\%)} = \frac{A_0 - A_1}{A_0} \times 100$$

Where A_0 is the absorbance of the control at 30 min. and A_1 is the absorbance of the sample after 30 min.

***IN VITRO* ANTI-INFLAMMATORY ACTIVITY**

Preparation of Red Blood Cells (RBCs) Suspension:

Ten milliliters of fresh human blood were collected and transferred into clinical heparinized centrifuge tubes. The samples were then centrifuged at 3000 rpm for 10 minutes and washed three times with an equal volume of isosaline. The total volume of blood was measured and reconstituted as a 10% v/v suspension in isosaline[34,35].

Heat-Induced Hemolysis:

The reaction mixture was prepared by combining different aliquots of plant extracts (containing 50 µg, 100 µg, 150 µg, 200 µg, and 250 µg) with 1.0 mL of the 10% RBC suspension. For the control, only saline was added in place of the test sample. The volume of all tubes was adjusted to 5.0 mL with isosaline, and the samples were incubated in a water bath at 56°C for 30 minutes, except for the blank. Separate blanks were prepared to account for the absorbance by plant extracts. After incubation, the tubes were cooled under running tap water and then centrifuged at 2500 rpm for 5 minutes to remove impurities. The absorbance of the supernatants was measured at 560 nm for all samples, with each experiment conducted in triplicate[36,37]. The percentage of hemolysis inhibition was calculated using the following formula.

$$\textbf{\% inhibition} = \frac{\textbf{A}_{560}\textbf{ control} - \textbf{A}_{560}\textbf{ Extract}}{\textbf{A}_{560}\textbf{ control}} \times 100$$

Where A_{560} control is the absorbance without sample, A_{560} extract is the absorbance of sample extract/standard.

Results And Discussionresults And Discussion

Preliminary phytochemical analysis

Coriander extracts were prepared using water, ethanol, and petroleum ether. These extracts were then analyzed for various phytochemicals, including alkaloids, flavonoids, steroids, terpenoids, reducing sugars, saponins, tannins, cardiac glycosides, anthraquinones, phenols, and anthocyanins (Table 1). Alkaloids were detected in all three types of extracts from both seeds and leaves, whereas flavonoids were only found in the seed extracts. Steroids and terpenoids were present in the water and ethanol extracts. Reducing sugars were identified in all extracts except the aqueous seed extract. Saponins were primarily found in the seed extracts, while tannins were more prevalent in the leaf extracts (Plate 2 & 3). The presence of other compounds varied depending on the solvent and the plant part used.

Preparation of *Coriandrum sativum* L. Extracts:

The leaves and seeds of *Coriandrum sativum* L. were shade-dried, and ethanolic extracts were prepared from the powdered material. These extracts were then subjected to UV-VIS and FTIR analysis.

UV-VIS Spectroscopic Analysis:

The UV-VIS spectra of the ethanolic extracts from the leaves and seeds are presented in Figures 1 and 2. The spectrum for the leaf extract exhibited a broad peak within the range of 415–450 nm, suggesting the presence of compounds with C=O functional groups. Another distinct peak at 670.75 nm indicated the presence of an N=O functional group. In contrast, the seed extract's spectrum did not display any broad or sharp peaks similar to those in the leaf spectrum, possibly due to a lower concentration of these compounds in the seeds.

FTIR Spectroscopic Analysis:

The FTIR spectra for both seed and leaf extracts revealed similar peak patterns. The peaks observed between 2800–3000 cm^{-1} correspond to N-H stretching (amides) and C-H stretching (alkanes). Additional peaks between 1300–1450 cm^{-1} suggest the presence of C-H bending, indicative of aldehydes. A sharp peak at 1045 cm^{-1} corresponds to C-N stretching (amines), and the peak at 879.54 cm^{-1} is associated with C=O bending (alkenes). The FTIR spectra of the ethanolic extracts indicate that both plant parts are rich in significant compounds (Figures 3 and 4). These compounds may serve as bioactive agents, potentially linked to the plant's medicinal properties.

Antioxidant Activity:

The free radical scavenging activity of aqueous, ethanolic, and petroleum ether extracts from seeds and leaves was evaluated using DPPH. Among the extracts, the ethanolic seed extract exhibited the highest activity at 92.70% (Table 2). Although the leaf extracts also demonstrated considerable activity, it was lower than that of the seed extracts (74.10%) (Plate 4). For aqueous extracts, the leaf extract showed the highest scavenging activity (Figure 5), with no significant difference observed between leaf and seed extracts. However, petroleum ether extracts showed much lower activity compared to the aqueous and ethanolic extracts, with percentages of 12.9% and 16.9%, respectively (Figure 6). This suggests that the bioactive compounds responsible for the free radical scavenging activity are likely strong electrophilic compounds, which are more effectively extracted by polar protic

solvents like water and ethanol, explaining the lower activity observed with the non-polar petroleum ether extract.

In Vitro Anti-inflammatory Activity:

The in vitro anti-inflammatory activity was assessed based on HRBC membrane stabilization. Aqueous, ethanolic, and petroleum ether extracts from both seeds and leaves were tested (Plate 5). While no significant differences were observed between the seed and leaf extracts, the choice of solvent had a notable impact on the activity. Extracts prepared with water and ethanol exhibited higher HRBC membrane stabilization, whereas those prepared with petroleum ether showed only moderate activity (Figures 7, 8, and 9). The IC50 values for the aqueous and ethanolic extracts ranged from 46 to 65 µg, whereas for the petroleum ether extracts, they were 187.5 µg and 215 µg for leaf and seed, respectively (Tables 3, 4, and 5). These results suggest that the bioactive compounds are likely polar in nature.

Comparing the antioxidant and anti-inflammatory activities, both seeds and leaves exhibited similar levels of activity. However, these activities were significantly more pronounced in the aqueous and ethanolic extracts, with the petroleum ether extracts showing poorer or moderate activity. This indicates that the bioactive compounds responsible for both activities are likely similar, as they are extracted by polar solvents rather than non-polar ones.

Further analysis of all three extracts confirmed that the water and ethanol extracts exhibited significant antioxidant and anti-inflammatory activities. Correlating these results with the preliminary phytochemical analysis suggests that the bioactive compounds may be derivatives of steroids or terpenoids. Compounds with membrane-stabilizing properties are known to interfere with the release of phospholipases, which trigger the formation of inflammatory mediators like prostaglandins and leukotrienes through the COX (cyclooxygenase) and LOX (lipoxygenase) pathways. Membrane stabilizers are compounds that protect erythrocytes against hemolysis and stabilize lysosomes and other cell organelles under in vitro conditions[38-42].

It is generally believed that compounds with membrane-stabilizing properties offer significant protection to cell membranes in experimental settings. Tannins, flavonoids, and other chemical compounds present in the plant are likely responsible for the observed antioxidant and anti-inflammatory effects of the extracts. In this study, the in vitro anti-inflammatory activity of the plant extracts can be attributed to their secondary metabolite content[39,43-47]. Some researchers suggest that these effects may result from a synergistic interaction between multiple compounds rather than the action of a single constituent.

PLATE 1. Picture showing the habit of *Coriandrum sativum* L.

a. coriander whole plant

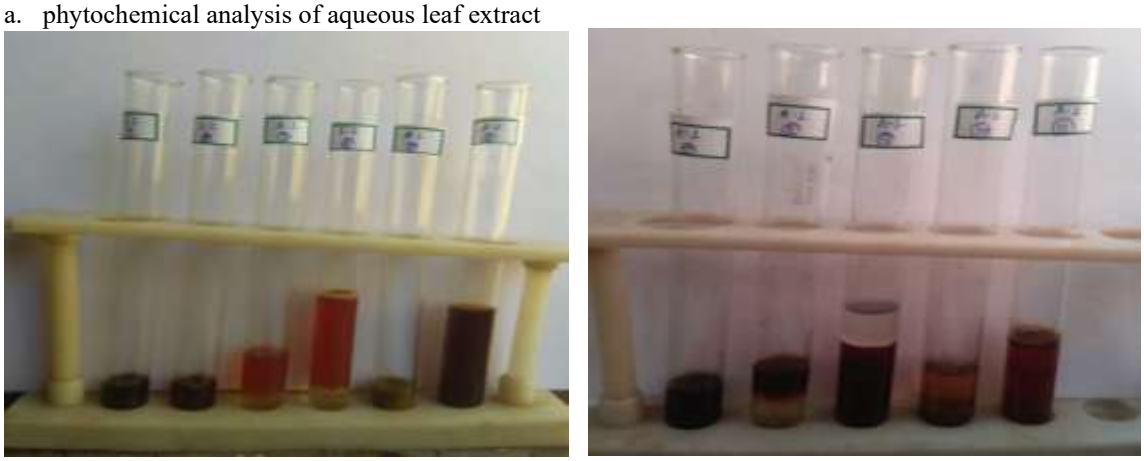
b. coriander leaf powder

c. coriander seeds

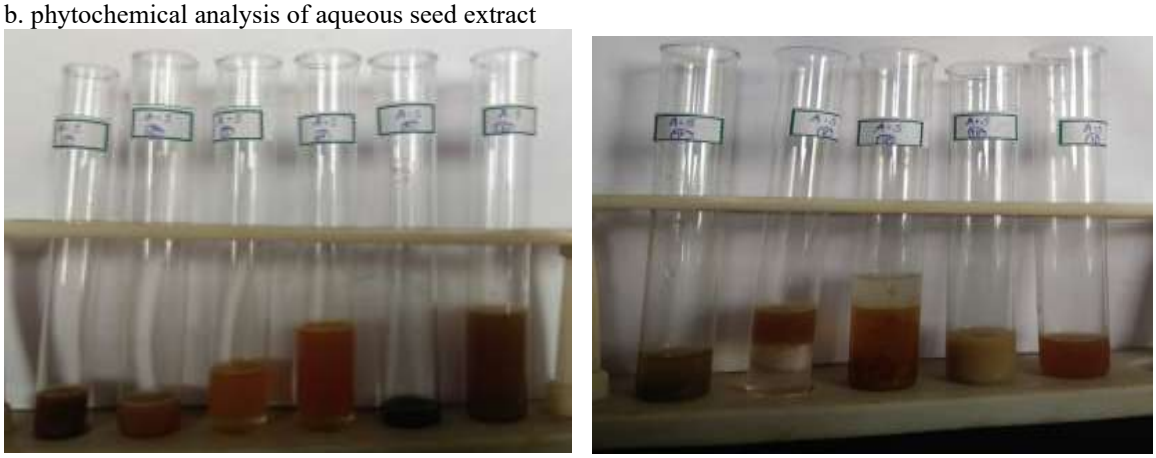
d. coriander seed powder

PLATE 2. Picture showing the result of preliminary qualitative phytochemical analysis of *Coriandrum sativum* L.

a. phytochemical analysis of aqueous leaf extract



b. phytochemical analysis of aqueous seed extract



c. phytochemical analysis of ethanolic leaf extract

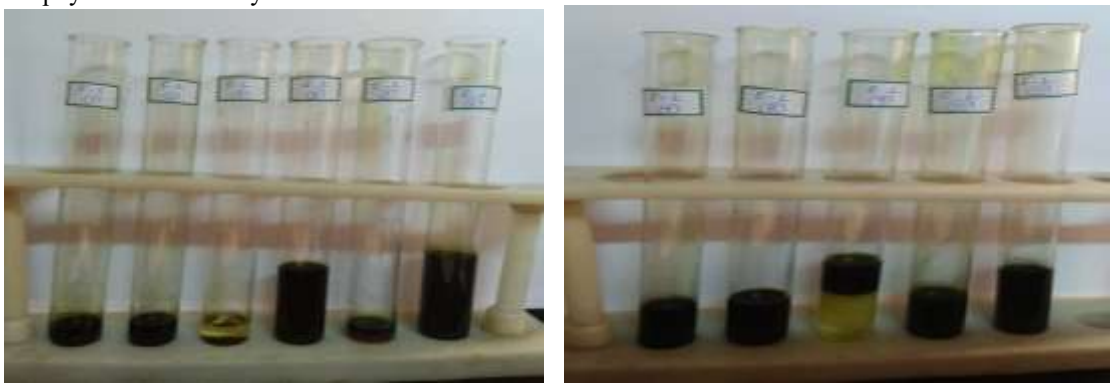
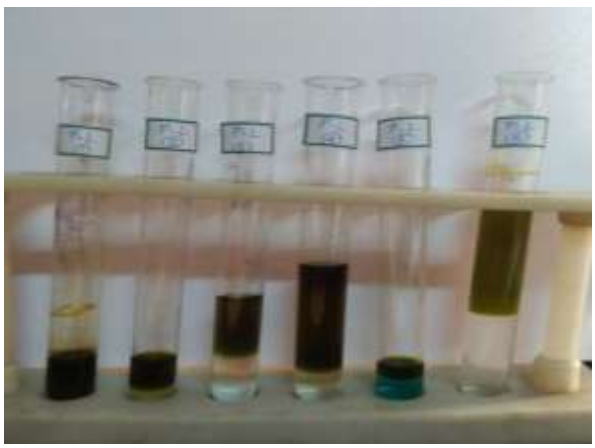


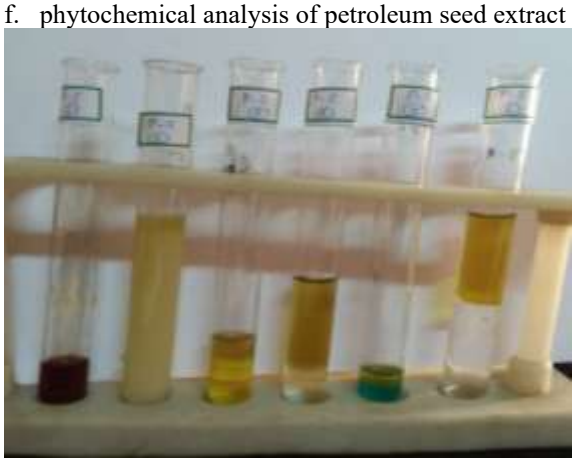
PLATE 3. Picture showing the result of preliminary qualitative phytochemical analysis of *Coriandrum sativum* L.

d. phytochemical analysis of ethanolic seed extract

e. phytochemical analysis of petroleum leaf extract



f. phytochemical analysis of petroleum seed extract



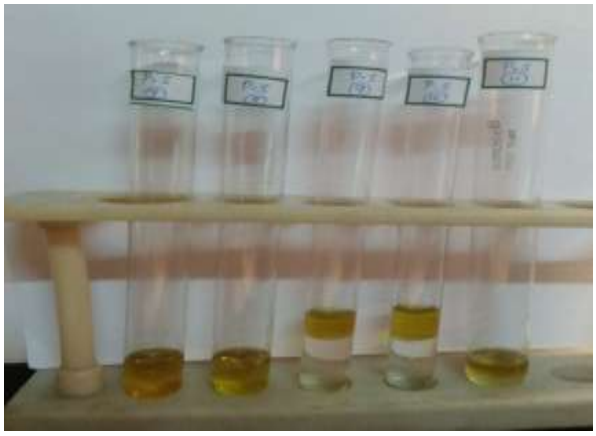


PLATE 4. Picture showing the antioxidant potential of *Coriandrum sativum* L.

a. Leaf extracts

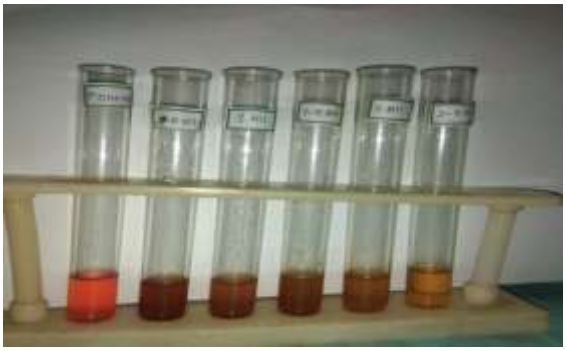
A.L-Aqueous Leaf extract
E.L-Ethanolic Leaf extract
P.L-Petroleum ether Leaf

b. seed extracts

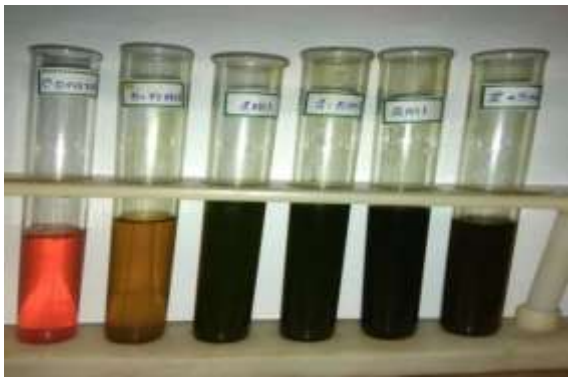
A.S-Aqueous seed extract
E.S - Ethanolic seed

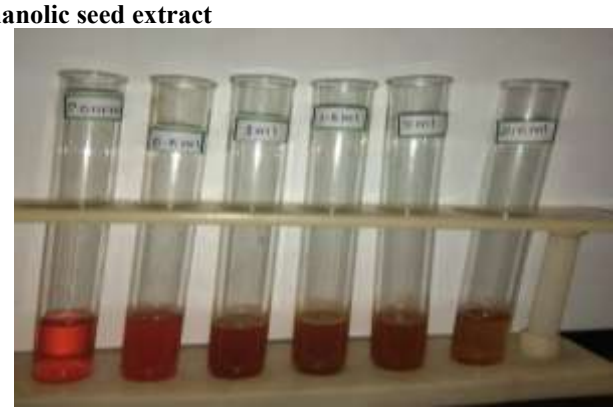
PLATE 5. Picture showing the anti-inflammatory potential of various extracts of *Coriandrum sativum* L.

a. Aqueous leaf extract **b. Aqueous seed extract**



c. Ethanolic leaf extract **d. Ethanolic seed extract**





e. Petroleum ether leaf extract **f. Petroleum ether seed extract**

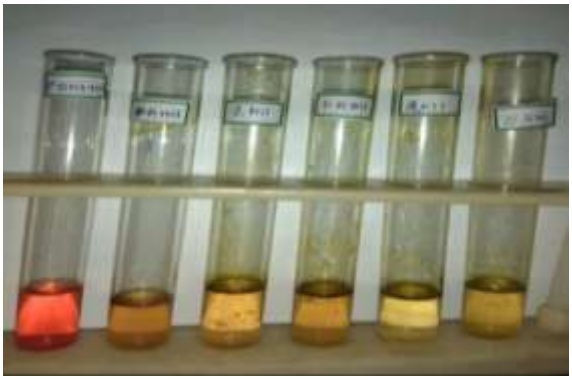


TABLE 1. Preliminary phytochemical analysis of different extracts of *Coriandrum sativum* L.

S.No	Tests	Aqueous Extract		Ethanol Extract		Petroleum Ether Extract	
		Leaf	Seed	Leaf	Seed	Leaf	Seed
1.	Alkaloids	+	+	+	+	+	+
2.	Flavonoids	-	+	-	+	-	+
3.	Steroids	+	+	+	+	-	-
4.	Terpenoids	+	+	+	+	-	-
5.	Reducing Sugar	+	-	+	+	+	+
6.	Saponins	+	+	-	+	-	+
7.	Tannins	+	-	+	+	+	-
8.	Cardiac glycosides	-	-	+	-	-	-
9.	Anthraquinones	+	-	+	-	+	-
10.	Phenols	-	+	-	+	-	-
11.	Anthocyanin	+	+	+	-	-	-

TABLE 2. Antioxidant activity of different extracts of*Coriandrum sativum* L.

S.No	Plant Extract		Absorbance at 517 nm	% of Scavenging activity
1.	Control		1.24	-
2.	Aqueous Extract	Leaf	0.14	88.7

		Seed	0.28	77.4
3.	Ethanolic Extract	Leaf	0.32	74.1
		Seed	0.09	92.7
4.	Petroleum ether Extract	Leaf	1.08	12.9
		Seed	1.03	16.9

HRBC membrane stabilization activity (Inhibition of hemolysis)

TABLE 3. Aqueous extract of *Coriandrum sativum* L.

S.No	Conc. of Extract (µg/ml)	Absorbance at 560nm (leaf)	% of inhibition	IC $_{50}$ (µg)	Absorbance at 560nm (seed)	% of inhibition	IC $_{50}$ (µg)
1	control	1.02	-	46	1.02	-	67.5
2	50	0.48	52.9%		0.52	49.0%	
3	100	0.36	64.7%		0.49	51.9%	
4	150	0.19	81.3%		0.40	60.7%	
5	200	0.12	88.2%		0.39	61.7%	
6	250	0.11	89.2%		0.34	66.6%	

TABLE 4. Ethanolic extract of *Coriandrum sativum* L.

S.No	Conc. of Extract (µg/ml)	Absorbance at 560nm (leaf)	% of inhibition	IC $_{50}$ (µg)	Absorbance at 560nm (seed)	% of inhibition	IC $_{50}$ (µg)
1	control	1.02	-	47.5	1.02	-	65
2	50	0.49	51.9%		0.62	39.2%	
3	100	0.41	59.8%		0.31	69.6%	
4	150	0.33	67.6%		0.24	76.4%	
5	200	0.12	88.2%		0.15	85.2%	
6	250	0.10	90.1%		0.09	91.1%	

TABLE 5. Petroleum ether extract of *Coriandrum sativum* L.

S.No	Conc. of Extract (µg/ml)	Absorbance at 560nm (leaf)	% of inhibition	IC $_{50}$ (µg)	Absorbance at 560nm (seed)	% of inhibition	IC $_{50}$ (µg)
1	control	1.02	-	187.5	1.02	-	215
2	50	0.66	35.2%		0.72	29.4%	
3	100	0.62	39.2%		0.69	32.3%	
4	150	0.54	47.0%		0.58	43.1%	
5	200	0.49	51.9%		0.52	49.0%	
6	250	0.42	58.8%		0.47	53.9%	

FIGURE 1. UV-Visible absorption spectrum recorded from ethanolic leaf extract of *Coriandrum sativum* L.

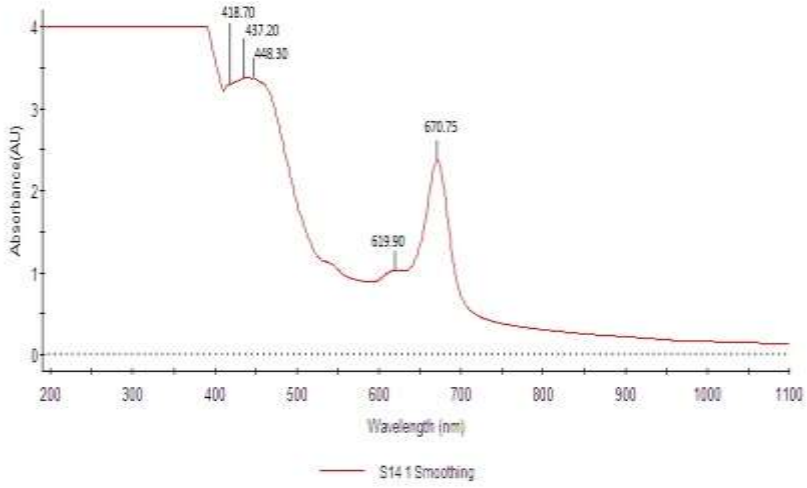


FIGURE 2. UV-Visible absorption spectrum recorded from ethanolic seed extract of *Coriandrum sativum* L.

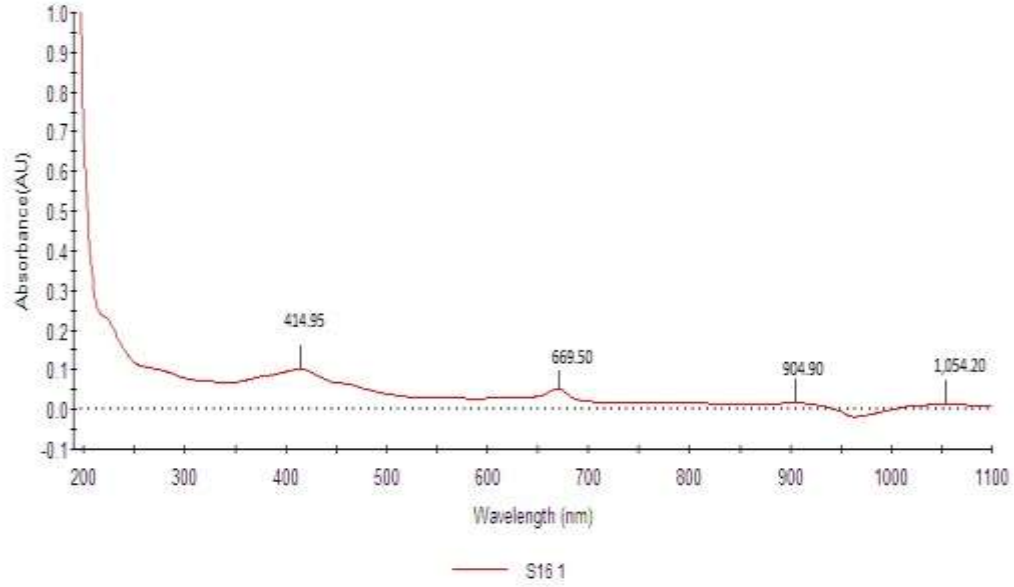


FIGURE 3. FTIR spectrum recorded from ethanolic leaf extract of *Coriandrum sativum* L.

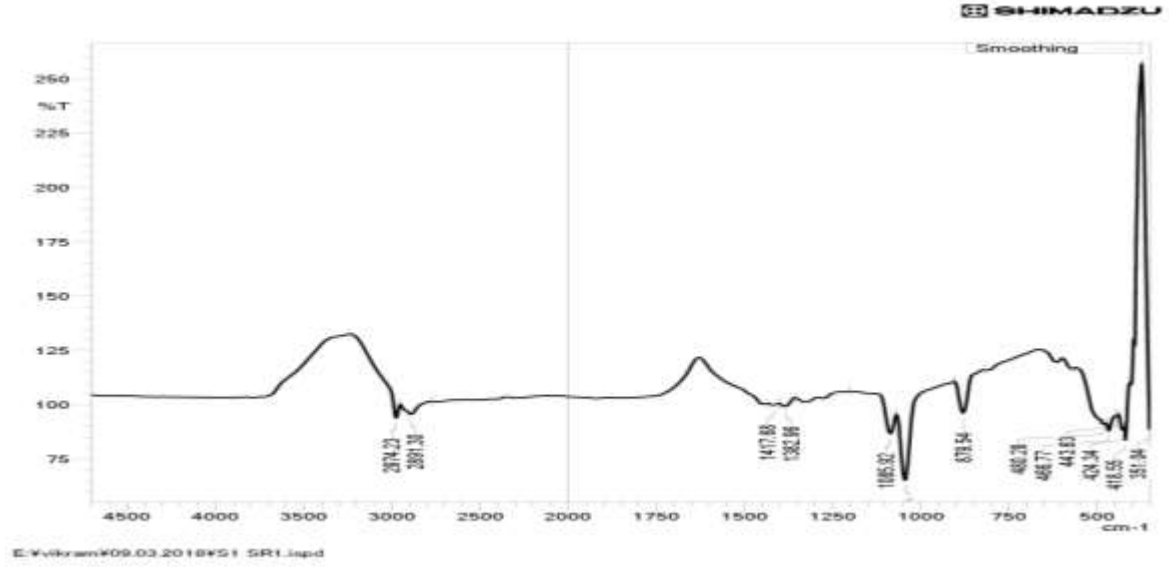


FIGURE 4. FTIR spectrum recorded from ethanolic seed extract of *Coriandrum sativum* L.

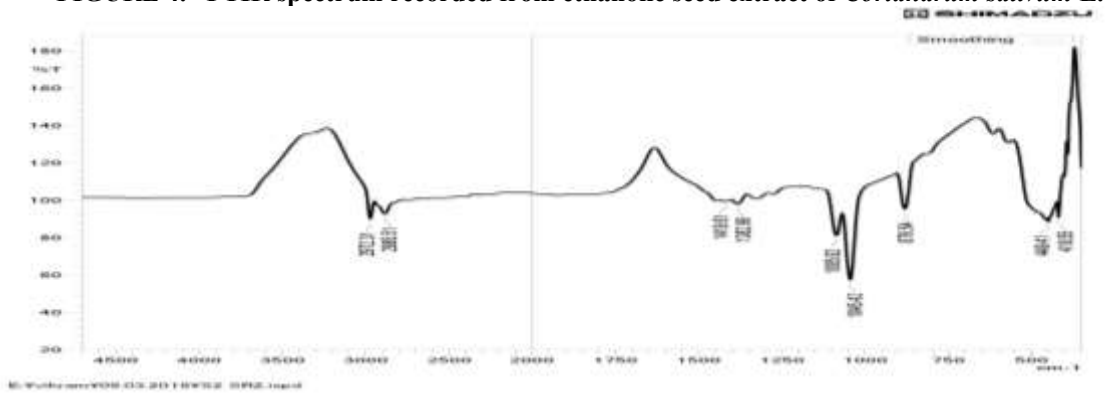


FIGURE. 5

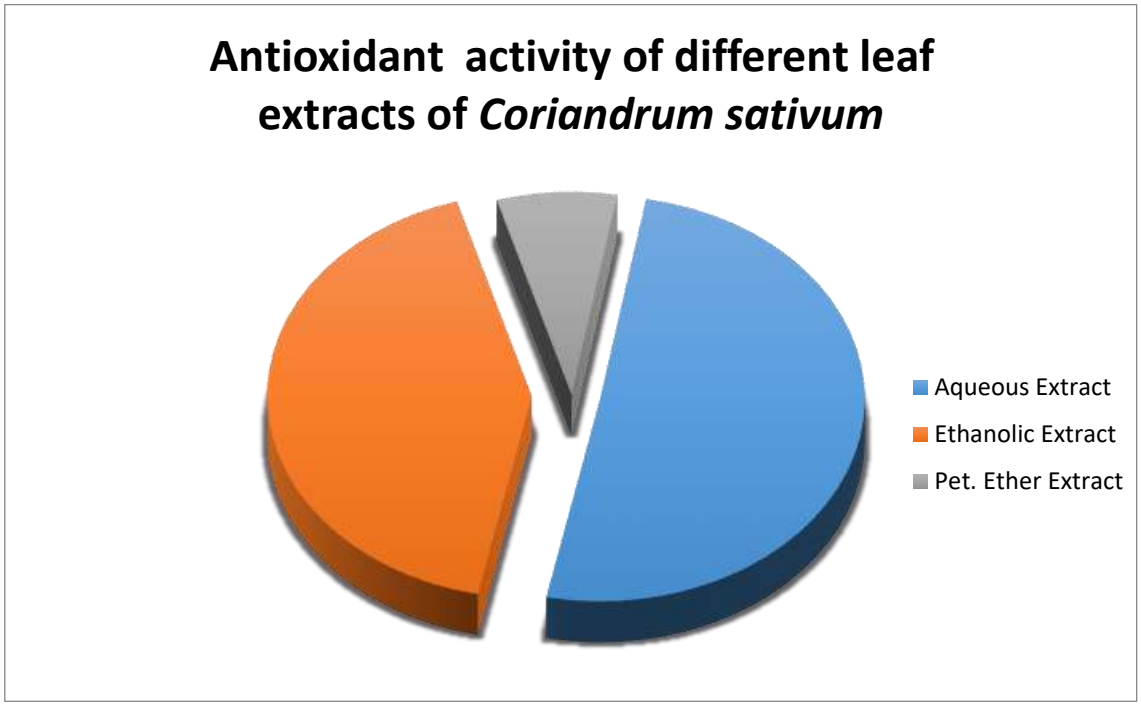


FIGURE. 6

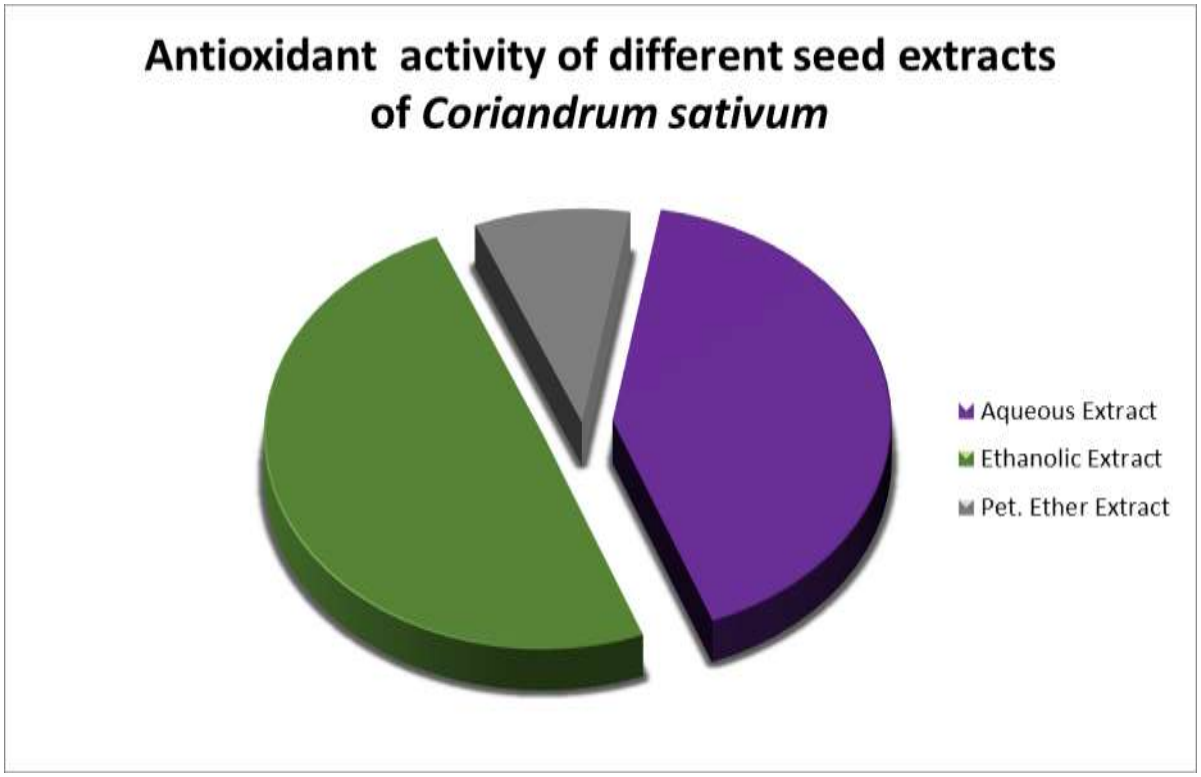


FIGURE. 7

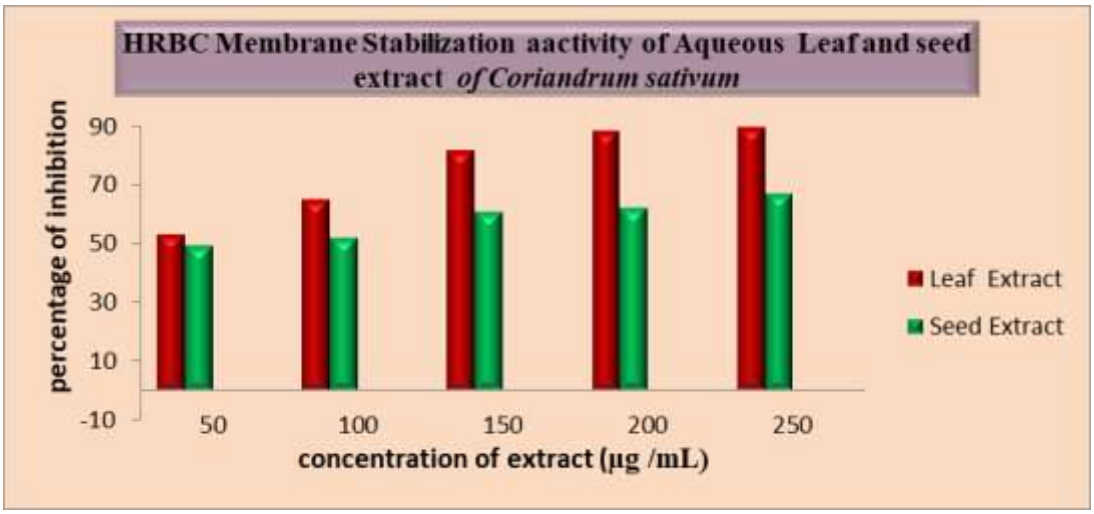


FIGURE. 8

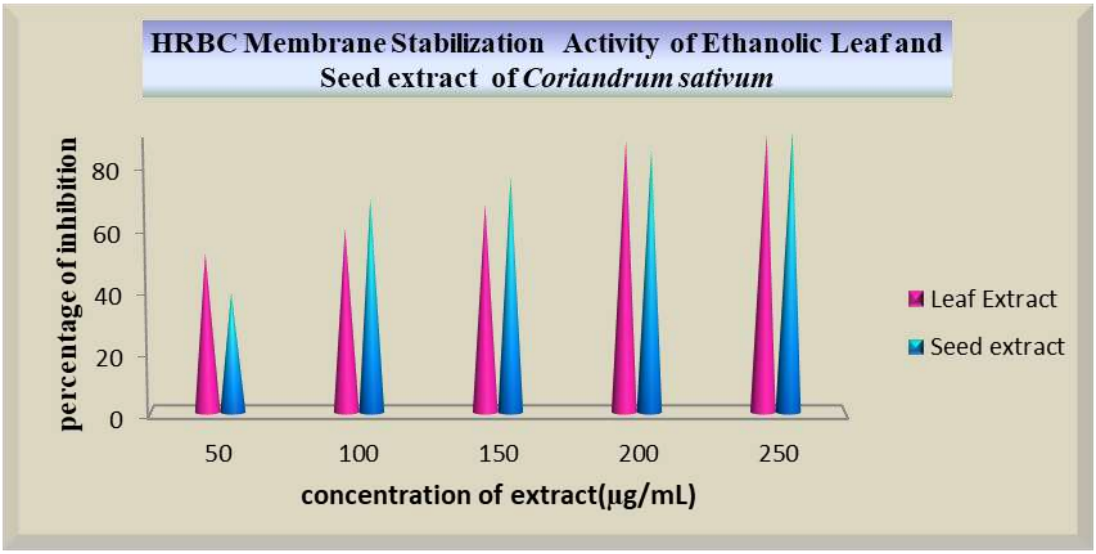
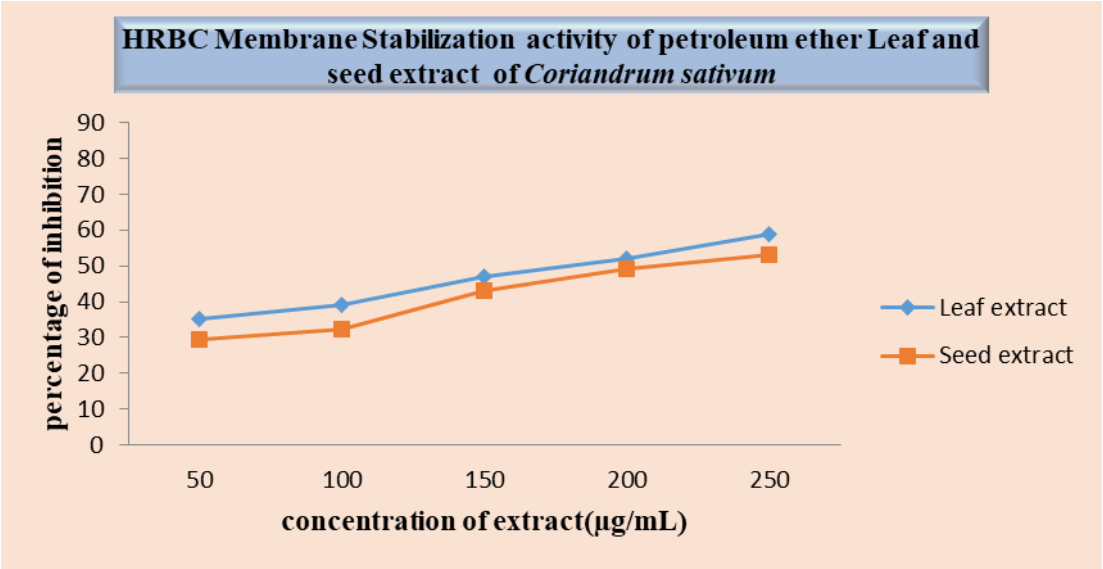


FIGURE. 9



Conclusion

Beyond providing food, shelter, and various valuable products with economic and environmental benefits, plants are a vital source of medicinal compounds. Medicinal plants have long been regarded as essential for maintaining health, offering therapeutic properties that can treat a variety of ailments. The major advantage of plant-derived medicines is that they are completely natural. Phytochemical analysis plays a crucial role in identifying the bioactive compounds present in these plants. This analysis is of significant commercial interest to pharmaceutical companies, as it serves as the foundation for developing new drugs aimed at curing various diseases. Therefore, phytochemical studies are an essential step in the process of discovering and developing new medications.

Coriandrum sativum L., commonly known as coriander, is one of the most recognized medicinal plants in our country. It belongs to the Apiaceae (Umbelliferae) family and is primarily cultivated for its seeds throughout the year. India is the world's largest producer, consumer, and exporter of coriander, with an annual production of approximately 300,000 tons. Coriander is celebrated for its numerous health benefits, including its antioxidant, anti-diabetic, anti-mutagenic, anti-anxiety, and antimicrobial properties. Additionally, it has analgesic and hormone-balancing effects, which contribute to its widespread use in food, both for its health benefits and its ability to preserve food for extended periods. This project involved a preliminary phytochemical analysis, UV-VIS and FTIR spectroscopic studies, and an examination of the antioxidant and anti-inflammatory properties of *Coriandrum sativum* L.

Fresh leaves and seeds of *Coriandrum sativum* L. were purchased from a market in Trichy. The plant materials were thoroughly washed, shade-dried, ground into fine powder, and stored at 20°C until extraction. The seeds and leaves were then subjected to extraction using water, ethanol, and petroleum ether as solvents. A preliminary phytochemical screening was conducted to detect various phytoconstituents such as flavonoids, alkaloids, phenols, tannins, terpenoids, saponins, steroids, glycosides, anthraquinones, anthocyanins, reducing sugars, and carbohydrates, following standard procedures. UV-VIS and FTIR analyses were performed, confirming the presence of multiple phytochemical compounds.

The antioxidant activity of the extracts was assessed by evaluating their free radical scavenging capacity using 1,1-diphenyl-2-picrylhydrazyl (DPPH). The anti-inflammatory activity was determined by measuring the RBC membrane stabilization effect. The ethanolic and petroleum ether extracts of both leaves and seeds demonstrated significant activity, whereas the aqueous extracts showed less pronounced results. These findings suggest that the phytoconstituents responsible for the antioxidant and anti-inflammatory activities are likely polar in nature. Future research could focus on purifying these compounds and synthesizing new drugs based on their derivatives.

Reference

1. K.Sahira Banu and Dr.L.Cathrine (2015). General techniques involved in Phytochemical analysis. *International Journal of Advance Research in Chemical Science* (IJARCS)., 2(4): 25-32.
2. MamtaSaxena, JyotiSaxena, Rajeev Nema, Dharmendra Singh and Abhishek Gupta. (2013). Phytochemistry of Medicinal Plants. *Journal of Pharmacognosy and Phytochemistry.,* 1(6): 168-182.
3. Monika Gupta, Shweta Thakur, Anuradha Sharma and Sudhakar Gupta. (2013). Qualitative and quantitative analysis of phytochemicals and pharmacological value of some dye yielding medicinal Plants. *Orient. J. Chem.,* 29(2): 475-481.
4. Isabel Martinez- Valverde, Maria Jesus Periago, Marina Santaella and Gaspar Ros (2000). The content and nutritional significance of minerals on fish flesh in the presence and absence of bone. Food Chemistry.,71(4): 503-509.
5. S.Velavan (2015). Phytochemical Techniques – a Review. World Journal of Science and Research., 1(2):80-91.

6. S.Velavan (2015). Phytochemical Techniques – a Review. World Journal of Science and Research., 1(2):80-91.
7. Shahidi and Naczk (2004). Phenolics in Food and Nutraceuticals. Boca Raton, FL:CRC Press. ISBN: 978-1587161384.
8. Tachakittirungrod, S., Okonogi, S. and Chowwanapoonpohn, S. (2007). Study on antioxidant activity of certain plants in Thailand: mechanism of antioxidant action of guava leaf extract. *Food Chemistry.*, **103**(2): 381-388.
9. Namiki, M. (1990). Anti oxidants/anti mutagens in food. *Crit. Rev. Food Sci. Nutr.*, **29**: 273-300.
10. Tomaino, A., Cimino, F., Zimbalatti, V., Sulf aro, V. and Depasquale, A. (2005). Influence of heating on anti oxidant activity and the chemical composition of some spice essential oils. *Food Chem.,* **89**: 549-554.
11. Hertog, M. G. L. (1995). *Flavonoid Intake and Long-term Risk of Coronary Heart Disease and Cancer in the Seven Countries Study. Archives of Internal Medicine., 155(4):* 381-386.
12. Rice-Evans, C. A., Miller, N. J. and Paganga. (1996). Structure, antioxidant activity relationships of flavonoids and phenolic acids. *Free Red Biol. Med.*, **20:**933-956.
13. Middleton, E. C., kandaswami and Theoharides. (2000). The effects of plant flavonoids on mammalian cells: implications for inflammations, heart disease and cancer. *Pharmacol reviews.*, **52**: 673-751.
14. Deepamurugesan and Renukadeviponnusamy. (2014). Potential anti-inflammatory medicinal plants. A review: *International journal of pharmacy and pharmacentical sciences.,* **16**(4): 43-49.
15. Apurba Sarker Apu, Mahmuda Sultana Liza, Jamaludin, A. T. M., Amarannowlader, M. D. and Repon Kumar Saha. (2012). Phytochemical screening and *In-vitro* bioactivities of the extracts of aerial part of *Boerhavia diffusa* Linn. *Asian pacific Journal of Tropical Biomedicine.*, **2**(9): 673-678.
16. Apurba Sarker Apu, Shakhawathossanbhuyan, Shamina Saiyaraprova and Abdul Muhit, Md. (2012). Anti-inflammatory activity of medicinal plants native to Bangaladesh : A review. *Journal of Applied Pharmaceutical Science*, **2**(2):7-10.
17. Mhemdi, H., Rodier, E., Kechaou, N. and Fages, J. (2011). A supercritical tuneable process for the selective extraction of fats and essential oil from coriander seeds. *J. Food Engg.,* 105(4): 609-616.
18. Sahib, M., Anwar, F., Gilani, A. H., Hamid, A. A., Saari, A. and Alkharfy, K. M. (2012). Coriander (*Coriandrum sativum* L.): A potential source of high value components for funcitional foods and nutraceuticals- A Review. *J. Phytother.,* **27**(9):1439-1456.
19. Verma. A., Pandeya, S. N., Sanjay, K. Y. and Styawan, S. (2011). A review on (*Coriandrum sativum* L.) an Ayurvadic medicinal herb of happiness. *J. Adv. Pharm. Healthcare Res.,* **1**(3): 28-38.
20. Mohan, P.K., Krishna, T.A., Stephy, P.P., Thirumurugan, A., Kumar, T.S. and Kumari, B.R., 2023. Nano-engineered silver rods from Pleurolobus gangeticus root extract and their antilithiatic and cytoprotective role on oxalate injured renal epithelial cells. Biocatalysis and Agricultural Biotechnology, 52, p.102837.
21. Ayyadurai, T., Moola, A.K., Mohan, P.K., Thiruppathi, S.K., Shanmugam, A. and Bollipo Diana, R.K., 2022. Ameliorative effects of Guilandina bonduc L. aqueous seed extract on letrozole induced polycystic ovary syndrome in female wistar albino rats. Advances in Traditional Medicine, 22(4), pp.885-903.
22. Jeyaram, M., Jeyaram, Y., Ayyadurai, T., Gurusamy, M. (2026). Exploration of Streptomycetes as Biocontrol Agents Against Plant Pathogens. In: Kaur, T., Kumar, H., Manhas, R.K. (eds) Streptomycetes: Biological Candidates for Sustainable Agriculture. Springer, Singapore. https://doi.org/10.1007/978-981-95-5803-2_6
23. Meenaloshini, P., Thirumurugan, A., Mohan, P.K. and Kumar, T.S., 2024. In Vitro Anticancer Efficacy of Hydroalcoholic Extract From Crateva religiosa G. Forst. Bark on Human Ovarian Cancer Cells. Journal of Herbal Medicine, 45, p.100870.
24. Coskuner, Y. and Karababa, E. (2007). Physical Properties of Coriander Seeds (*Coriandrum sativum* L.). *Journal of Food Engineering.*, 80: 408-416.
25. Dhankar, S., Kaur, R., Ruhil, S., Balhara, M., Dhankhar, S. and chhillar, A. K. (2011). A review on *Justicia adhatoda*: A potential source of natural medicine. *Afr. J. Plant Sci.*, **5**(11): 620-62.
26. Shreya Kothari, Vishnupriya, V., Gayathri, R. (2017). Anti- inflammatory activity of *Coriandrum sativum* using HRBC membrane stabilizing method. *Int. J. Pharm. Sci. Rev. m.,* **43**(2): 68-70.
27. Lalitha ,P., Sripathi , S.K., and Jayanthi, P.(2012). Phytochemical analysis of some lichen species. *International Journal of Applied Biology and Pharmaceutical Technology.*, 3(3): 269-273.
28. Ejoba, R. (2012). Phytochemical constituent of some leaves extract of *Aloe vera* and *Azadirachta indica* plant species. *Global Advanced Research Journal of environmental science and Toxicology.*, 1(2):014-017.
29. Sofowora, A. O. (1993). Medicinal plants and traditional medicine in Africa. University of IFE, Press 2nd Ed. pp 320.
30. Harbone, J. B. (1998). Phytochemical method guide to modern techniques in Plant analysis, third ed. *Chapman and Hall, Landon.*, 42-58.
31. Harborne, J. B. (1973). Phytochemical Methods, Chapman and Hall, Ltd., London, pp. 49-188.
32. Ayyadurai, T., Mohan, P. K., Annamalai, A., Kamaraj, C., & Waheeb, M. Q. (2026). Biogenic silver nanoparticles synthesis from Guilandina bonduc L. seed kernel extract with antibacterial, antioxidant and anticancer potential against ovarian Cancer cells. Results in Chemistry, 103246.
33. Thirumurugan, A., Padmanaban, M., Kumar, D. S., Govindharaju, R., Padmavathy, S., Karthikeyan, V., ... & Karthik, S. (2026). Phytochemical and antioxidant properties of Kedrostis foetidissima and its larvicidal potential against mosquitoes. South African Journal of Botany.
34. Sakthivel V, Ilanthiraya S, Jeevanantham G, Aravindhan T, Priya K, Thirumurugan A, Larvicidal Activity Of Marine Macroalgae: A Comprehensive Review. Int J Drug Deliv Technol. 2026;16(4s): 908-917; DOI: 10.25258/ijddt.16.4s.106
35. Sandhiya T, Jeyabharathi S, Thirumurugan A. Exploration of Antimicrobial Drug Targets from Human Breast Milk Lactobacillus for the Control of Vaginal Infections. Int J Drug Deliv Technol. 2026;16(7s): 924- 933; DOI: 10.25258/ijddt.16.7s.98.

36. Ogbuewu, I. P. (2008). Physiological responses of rabbits fed graded levels of neem (*Azadirachta indica*) leaf meal. Thesis, University of Technology, Owerri, Nigeria, 200 pp.
37. S.Velavan (2015). Phytochemical Techniques – a Review. World Journal of Science and Research., 1(2):80-91.
38. K.Sahira Banu and Dr.L.Cathrine (2015). General techniques involved in Phytochemical analysis. *International Journal of Advance Research in Chemical Science* (IJARCS)., 2(4): 25-32.
39. .Nandiyanto,A.B.D., Rosi Oktiani and Risti Ragadhita (2019). How to read and interpret FTIR Spectroscope of Organic. *Indonesian Journal of Science and Technology.*, 41(1):97-118.
40. Khan, S.A., Khan, S.B., Khan, L.U., Farooq, A., Akhtar, K., Asiri, A.M. (2018). Fourier Transform Infrared Spectroscopy: Fundamentals and Application in Functional Groups and Nanomaterials Characterization. *Handbook of materials characterization*., 2(9): 317-344.
41. Lee, S. K., Mbwambo, Z. H., Chung, H. S., Luyengi, L., Games, E. J. C. and Mehta, R. G. (1998). Evaluation of the anti -oxidant potential of natural products. *Comb. chem . high T. Sci.*, **1**:35-46.
42. Sadique, J. A., Rqobahs, W. A., Bughaith, E. I. and Gindi, A. R. (1989). The bio activity of certain medicinal plants on the stabilization of RBS membrane system. *Fitoterapia*., 60: 525-532.
43. Sakat, S., Juvekar, A. R. and Gambhire, M. N. (2010). *In vitro* antioxidant and anti-inflammatory activity of methanol extract of *Oxalis corniculata Linn. I.J. Pharm. Pharm. Sci.,* 2**(**1):146-155.
44. Shinde, U. A., Phadke, A. S., Nari, A. M., Mungantiwar, A. A., Dikshid, V. J. and Saraf, M. N. (1999). Membrane stabilization activity a possible mechanism of action for anti-inflammantory activity of *Cedrus deodara* wood oil. *Fitoterapia.*, 70: 251-257.
45. Sakat, S., Juvekar, A. R. and Gambhire, M. N. (2010). *In vitro* antioxidant and anti-inflammatory activity of methanol extract of *Oxalis corniculata Linn. I.J. Pharm. Pharm. Sci.,* 2**(**1):146-155.
46. Niraimathi, V., Jerad suresh, A. and Latha, T. (2011). Activity of Azomethines of Aryl Oxazoles. *E-Journal of Chemistry.,* 8(S1):392-394.
47. Sangita Chandra, Priyanka Chatterjee, Protapaditya Dey, Sanjib Bhattacharyae. (2012). Evaluation of *in vitro* anti-inflammatory activity of coffee against the denaturation of protein. *Asian Pacific Journal of Tropical Biomedicine.*, 178-180.