https://doi.org/10.47552/ijam.v16i2.6069 ISSN No: 0976-5921

International Journal of Ayurvedic Medicine, Vol 16 (2), 2025; 349-353

Pharmacological Insights and Phyto-Chemical Profiling of *Dhanyaka* (*Coriandrum Sativum* Linn) for Therapeutic Applications

Research Article

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Abstract

Dhanyaka (Coriander) is botanically identified as *Coriandrum sativum* Linn belongs to *Apiaceae (Shatapushpa Kula)* family. It is a commonly used spices and medicine. In Ayurveda, *Ardha Dhanyaka* (wet coriander), *Sushka Dhanyaka* (dry coriander), and *Dhanyaka Shaka* (fresh coriander leaves) are different forms of coriander used for their medicinal properties. It is having *kashaya, tikta rasa* (astringent and bitter taste), *snigdha laghu guna (unctuous, light properties)*, *ushna veerya* (hot in potency) and *madhura vipaka* (undergoes sweet metabolism). It acts as *tridhosha shamaka* (mitigates vata, pitta and kapha), *deepana* (appetizer), *pachana* (enhances digestion), *mutrala* (diuretics), *jwaraghna* (anti-pyretic), *grahi* (absorbent), *trishnanigrahana* (subsides excessive thirst), *dahahara* (cooling), *chardighna* (antiemetic), *swasahara* (anti-asthmatic), *krimighna* (anti-microbial), and *hridya* (cardiac tonic). Despite its reported utility in the management of various ailments, the therapeutic potential of its phyto-constituents remains inadequately explored. Accordingly, this study was undertaken to evaluate its physicochemical and phytochemical properties and to investigate its potential pharmacological applications. Observations and results: The qualitative and quantitative analysis shows oil yield 7.89% and 9.25%, odour- pleasant, colour- greenish brown, taste- spicy, acid value - 8.569 & 7.568, iodine value - 42.12 & 82.39, saponification value - 285.36 & 236.23, ester value- 265.35 & 226.521 in aqueous & methanol respectively. Phytochemical analysis of *Dhanyaka* extract shows presence of carbohydrates, alkaloids, flavonoids, glycosides, tannins, gas chromatography and mass spectrometric analysis indicates the presence of β-linalool as major chemical constituent along with other essential components, which is widely used in the markets of food, pharmaceutical, cosmetic and aromatherapy.

Keywords: *Dhanyaka*, Coriander, *Coriandrum sativum* Linn, Essential oil, Extracts Linalool, GC-MS.

Introduction

Dhanyaka is an annual herb cultivated throughout India; botanically it is identified as *Coriandrum sativum* Linn, belongings to the family *Apiaceae.* It is one of the common spices and highly valued medicinal herb in Ayurveda. It is included in *Trishna nigrahana, Sitaprashamana dashaimaneeya* (1), *Guduchyadi gana* (2, 3), *Haritakyadivarga* (4). It is having *kashaya, tikta rasa* (astringent and bitter taste), *snigdha laghu guna* (unctuous, light properties), *ushna veerya* (hot in potency) and *madhura vipaka* (undergoes sweet metabolism). It acts as *tridhosha shamaka* (mitigates vata, pitta and kapha) (5), *deepana* (appetizer), *pachana* (enhances digestion), *mootrala* (diuretics), *jwaraghna* (anti-pyretic), *grahi* (absorbent), *trishnanigrahana* (subsides excessive thirst), *dahahara* (cooling), *chardighna* (Antiemetic), *swasara* (anti-asthmatic), *krimighna* (anti-microbial), and *hridya* (cardiac tonic) (6). It consists of volatile oil (0.3 to1%) and fixed oil (13%), proteins (20%), tannin, malic acid and vit A, and 84% water (leaf) (7).

Dhanyaka sheetakashaya (cold infusion) is used with *sharkara (sugar)* or *madhu* (Honey) in *jwaradaha* (fever) and *trushna* (thirst). Its *kwatha* (decoction) is used in *netraabhishyanda* (eye diseases) in the form of *netrabindu* (eye drops). Its oil is used in *Sandhishhola* (joint pain). Its *sheetakashaya* can be used as *anupana* (adjuvant) in *Shwetapradara* (leucorrhoea) (8). *Varuni*, *dhanyakashrutajalapana* is used *vataja* gulma (9). *Shunti dadhi dhanyakasiddhaghrita* (ghee prepared by using ginger, curd) mitigates *vataja Chardi* (vomiting), *Dhanyaka* taken with *dadima* (pomegranate) *chincha* (tamarind) and *lavana* (salt), subsides the *chardi* (vomiting). *Dhanyaka* pounded & mixed with sour & salt is used in *garbhini chardi* (emesis gravidarum) (10). Diuretic, Antioxidant Activity, Ant-diabetic Anti-convulsant activity, Sedative Hypnotic Activity, Anti-microbial Activity, Anti mutagenic, Anthelmintic activity. Various phytopharmacological evaluations have been reported in this literature for the important potential of the Coriandrum sativum (11). Being useful

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in many ailments, its therapeutic potentialities with respect to phyto-constituents is to be explored. Hence an attempt was made to evaluate its physico-chemical, phyto-chemical and to explore the pharmacological applications.

Materials and Methods

The Physico-chemical parameters were determined as per the guidelines of API.

Physico-chemical Analysis

a) Identification and authentication of Dhanyaka
b) Total Ash value.
c) Water soluble extractive.
d) Alcohol soluble extractive.
e) p^H Value.

Identification and authentication: The official part of the *Coriandrum sativum* Linn was collected from reliable sources in October 2024; the official part was identified and authenticated by KAHER's CRF Belagavi.

Total Ash value: Five grams of powdered *Dhanyaka* was placed in a silica crucible and incinerated in a muffle furnace at 450 °C for 30–60 minutes. After self-cooling in a desiccator, the total ash was weighed and calculated as a percentage relative to the air-dried crude drug. (12).

Water soluble extractive: Weighed 5 g of powdered drug into a dry 250 mL conical flask. 100 mL of water-chloroform mixture was added to the flask. The flask was corked, shaken frequently, and left for 24 hours. The mixture was then filtered into a 50 mL cylinder. From the filtrate, 25 mL was transferred to a pre-weighed beaker, evaporated in a hot air oven for 10–15 minutes, cooled by using desiccator and weighed. The percentage w/w extractive value was calculated relative to the air-dried drug. (13)

$$\% \text{ of Water-soluble extractive for 100ml} = \frac{100 \times \text{wt.of extract.}}{\text{Wt of sample} \times 25}$$

Alcohol soluble extractive: Weighed 5 g of powdered drug into a dry 250 mL conical flask containing 100 mL of 90% alcohol. The mixture was shaken frequently, corked, and left for 24 hours. It was then filtered into a 50 mL cylinder. From the filtrate, 25 mL was transferred to a pre-weighed beaker, evaporated on a water bath and in a hot air oven at 100 °C for 10–15 minutes, cooled in a desiccator, and weighed. The percentage w/w extractive value was calculated relative to the air-dried drug. (14)

$$\% \text{ of Alcohol-soluble extractive for 100ml} = \frac{100 \times \text{wt. of extract.}}{\text{Wt of sample} \times 25}$$

Determination of ^{pH}: A digital pH meter was calibrated using 50 mL of distilled water, adjusting the reading to 7.0. Then, 5 g of aqueous extract was added to 50 mL of distilled water, stirred to form a uniform suspension, and the pH was measured after immersing the electrode to the recommended level. (15)**.**

Solubility test of *Dhanyaka* (*Coriandrum sativum* Linn): Two grams of fine *Dhanyaka* powder was added to separate test tubes containing different solvents, mixed thoroughly, and allowed to stand. The mixtures were then filtered, and solubility was assessed based on the residue left on the filter paper—less residue indicating greater solubility. (16).

Extraction Methods: An aqueous extract was prepared by soaking 25 g of shade-dried coarse *Dhanyaka* powder in 100 mL of sterile distilled water with intermittent shaking (15 minutes every hour, 9 a.m.–5 p.m.) for 3 days. The mixture was then filtered using Whatman filter paper to obtain 90 mL of extract, which was concentrated using a water bath at 60 °C to remove residual water.

Extraction of oil: Dried *Coriandrum sativum* Linn. plant material was sourced from reliable suppliers, air-dried, and stored in sealed bags at a cool temperature. Essential oil was extracted by hydrodistillation using 500 g of the dried sample in a Clevenger-type apparatus for 45 minutes. The resulting yellow oil was collected with a syringe, dehydrated using dry sodium sulfate, filtered, and stored in a brown, capped bottle under refrigeration. (17).

Preliminary phyto-chemical test: *Dhanyaka* (*Coriandrum sativum* Linn) extract was subjected to preliminary phytochemical analysis. Presence of sterols (Salkowski's test), proteins (Million's test), alkaloids (Mayer's test), carbohydrate **(**Molish's test**),** Glycosides (Keller Kiliani test), tannins (Ferric chloride test) and flavonoid's (Shinoda test) were evaluated.

Methods

- **Test for sterols: a) Salkowski's test:** To 2ml extract added 2ml chloroform and 2 ml cone H^2So^4, shaken well.
- **Test for proteins: Preparation of test solution:** 0.5 gm of sample extract was added to 100ml of water and heated. This solution was used for following tests.
- **Million's test:** To 3 ml of test solution added 5 ml of Million's reagent.
- **Test for Alkaloids: Preparation of test solution:** Evaporated the alcoholic extract, to residue added dilute HCl, shaken well and filtered by using the filtrate the following test are performed.
- **Mayer's test:** To 2ml of filtrate in a test tube added few drops of Mayer's reagent.
- **Test for carbohydrate: Molish's test (General):** To 2ml extract in a test tube added few drops of Molish's reagent, shaken well and added few drops of H^2So^4 from the side of test tube.
- **Test for Glycosides: Keller Kiliani test:** To 200 µL of the drug add 100 µL of glacial acetic acid containing 1 drop of $FeCl_3$ solution followed by 100 µL of con. H_2SO_4.
- **Test for Tannins: Ferric chloride test:** To 2ml extract added few drops of 5 % $FeCl^3$ solution in a test tube.

https://doi.org/10.47552/ijam.v16i2.6069 ISSN No: 0976-5921

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- **Test for Flavonoid's: Shinoda test:** To 2ml extract in a test tube added 5ml of 95 % ethanol and few drops of Conc. HCl and 0.5gm magnesium turnings (17).
- **GC-MS Analysis(18)**
  - **Sample:** Dhanyaka extract
  - **Instrument Make** – Agilent Technologies
  - **Instrument Model** -7890 A GC with 5975C with triple axis detector
  - **Column** - DB 5MS 30 m x 0.250mm Diameter x 0.25 Micro Meter Thickness
  - **Preparation of Sample:** Volatile oil from the sample was diluted with hexane, filtered through a syringe filter (Nylon 13 mm 0.2um) into a vial and injected to GCMS
  - **Method**: Analysis was performed by injecting 2 μL of the sample in a split mode with a split ratio of 100:1. Helium gas (99.9995%) was used as the carrier gas at a flow rate of 0.6mL/min. The analysis was performed in the EI (electron impact) mode with 70 eV of ionization energy. The injector temperature was maintained at 280°C (constant). The column temperature was increased at 4° / min from 60 to 150°C and then at 10° C/ min to 220°C.

The compounds were identified after comparing the spectral configurations obtained with that of available mass spectral database (NIST -08 SPECTRAL DATA).

Observations and Results

Physico-chemical analysis of *Dhanyaka* shows 7.82% & 9.25% oil yield, which is pleasant odour, greenish brown in colour and spicy taste by aqueous and methanol extract methods respectively. Also it has 6.2 pH, 88.2g/100g moisture content, 1.7g/100g and 1.65g/100g of total ash value, 8.569, 7.56 acid values, 42.12, 82.39 iodine value, 285.36, 236.23 saponification value and 265.35, 226.52 ester values respectively for aqueous and methanol extracts (Table No. 1). *Dhanyaka* is soluble in ethanol, methanol and water; it shows presence of carbohydrate, flavonoids, alkaloids, tannins, glycosides (Table No. 02).

Table 1: Physico-chemical analysis of the *Coriandrum sativum* Linn extract

Sl. No.	Physico-chemical Property	Aqueous extract	Methanol extract
1	Oil yield	7.82%	9.25%
2	Odour	Pleasant	Pleasant
3	Color	Greenish brown	Greenish brown
4	Taste	Spicy	Spicy
5	p^H	6.2	6.2
6	Moisture content	88.2g/100g	88.2g/100g
7	Total Ash	1.7g/100g	1.65g/100g
8	Acid Value	8.569	7.568
9	Iodine Value	42.12	82.39
10	Saponifiction Value	285.36	236.23
11	Ester Value	265.35	226.521

Table 2: Phyto-chemical analysis of the *Coriandrum sativum* Linn. extract

Sl. No.	Particulars	Test	Observations	Results
1	Solubility test	Ethanol	Change in the colour of the solvent	Soluble
		Methanol	Change in the colour of the solvent	Soluble
		Water	Change in the colour of the solvent	Soluble
2	Test for Carbohydrates	Molisch test	Violet ring formed at the junction of two liquids observed.	Present
		Fehling's test	Reddish brown ppt observed	Present
		Benedict's test	Green colour appeared	Present
3	Test for Flavonoids	Shinoda test	Pink colour observed	Present
		Lead acetate test	Yellow ppt observed.	Present
		Sodium hydroxide test	Yellowish red colour observed	Present
4	Test for Alkaloids	Dragendorff's test	Orange red ppt observed	Present
		Hager's test	Yellow colour ppt observed.	Present
		Wagner's test	Reddish brown ppt observed	Present
5	Test for Glycosides	Killer killani test	Reddish brown colour layer was found	Present
		Borntrager's test	Ammonical layer shows pink red colour	Present
6	Test for Tannins	Ferric chloride test	Black colour observed.	Present
		Lead acetate test	White ppt observed.	Present
7	Test for Oils	Filter paper test	Oil stain persist for a long time	Persistent oil stains to filter paper

Gas Chromatography and Mass spectrometry of *Dhanyaka* (*Coriandrum sativum* Linn.) extract

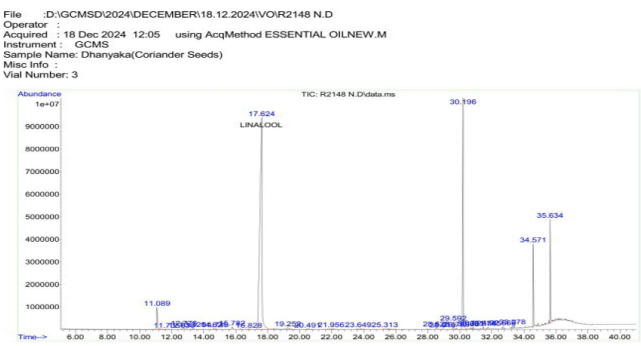

Table 3: Phyto-constituents present in the *Coriandrum sativum* Linn extract by GCMS

SL NO	RT	MOLECULES	AREA %
1	11.09	α-Pinene	2.64%
2	11.7	Camphene	0.02%
3	12.63	β-Thujene	0.03%
4	12.77	β-Pinene	0.30%
5	13.32	β-Myrcene	0.13%
6	14.62	p-Cymene	0.10%
7	14.74	Limonene	0.11%
8	15.78	γ-Terpinen	0.35%
9	16.82	cis-Linaloloxide	0.04%
10	**17.62**	**β-Linalool**	**63.20%**
11	19.25	β-Citronellal	0.37%
12	20.46	endo-Borneol	0.12%
13	21.97	Decanal	0.19%
14	23.62	β-Citronellol	0.36%
15	25.32	Methyl citronellate	0.47%
16	28.53	Undecanal	0.27%
17	28.92	Myrtenyl acetate	0.12%
18	29.58	Citronellol acetate	0.66%
19	29.78	Nerol acetate	0.13%
20	30.18	Geraniol acetate	19.69%
21	30.67	Dodecanal	0.12%
22	30.82	Caryophyllene	0.17%
23	31.45	2-Dodecenal	0.18%
24	31.74	Phytol	0.09%
25	32.66	Caryophyllene oxide	0.16%
26	33.27	2-Tridecenal	0.19%
27	34.57	1-Hexadecanol	4.55%
28	35.63	1-Octadecanol	5.24%

Discussion

Dhanyaka (*Coriandrum sativum* Linn), commonly known as coriander, is an annual herb widely cultivated across India and extensively used in both culinary and medicinal applications. According to Acharya Charaka, it possesses *Trushna Nigrahana* (thirst-quenching) and *Sheeta Prashamana* (cooling) properties. It is characterized by *Kashaya* and *Tikta* rasa, *Snigdha* and *Laghu* guna, *Ushna* veerya, and *Madhura* vipaka, making it *Tridoshaghna* and effective as a *Deepana*, *Pachana*, *Shoolaprashamana*, *Jwaraghna*, *Chardi Nigrahana*, and *Hridya* dravya. Physicochemical analysis reveals low inorganic content (ash value 1.7 g/100g) and richness in carbohydrates, glycosides, flavonoids, and alkaloids, with high *β-Linalool* content (63.20%), a key compound known for its antiemetic effect. Acharya Sushruta acknowledged its role in managing *Garbhini Chardi* (emesis gravidarum) due to its *Rasapanchaka* and actions like *Deepana*, *Pachana*, *Anulomana*, and *Aruchihara*.

Conclusion

Dhanyaka (coriander) is a readily available, noncontroversial herb used in food and medicine. It contains low ash, high moisture, acidic and bioactive compounds like carbohydrates, alkaloids, flavonoids, tannins, and linalool, with its effectiveness in *aruchi*, *jwara*, and *chardi*, it may serve as a natural alternative for managing *emesis gravidarum*.

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