IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

The Study Of Medicinal Plant Constituents Of Trachyspermum Ammi

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Abstract – India, with a rich history & legacy of Ayurveda, has been using this ancient repository of plants and their extracts for their medicinal properties. The objective of this study is to study the important chemicals and evaluate the potential of Trachyspermum ammi seeds for their medicinal properties. T. ammi is a native of Egypt and has been cultivated in different regions in South & West Asia such as Iraq, Afghanistan, and India.

The results of our analysis showed the presence of flavonoids & saponins in T. aami. Similarly, alkaloids, phenols, glycosides, & carbohydrates also seemed to be present. Further, proteins, terpenoids, & tannins presence were found in certain extracts.

These constituents have been known to show different medicinal properties for humans and their presence clearly indicates that extracts from T. ammi can be leveraged for them. Further, antimicrobial activity was also observed and thus it can serve as a source of obtaining novel compounds for the treatment of infectious diseases.

Keywords: Trachyspermum ammi; plant extracts; phytochemicals; medicinal plants

1. Introduction

The history of medicine in India can be traced as back as to vedic times1. In Rigveda (4500 B.C. to 1600 B.C.) perhaps the oldest repository of human knowledge and Atharvaveda, we find the mention of different types of medicines prepared from the extracts of different plants. In other works of later vedic period particularly in Ayurveda, the proportion of various drugs have been given in detail. Susruta – Samhita written before 1000 B.C. Contains a comprehensive chapter on therapeutics and Charak – Samhita of the same period gives a remarkable description of the materia–medica as it was known to Ancient Hindus.

Plant chemistry is an important branch of chemistry which deals with the isolation of organic constituents in pure form and their studies from structural and physiological point of view. The chemistry of plant products has now taken a new shape depending upon the recent highly developed techniques like chromatography, infrared, ultraviolet, nuclear electron spin resonance spectroscopies and mass spectroscopy, polarography and counter current separation. The great diversity and complexity of the chemical nature of natural products their presence sometimes in very poor amount in plants had been a major obstacle in the progress of phytochemistry. With the availability of modern physio-chemical techniques, as described above, it has become possible for an organic chemist to investigate successfully various biologically active compounds occurring in very small amount.

Medicinal properties of plants depend upon the presence of one or more physiologically active compounds because in addition to physiologically active constituents, it might also contain some toxic substances injurious to the body. It therefore becomes necessary to isolate the physiologically active principles from plants in pure form and to study their exact composition and structure by chemical examination and then subject them to physiological tests.

The Plant Trachyspermum Ammi1 belongs to the natural order Linneaceae Commonly known as "Ajowan" it is an annual herbaceous plant bearing the greyish brown seeds. It is grown in Iran, Egypt, Afganistan and chiefly in India. Ajowan seeds are used in small quantities for flavouring numerous foods as antioxidants, as preservative in medicine or for manufacture of essential oil for ultimate use in perfumery, essences and in medicine etc. Oil of Ajowan is an almost colourless to brown liquid possessing characteristic odour and a sharp burning taste.

On standing, a part of the thymol may separate out from the oil in the form of crystals, which is sold in Indian market under the name of "Ajowan Ka phul" or "Sat Ajowan" and is much valued in medicine as it has nearly all the properties of ajowan seeds. This was used in surgery as an anti-septic and was also found to be of great value in the treatment of hook-worm disease and appeared to be far more effective than warm seed oil (Chenopodium ambrosivides). A tea spoonful of the seeds with a little salt is a common domestic remedy for indigestion from regular diet. For stomach, cough and indigestion, the seeds are masticated, swallowed and followed by a glass of hot water. A hot poultice of the seeds is used as a dry fomentation to the chest in asthma and to the hands and feet in cholera and fainting. Ajowan is thus one of the most valuable spices used in medicine [1]. Even the roots of Ajowan plant are reported to be diuretic and carminative.

Table 1: Medicinal properties of T. ammi

Antimicrobial [2]	Broncho-dilating [5]	Abortifacient [7]	Anti-inflammatory [9]	Nematicidal [13]
Hypolipidemic [3]	Antihypertensive	Anti-lithiasis	Antitussive [10]	Anthelmintic [14]
Digestive stimulant [4]	Hepatoprotective	Galactogogic [8]	Anti-filarial [11]	Detoxification of aflatoxins [15]
Antispasmodic	Diuretic [6]	Antiplatelet-aggregator	Gastroprotective [12]	Ameliorative effects [16]

2. Materials & Methodology

Ajwain (T. ammi) was purchased from the local market in Dehradun, Uttarakhand. The seeds were dried in an oven and powdered in an electric grinder. The plant morphology was determined through simple physical observation and the shape, size, color, and odor were noted.

In a soxhlet apparatus, coarse seed powder was extracted in each of four 200-milliliter conical flasks using a successive extraction method. The flasks were extracted with 50 milliliters of distilled water, a mixture of 7:3 methanol and water, chloroform, and 70% acetone for 48 hours.

The phytochemical tests were carried out for using the standard methods:

Test for alkaloids (Dragendorff's test): Aqueous extract was stirred with the addition of the Dragendorff's reagent & a reddish-brown precipitate confirmed positivity.

Test for carbohydrates (Benedict's test): Benedict's solution was added to concentrated and filtrate extract. The presence of carbohydrates was indicated by formation of a brick red precipitate.

Test for saponins (Froth test): The dried seed extracts were added to distilled water and concentrated and shaken vigorously. Formation of foam across the surface indicated saponins.

Test for flavonoids (Alkaline reagent test): Aqueous seed extract was added with a few drops of sodium hydroxide solution. Flavonoids presence was indicated due to formation of yellow color which disappeared on addition of dilute acetic acid.

Test of proteins (Biuret test): The seed extract solution was taken & 4% NaOH solution & 1% CuSO4 solution were added. Violet color indicated proteins.

Test of tannins (Ferric chloride test): Few drops of 0.1% ferric chloride solution were added to the extracts & allowed to stand for a few minutes. Formation of brownish-green or blue-black color indicated tannins.

Tests for steroids and terpenoids (Salkowski test): Aqueous extract was treated in chloroform with a few drops of concentrated H_2SO_4, shaken & left to stand. Formation of a yellow colored lower layer indicated terpenoids.

Tests for glycosides (Borntrager's test): The seed's aqueous extracts were shaken vigorously with benzene & dil. ammonia solution. Formation of reddish pink color indicated glycosides.

Evaluation of Anti-microbial activity: Agar well-diffusion was used to determine the antimicrobial activity. E. coli suspension was seeded on 2 Muller Hinton Agar plates. Using sterilized corn borer, two wells were punched. Dried crude extract dissolved in 20% dimethyl sulfoxide and the stock solution, water extract and control were loaded on the plates. These were then incubated for 24 hours at 37°C. The antimicrobial activity analysis was done through the diameter measurement method of the inhibition zone with the standard antibiotic ciprofloxacin considered as standard for comparison.

3. Results & Discussion

Phytochemical tests indicated flavonoids, saponins, alkaloids, and phenols. Alkaloids have been known to show potent antioxidant properties. Carbohydrates and glycosides were also observed. Further, proteins, terpenoids, and tannins were also found. Plant terpenoids are used extensively for their aromatic qualities and play a role in traditional herbal remedies.

Many other studies have also indicated similar antioxidant properties in other medicinal plants. Flavonoids have antioxidant properties, while alkaloids have some anticancer properties. The seed extracts also showed saponins, known to have impact on inflammation.

After the incubation period, inhibition zones were measured for antimicrobial activity. Though not as strong as the control region which showed inhibition zone of 17.5 mm, zones of 9-14 mm were observed in different solvents.

The study revealed that T. ammi has some antimicrobial activity & can be potentially considered for further pharmacological evaluation, drug discovery, & treatment of various infectious diseases. Combined with its other phytochemical components, T. ammi can be taken up as a candidate for further scientific exploration for its hidden curative & therapeutic potential.

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