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Physico-chemical and pharmacological study of *Anethum graveolens* and *Carum copticum*

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INTRODUCTION

Plant natural compounds play an important role in drug detection and chemical biology. The medicinal properties of plants have been investigated due to their potent pharmacological activities, low toxicity and economic viability. There is an abundance of medicinal plants throughout the world, but only limited numbers have been investigated for its biological and pharmacological properties. Phytochemicals obtained from plant have a significant role in defense mechanism and also important for their unambiguous physiological action in the human body. The secondary metabolites are becoming a part of the integrated health care system as supportive and alternative medicines because of their therapeutic property. Therefore, it is essential to study the medicinal plants so that the discovery of active natural products ingredient can be identified for healing diseases [3, 7].

Carum copticum belongs to the Apiaceae plants family and its seeds are used extensively as a food additive in India. In traditional medicine, different therapeutic applications for *C. copticum* seeds have been described as carminative, antiseptic, amoebiasis expectorant, antimicrobial, antiparasitic, antiplatelet-aggregatory, and antilithiasis as well as treating common cold and acute pharyngitis, carminative, antiseptic, amoebiasis expectorant, antimicrobial, antiparasitic, antiplatelet-aggregatory, and antilithiasis as well as treating common cold and acute pharyngitis, foetotoxicity, abortion potential, and galactogogue properties [4,5,6].

Anethum graveolens, belong to the family Umbelliferae, is indigenous to southern Europe. It is an annual herb growing in the Mediterranean region, central and southern Asia. Previous studies showed that *Anethum graveolens* induced analgesic effect, anti-aggregatory effects, antibacterial, antifungal, anti-inflammatory, antimicrobial, antioxidant, antitussive effect, anti-vomiting effects, bronchodilatory effect, digestive stimulant, cholinomimetic effects, hepatoprotective activities, relaxant effects [1, 3].

The aim of the presented work is to highlight the chemical constituent and pharmacological effects of *Anethum graveolens* and *Carum copticum.* Studies of various parameters affecting market of both the plant was done.

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MATERIALS AND METHODS

The seeds of *Anethum graveolens* and *Carum copticum* were collected from Ratanshi's Agro-hortitech, Byculla, Mumbai. Collected seeds were washed and subjected to analyze physico-chemical and pharmacological studies. Porcelain dish, whatmann's paper (ashless no. 41), muffle furnace, desiccators was used to find physico-chemical parameters.

PHYSICO-CHEMICAL PARAMETERS

Determination of moisture content

Moisture content is the ratio of mass of water in sample to the mass of solid in sample which is expressed in percentage. Moisture is an inevitable component of crude drugs, thus it was determined by gravimetric method in both the samples. Sample was taken separately in a previously dried and weighed dish, evaporated on water bath and further dried in an oven at 80-100°C till constant weight, weight of the residue obtained after the complete evaporation was the total solid content of the sample. The percentage of total solid content in the sample was determined and expressed as percentage w/w.

Determination of total ash content

Ash content is a measure of the amount of inorganic compound present in the sample. To determine the ash content, measured amount of dry solid obtained from sample was taken in a tarred silica dish and incinerated by gradually increasing the heat, not exceeding dull red heat, until free from carbon. Then, the dish was allowed to cool in a desiccator and weighed. The percentage of ash content (w/w) was calculated.

Determination of total acid insoluble ash content

Ash residue obtained from total ash content is treated with HCl and is filtered through whatmann's paper (ashless no. 41) and is incinerated in muffle furnace till all carbon is burn. The residue left is weighed as acid insoluble ash content.

Determination of total water soluble ash content

Ash residue obtained from total ash content is treated with water and is filtered through whatmann's paper (ashless no. 41) and is incinerated in muffle furnace till all carbon is burn. The residue left is weighed as acid insoluble ash content.

PHARMACOLOGICAL STUDY

Preliminary phytochemical screening was done by extract prepared by Soxhlet extraction *Anethum graveolens* and *Carum copticum*. Thin layer chromatography was done of seed extract of *Anethum graveolens* and *Carum copticum* in solvent system of toluene and ethyl acetate (9:3) and petroleum ether and chloroform (4:1) respectively. Spraying reagent was anisaldehyde-sulphuric acid and vanillin-sulphuric acid.

Anti-microbial activity was determined by disc diffusion method. Extract prepared by Soxhlet extraction *Anethum graveolens* and *Carum copticum* was used on inoculum suspension of E. Coli grown on Muller-Hilton agar.

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RESULTS AND DISCUSSION

MORPHO-ANATOMICAL OBSERVATIONS

Macroscopic studies

The fresh plant was used for the study of macroscopic characters. Fruit of *Anethum graveolens* occurs as separate mericarps , usually devoid of pedicle at the base oblong strongly dorsally compressed,3 to 4 mm in length and 1.5 to 2 mm in width, surface glabrous, exhibits 5 yellowish stouts, prominent dorsal ridges, the lateral being extended into wings and ramnents of stylopod at the apex, commissural surface flat, often attached with a carpophores and shows the impression of two dark arc shaped vittae, each embedded on its either side.

Photo plate 1: Fruit of *Anethum graveolens* and *Carum copticum*

Fruit of *Anethum graveolens*

Fruit of *Carum copticum*

Fruit of *Carum copticum* have cremocarps with a persistent stylopodium. It consist of two mericarps, compressed about 2 mm long and 1.7 mm wide, 5 ridges and 6 vittae in each mericarp, usally separate, 5 primary ridges.

Organoleptic characters

Table 1: Organoleptic characters of *Anethum graveolens* and *Carum copticum*

Parameter	*Anethum graveolens*	*Carum copticum*
Colour	Dark brown	Brown
Odour	Strong aromatic	Strong aromatic
Taste	Acrid	Pungent

Microscopic study

Anatomical study was carried out by taking free hand section of seeds of *Anethum graveolens* and *Carum copticum.* Saffaranin was used to stain the sections. Photomicrographs were taken by using compound binocular microscope.

Photo plate 2: Transverse section of *Anethum graveolens* and *Carum copticum* fruit

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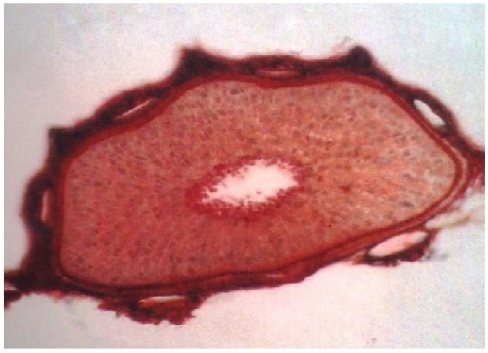
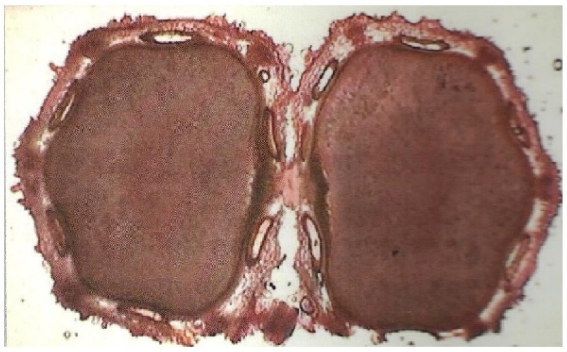
Transverse section of *Anethum graveolens* fruit



Transverse section of *Carum copticum* fruit



The transverse section of *Anethum graveolens* fruit shows a mericarp shows 5 primary ridges ridges being prolongled into membranous wings, under each of which lies a vascular bundle, more developed in the wing; alternating with vascular bundles, 6 vittae are present in each mericarp , 4 on the dorsal and 2 on the commissural surface, raphae lies on the inner side of the non-grooved endosperm embryo small, located in the apical region of the fruit. The powder microscopy shows the presence of oil globules, aleurone grains embedded with micro rosette crystal of calcium oxalate and groups of endosperm cells.

The transverse section of *Carum copticum* fruit shows two hexagonal structures attached with each other by carpophores, epicarps consist of a single layer of tangentially elongated tabular cells, mesocarp consist of moderately thick walled, rectangular to polygonal tangentially elongated cells having some vittae, carpophores and vascular bundles present as group of thick walled radically elongatd cells, endosperm consist of thin walled cells filled with embryo, oil globules, small and circular, composed of thin walled cells. The powder microscopy shows the presence of oil globules and groups of endosperm cells.

PHARMACOLOGICAL STUDY

Table 2: Physico-chemical Parameters analysis of *Anethum graveolens* and *Carum copticum*

Parameters	***Anethum graveolens*** **Observed values (g %)**	***Carum copticum*** **Observed values (g %)**
Moisture	6.4±0.5	7.25±0.6
Total ash	7±0.4	7±0.4
Acid insoluble ash	3±0.5	3±0.6
Water soluble ash	2±0.6	4±0.5

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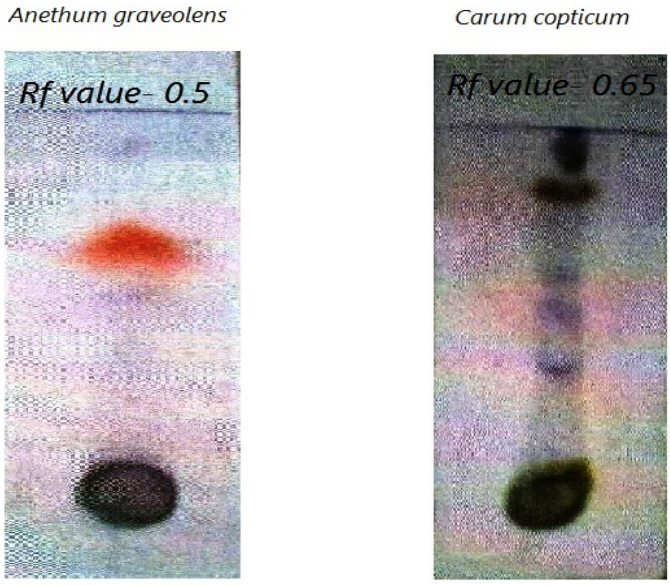
Table 3: Preliminary phytochemical analysis of *Anethum graveolens* and *Carum copticum*

Phytochemical tests	Water Extract		Alcohol Extract	
	Anethum graveolens	***Carum copticum***	***Anethum graveolens***	***Carum copticum***
Alkaloids	+	+	+	+
Carbohydrates	+	+	+	+
Cardiac glycosides	+	-	+	-
Coumarin glycosides	-	+	+	+
Flavonoids	+	+	+	+
Phenol and tannin	+	+	+	+
Proteins and amino acids	+	+	+	+
Saponins	-	-	-	+
Steroids	-	-	-	+
Terpenoids	+	+	+	+

Note: '+'= detected, '-'= not detected

Photo plate 3: Thin layer chromatography of *Anethum graveolens* and *Carum copticum* fruit



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Thin layer chromatography of seed extract of *Anethum graveolens* and *Carum copticum* showed Rf value 0.5 and 0.65 respectively. Antimicrobial activity of methanolic extract of *Anethum graveolens* and *Carum copticum* showed inhibition zone of 14±0.5mm and 15±0.5mm. Hence, *Anethum graveolens* and *Carum copticum* can be used anti-microbials.

Herbal medicines have multiple key components such as flavonoids, terpenoids, saponins, polyphenols, tannins, alkaloids, and polysaccharides that have their individual remedial properties. The use of herbal medicines is not a novel matter but there is a great promise for development of novel drugs from *Anethum graveolens* and *Carum copticum* to treat human diseases as a result of its effectiveness and safety.

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