

Pharmacognostical and phytochemical studies on *Origanum vulgare* L.(Lamiaceae).

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Abstract

With increasing demand in the field of herbal medicines and cosmetics, it has become necessary and pertinent to probe into the area of systematic knowledge about herbal drugs. There is a need for the application of this knowledge in authentication, detailed study and practical utilization of crude drugs. The present paper deals with the taxonomy, anatomy, powder study pertaining to organoleptic, microscopic, fluorescence, physical constant evaluations and phytochemical screening of *Origanum vulgare* L.

Key words: *Origanum vulgare* L., organoleptic, microscopic, fluorescence, physical constant evaluations, phytochemical screening.

Introduction

Herbal medicine has been practiced Worldwide and is now recognized by World Health Organization (WHO) as an essential building block for primary health care¹⁸. The branch of medical science, which deals with the drug plant, is known as Pharmacognosy. This medical science is concerned with history, commerce, collection, selection, identification and preservation of crude drugs and raw materials. Pharmacognosy has a vital link between Ayurvedic and Allopathic systems of medicines. It provides system adhere in the active principle of crude drugs derived from natural origin could be dispensed, formulated and manufactured in dosage forms acceptable to allopathic system of medicine. The medicinal value of drug plant is due to the presence of some chemical substances⁴.

Origanum vulgare L. belongs to the family Lamiaceae. *O. vulgare* L. is a perennial herb, distributed among temperate/ tropical and subtropical regions. Literature survey of this plant indicates its high medicinal value. Aerial part of the plant is used for the treatment of toothache, kidney stone, flatulence, rheumatism, headache, diaphoretic, reconstituent^{3,2} sedative, anxiety² emmenagogue (herbs which stimulate blood flow in the pelvic area and uterus), asthma, jaundice²³ flavoring agent, diuretic, antiseptic¹ nerves tonic^{2,11} vermifuge, spasm, diarrhea, heart tonic, Gastrodynia¹⁹ Inhibition of thrombin Anticancer radical scavenging¹⁷, antihyperglycemic,¹⁴ anti-H. pylori²⁰ antifungal¹⁵. *O. vulgare* L. has been used to give flavor to the cooked food⁷ An additional benefit found by modern science is that *Oregano* abounds with antioxidants of one medium sized apple¹⁰ Proper and detailed Pharmacognostical studies have not been reported so far. So, an

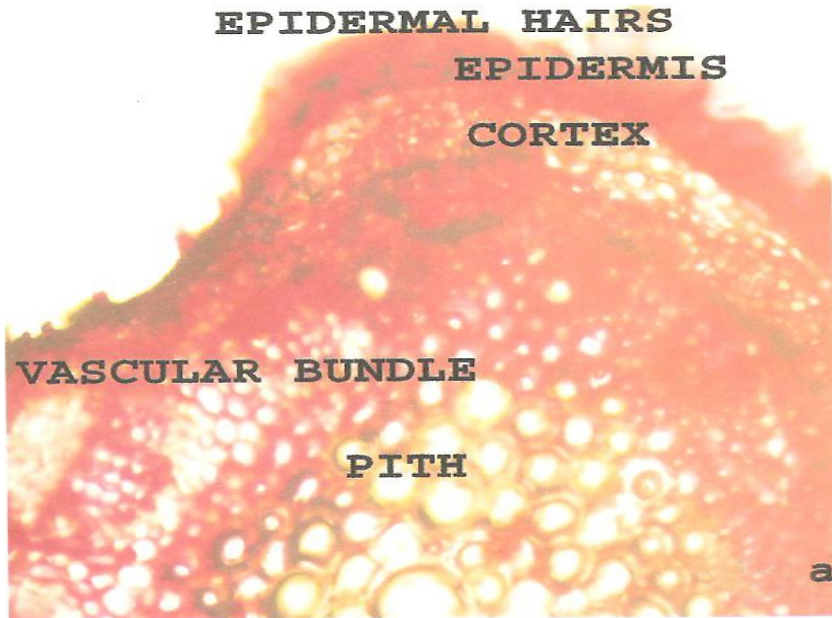
attempt was made to standardize the drug on the basis of botanical and phyto-chemical parameters.

Materials and Methods

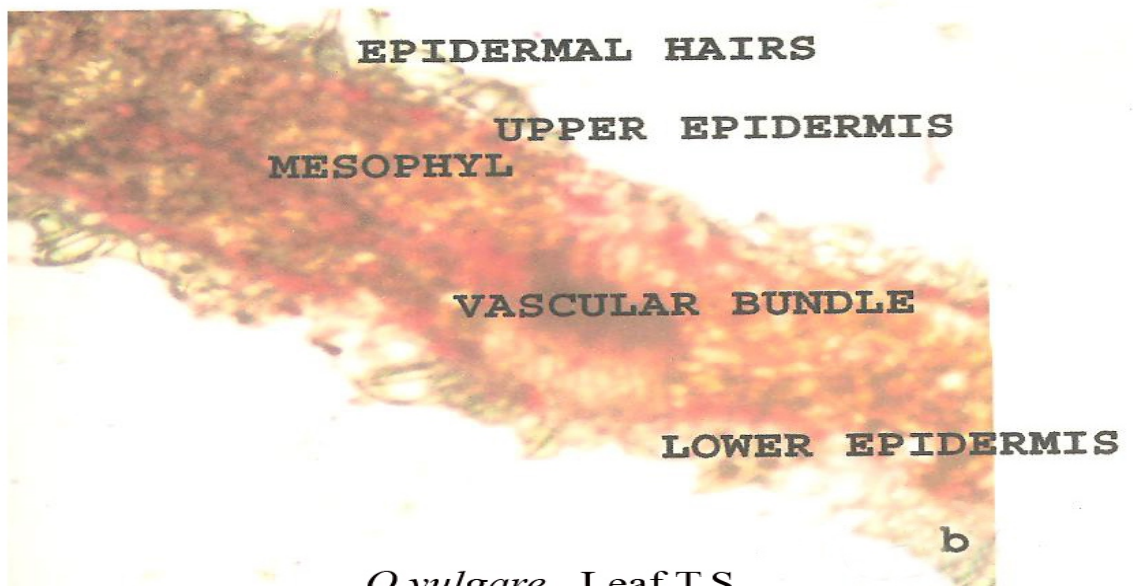
O. vulgare L. is a perennial herb distributed among temperate/ tropical and subtropical regions. Disease free plants were collected from Coimbatore District, during December 2008. The collected plant material was identified and their authenticity was confirmed with the flora of presidency of Madras⁸ and the flora of Tamilnadu Carnatic¹⁶. The voucher specimens (O.V1023-1027) were deposited in the Department of Botany, Kongunadu Arts and Science College. Vegetative parts of the plant was cleaned to remove adhering dust and then dried under shade, finally powdered with the help of pulverizer. This powder was used for further studies. Morphological characters of plants like colour, surface texture, taste and odour were examined (macroscopic-organoleptic evaluation) as per Trease and Evans²¹.

Free hand sections were taken, cleared with chloral hydrate and treated with phloroglucinal and mounted in glycerin. Organoleptic evaluation, histochemical colour reactions, fluorescence evaluations, behaviour of the powder with different chemical reagents, Ash values, and preliminary phytochemical analysis were determined^{21,12,13,22,6,5}

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O. vulgare Stem T.S



O. vulgare Leaf T.S

Observation and Results

Macroscopical Characters

Habit

Erect villous, corymbosely, branched plant with white purple coloured flowers. It is an aromatic herb, bearing angular stem. Flowering season July September.

Taxonomic Description

The leaves are entire, bracts green, ovate obtuse or acute. Flowers dimorphic larger bisexual white purple, smaller female, calyx-teeth short. Corolla obscurely bilipped, upper lip notched or bifid, lower spreading trifid. Stamens 4 distant ascending. Style lobes acute. Fruits are nut lets. The taxonomic features collected from the species have been confirmed with the flora of presidency of Madras⁸ and the flora of Tamilnadu Carnatic¹⁶

T.S of leaf

Epidermis of leaf is single layered, cuticularised and amphistomatic with multicellular epidermal hairs. Mesophyll is distinguished in to Palisade and Spongy Parenchymatous cells. The palisade cells are columnar in outline and single layered. Spongy cells are scattered and loosely arranged. Vascular bundle consists of well developed midrib portion, and are conjoint, collateral and closed (fig-a)

T.S. of stem

The *O. vulgare* L. stem shows ridges and furrows. Epidermis is single layered, cuticularised with long glandular epidermal hairs. Cortex consists of Collenchymatous, Parenchymatous and Chlorenchymatous cells. The ridges consist of Collenchymatous cells. Endodermis is single layered and consists of compactly arranged barrel shaped Parenchymatous cells. Pericycle consists of Sclerenchymatous and Parenchymatous patches. Vascular bundle consists of normal ring, which showed secondary thickening. Cambium is present in between outer phloem and inner xylem. So the vascular bundles are conjoint, collateral and opened (fig.-b)

Organoleptic evaluation

Colour, odour, taste, texture and special features are recorded (table -1). Histochemical colour reactions were noted which possess cellulose, lignin, starch, tannins and mucilage (table-2). Behavior of the powder with different chemical reagents is presented (table-5), which reveals the presence of protein, alkaloids, steroids, flavanoids, starch and anthraquinone. Total ash values, NaOH insoluble ash, ethanol insoluble ash, acid insoluble ash (Hcl), sulphated ash are presented (table-3).

Table 1. Organoleptic evaluation of *O. vulgare* L..

S. No.	Particulars	Observations
1	Colour of Powder	Dark green
2	Odour	Aromatic and pleasant
3	Taste	Bitter and astringent
4	Texture	Smooth
5	Special features	Normal oblong oval leaves, stems quadrangle and opposite leaves.

Table 2. Histochemical colour reactions of *O. vulgare* L..

S.No	Reagents used	Test for	Nature of change	Histochemical zone	Degree of change
1	Phloroglucinol: HCl (1:1)	Lignin	Red	Vascular bundle sclerenchyma cells	+
2	Safranine	Lignin	Red	Vascular bundle sclerenchyma cells	++
3	Iodine solution	Cellulose	Pale yellow	Collenchymas	++
4	Iodine solution	Starch	Reddish brown precipitate	Spongy parenchyma	+
5	Dilute ferric chloride solution	Tannin	Bluish black	Mesophyll	+
6	Methylene blue	Mucilage	pink	Spongy parenchyma	+

Number of + values indicates the intensity of nature of colour change to histochemical zone.

Table 3. Ash values of *O. vulgare* L..

S. No.	Parameters	Ash values in %
1	Total ash value	10.6
2	Sodium hydroxide insoluble ash (NaOH)	5.75
3	Ethanol (insoluble ash)	5.6
4	Acid insoluble ash (HCl)	0.47
5	Sulphated ash (H ₂ SO ₄)	9.4

The values are average of three replicates. Values are expressed in percentage on dry weight basis.

Table 4. Fluorescence evaluation of *O. vulgare* L..

Sl. No.	Treatment	<i>O. vulgare</i>	
		visible	UV (365nm)
1	Benzene	Brownish green	Light pink
2	Petroleum Ether	Dark green	Pinkish
3	Ethanol	Dark green	Colourless
4	Solvent Ether	Dark green	Reddish
5	Chloroform	Dark green	Pink
6	Acetone	Dark green	Reddish
7	Water	Brownish green	Colourless
8	Methanol	Dark green	Dark red
9	Hydrochloric acid (HCl)	Dark green	Pinkish
10	Sulphuric acid (H ₂ SO ₄)	Brownish	Reddish
11	Sodium hydroxide (NaOH)	Dark green	Colourless
12	N- Propanol	Dark green	Pinkish
13	Powder as such	Dark green	Green

Followed ancient paints colour chart.

Table 5. Behavior of the powder of *O. vulgare* L. with different chemical reagents

S. No.	Test	observations	
1	Powder+ picric acid	Yellow colour	Presence of alkaloids
2	Powder+ Conc. Sulphuric acid	Reddish brown colour	Presence of steroids
3	Powder+ aqueous ferric chloride	Green fluorescence	Presence of flavonoids
4	Powder+ iodine solution	Blue colour	Presence of starch
5	Powder+ ammonia solution	Pink colour	Presence of anthraquinone glycoside
6	Powder+ aqueous silver nitrate	White precipitate	Presence of protein
7	Powder+ aqueous potassium hydroxide	Yellow colour	Presence of flavonoids

Table 6. Phytochemical screening of *O. vulgare* L..

S. NO.	Types of compounds	Methanolic extract
1	Alkaloids	++
2	Saponins	++
3	Carbohydrates	+++
4	Glycosides	++
5	Flavonoids	+++
6	Gums and Mucilage	++
7	Proteins and Amino acids	++
8	Tannins and phenolic compounds	++
9	Steroids and sterols	+++
10	Fixed oils and fats	++
11	Triterpenoids	++
12	Resins	++

Number of + values indicates the intensity to colour of the reactions and the compounds

Fluorescence analysis

O. vulgare L. plant powder and the extracts of the powder on various solvents were examined under ordinary light and ultra- violet light (365 nm). This powder was also treated with various chemical reagents and the changes in colour were recorded. These results were presented (table-4), which reveals the presence of fluorescence compound in them.

Phytochemical screening

The phytochemical test reveals the presence of alkaloids, saponins, glycosides, tannins and phenolic compound, fixed oils and fats, triterpenoids, resins, carbohydrate, flavanoids, gums and mucilage, steroids and sterols. Results obtained are presented in table 6.

Conclusion

The macroscopic, microscopic characters, fluorescence analysis, and phytochemical values reported in this paper could be used as the diagnostic tool for the standardization of this medicinal plant. Adulterants if any can be easily identified using these parameters. The microscopic features could help in laying down micro morphological standards as per WHO guidelines for authentication of the drug.

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