



**A COMPARISON STUDY OF MACROSCOPICAL AND MICROSCOPICAL CHARACTERISTICS OF POWDER OF HARITAKI: *TERMINALIA CHEBULA* (PERICARP), YAVANI: *TRACHYSPERMUM AMMI* (FRUIT), AJMODA: *APIUM LEPTOPHYLLUM* (FRUIT) AND SUNTHI: *ZINGIBER OFFICINALIE* (RHIZOME)**

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**ABSTRACT**

*Terminalia chebula*, *Trachyspermum ammi*, *Apium leptophyllum*, *Zingiber officinalie* are herbal medicines having many maladies in Asian traditional medicine. This crude drug powder study was aimed to develop characteristics of powder crude in order to assess the quality of herbal drugs for therapeutic value. We have developed a simple scheme for quality and authentication of botanical ingredients. Due to very little literature is available for quality evaluation of crude drug powder. Samples subjected to botanical characterization. The set parameters were found to be sufficient to evaluate crude drug powder and can be used as reference standards for the quality control /quality assurance study. The powder characteristics of individual drugs are studied by classical pharmacognostical methods. The authenticity of the herbal drugs was confirmed by comparison of their powder characteristics with those given in the literature. A large number of ayurvedic formulations have been marketed but hardly any standards have been laid down for establishing their quality. This work utilizes microscopy as a tool to identify the presence of all the ingredients claimed in the various ayurvedic formulations.

**Keywords:** *Apium leptophyllum*, *Terminalia chebula*, *Trachyspermum ammi*, *Zingiber officinalie*, Macroscopic, Microscopy, Crude drug powder.

**INTRODUCTION**

Traditional medicine is a very important part of health care. Most of population in the developing countries still relies mainly on indigenous traditional medicine for satisfying their primary health care needs, traditional medicine has not however been incorporated in most national health system and the potential of service provided by traditional practitioners is far from being fully utilized<sup>1</sup>. Herbal medicines are assuming greater importance in the primary health care of individuals and communities in many developed as well as developing countries and there has been an increase in international trade in herbal medicines. Because of their uniqueness Ayurvedic products as an alternative system of medicine, and many herbal products of Indian origin, have very good potential to win a considerable share of the world market<sup>2</sup>. The World Health Organization (WHO) has recently defined traditional medicine (including herbal drugs) as comprising therapeutic practices that have been in existence, often for hundreds of years, before the development and spread of modern medicine and are still in use today. Or say, traditional medicine is the synthesis of therapeutic experience of generations of practicing physicians of indigenous systems of medicine. The traditional comprise medicinal plants, minerals, organic matter, etc. Herbal drugs constitute only those traditional medicines which primarily use medicinal plant preparations for therapy. The earliest recorded evidence of their use in Indian, Chinese, Egyptian, Greek, Roman and Syrian texts dates back to about 5000 years.

*Apium leptophyllum* fruits are acrid, thermogenic antispasmodic, stimulant, tonic, digestive, Anthelmintic and carminative. They are useful in flatulence, dyspepsia, diarrhea, pharyngitis, rheumatoid arthritis, bronchitis,

cough, asthma and strangury. They have been shown to possess antibiotic and diuretic properties. They are used as a household remedy for dyspepsia. Fruits astringents, cooling, diuretic, laxative, a rich source of vitamin C. Fruits-cardiac diseases, chronic fever, polyuria, vomiting, constipation, eye diseases, haemorrhage, tuberculosis, dyspnoea, disorders of blood<sup>4</sup>. *Terminalia chebula* is used mainly as an astringent, laxative, stomachic and tonic. The laxative property of *Terminalia chebula* is due to anthracene derivative present in the pericarp. It is also an Anthelmintic. Fruit pulp is used to cure bleeding. it is an ingredient of ayurvedic preparation 'Triphala', used for treatment of variety of ailments. Commercially, it is used in dyeing and tanning industry and also in treatment of water used for locomotive. *Terminalia chebula* is used in treatment of piles and external ulcers<sup>5</sup>. Ajowan is used as antispasmodic, stimulant and carminative. It is also recommended in sore throat and bronchitis. Ajowan is used in preparation of lotion and ointments for checking chronic discharge. *Trachyspermum ammi* oil and dethymolised *Trachyspermum ammi* oil is used as antiseptic, antifungal, insecticide and anthelmintic. The rhizomes of *Zingiber officinale* Roscoe (Zingiberaceae), has widely been used as a spice and condiment in different societies. Besides its food-additive functions, ginger has a long history of medicinal use for the treatment of a variety of human ailments including common colds, fever, rheumatic disorders, gastrointestinal complications, motion sickness, diabetes, cancer, etc. Ginger contains several nonvolatile pungent principles viz. gingerols, shogaols, paradols and zingerone, which account for many of its health beneficial effects. Studies conducted in cultured cells as well as in experimental animals revealed that these pungent

phenolics possess anticarcinogenic properties. This chapter summarizes updated information on chemopreventive and chemotherapeutic effects of ginger-derived phenolic substances and their underlying mechanisms<sup>6</sup>. The herbal medicines / traditional medicaments have, therefore, been derived from rich traditions of ancient civilizations and scientific heritage. Herbal medicine has been enjoying renaissance among the customers throughout the world. However, one of the impediments in the acceptance of the Ayurvedic medicines is the lack of standard quality control profiles. The quality of herbal medicine i.e. the profile of the constituents in the final product has implication in efficacy and safety

## MATERIALS AND METHODS

### Chemical and reagents

The entire chemical used in experiment were of analytical grade. All the solvents used in the experiment were procured from Merck specialities Pvt. Ltd, Mumbai, India.

### Collection and Identification of Plant Material

Haritaki – *Terminalia chebula* (Pericarp, figure 1), Yavani - *Trachyspermum ammi* (fruit, figure 4), Ajmoda – *Apium leptophyllum* (fruit, figure 3,5), Sunthi – *Zingiber officinalie* (Rhizome, figure 2)<sup>7</sup>. All these crude drugs were procured from the local market of Jeypore, Koraput, Odissa, India and were authenticated by botanist Mr. S.R. Dash H.O.D Dept of Botany Vikram Dev College Jeypore, Koraput Odissa. Voucher specimens of the same have been deposited in the museum of Dept. of Pharmacognosy, Jeypore College of Pharmaceutical Sciences, and Jeypore for future reference.

### Method of Preparation

According to the Ayurvedic Formulary of India all ingredients are taken in a stainless steel pan at a low temperature till it becomes free from moisture. Each ingredients *Terminalia chebula* (Pericarp), *Zingiber officinalie* (Rz.), *Apium leptophyllum* (Fr), *Trachyspermum ammi* (Fr.) are powdered individually in a pulverizer and pass through sieve number 80#. It is packed in tightly closed containers to protect from light and moisture.

### Organoleptic evaluation

Table 1 refers to evaluation of formulation by colour, odour, taste, texture etc. Organoleptic characters<sup>8</sup> of the samples were carried out based on the method as described by Siddiqui *et al*.

### Microscopic Identification

Microscopic identification<sup>7</sup> of the botanical ingredients is a standard for statutory purposes in several solid and semi-solid compound formulations. Microscopic identification tests are confined to those formulations where the botanical ingredients are not more than ten, and where they are added 'in situ' in powder form as 'Praksepa Dravya'. Such comminuted ingredients lend themselves for microscopic identification, as they are not drastically changed in cell structure or contents while processing, and appear intact in microscopic slide preparations, after proper treatment. Appropriate processing for separation and isolation of botanical debris from a formulation without loss of debris, by hand picking, shifting, washing, sedimentation, density separation or by floatation etc., are the preliminary steps. This is followed by clearing the debris in chemical reagents, reacting it with suitable reagents and stains and finally mounting a little part on a slide in a medium of suitable refractive index that helps to show the unit structures in good relief. Although monographs prescribe standards only for the 'Praksepa Dravyas', characteristics from other ingredients that are processed into extracts or decoctions prior to their addition to a formulation may also be seen in a slide preparation, giving rise to recognizable unique characteristics. In addition, cell or tissue structures common to several ingredients added to a formulation, and therefore not specific to any one of them, would also be present. Proper study of the individual ingredients using authentic material and reference to their monographs in the Ayurvedic Pharmacopoeia for Single Drugs would help avoid errors of this nature. Skill in the recognition of discrete and disoriented tissue components and the knowledge required to ascribe them to their correct source should be acquired by the analyst.

### Stains and Reagents for Microchemical Reactions

The Ayurvedic Pharmacopoeia volumes on single drugs already include microchemical reactions for ergastic substances and may be consulted in addition to the following for use on isolated debris.

### Chloral Hydrate Solution

Dissolve 50 g of chloral hydrate in 20 ml of distilled water. A valuable clarifying agent for rendering tissues transparent and clear, by freeing them from most of the ergastic substances, but leaving calcium oxalate crystals unaffected.

**Glycerin:** Pure or diluted as required with one or two volumes of distilled water, used as a general mountant<sup>7</sup>.

### Method Microscopic Identification

A few mg of each crude drugs powdered part cleared in chloral hydrate, washed with distilled water and mounted in glycerin (80%).

Table 1: Organoleptic properties of each crude drugs powder

Different drugs powder	Appearance	Colour	Taste	Odour
<i>Trachyspermum ammi</i>	Powder	Light brown	Pungent	Characteristic
<i>Apium leptophyllum</i>	Powder	Brown	Pungent	Characteristic
<i>Terminalia chebula</i>	Powder	dark brown	Astringent	Characteristic
<i>Zingiber officinale</i>	Powder	Whitish brown	Intense	Characteristic



Figure 1: *Terminaila chebula* (P)



Figure 2: *Zingiber officinale* (Rz.)

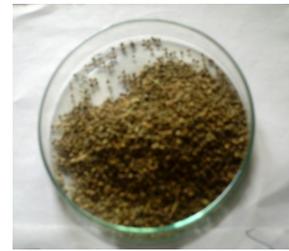


Figure 3: *Apium leptophyllum* (Fr.)



Figure 4: *Trachyspermum ammi* (Fr.)



Figure 5: *Apium leptophyllum*

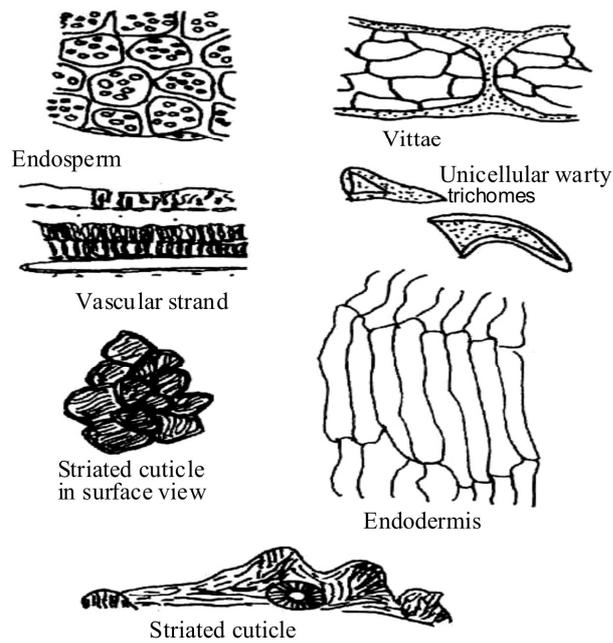


Fig.6-Microscopic study of *Trachyspermum ammi*

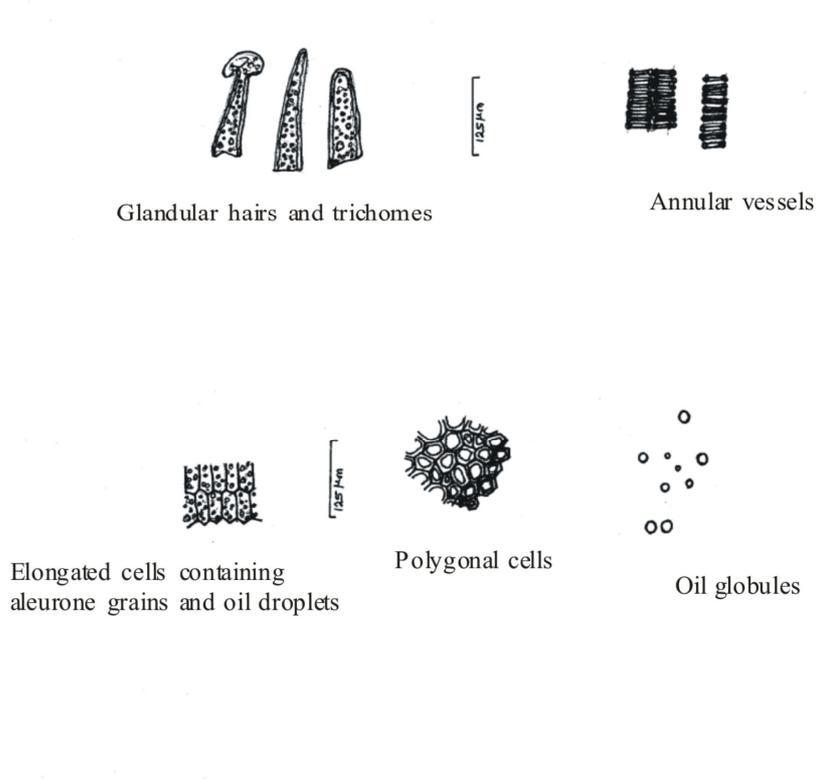


Fig.7-Microscopic study of *Apium leptophyllum*

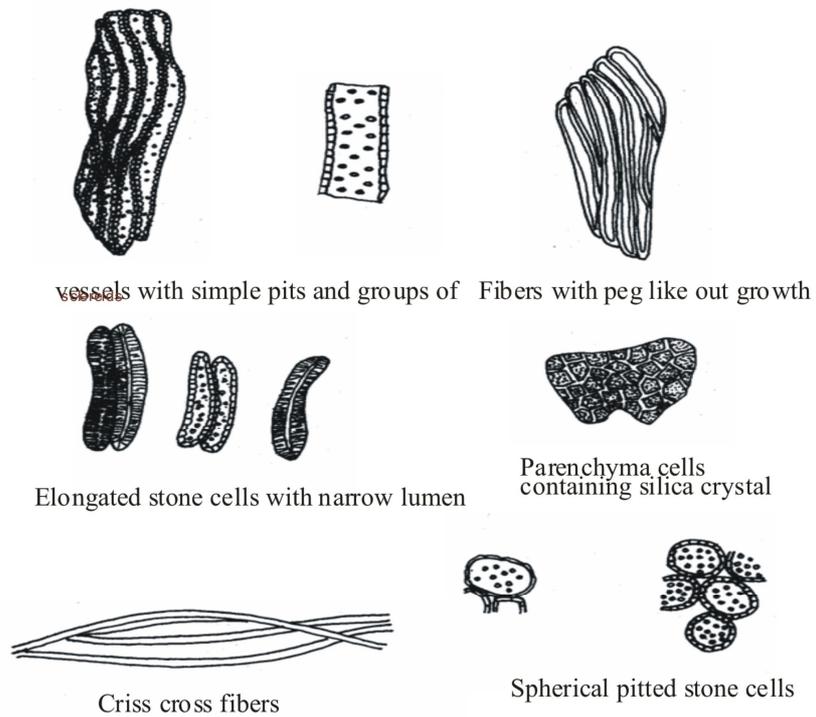


Fig.8-Microscopy structure of *Terminalia chebula*

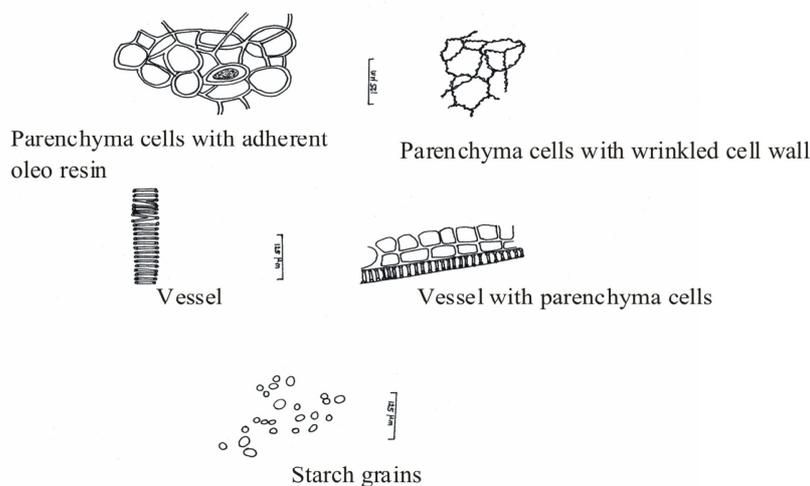


Fig.9-Microscopic study of *Zingiber officinale*

## RESULTS AND DISCUSSION

The proper and meaningful utilization of our medical traditional heritage can only be achieved if each and every formulation mentioned in our indigenous of medicine would be scientifically evaluated and their desired efficacy may be mentioned. The foreign matter was removed and the powder was prepared. A part of the pure powder was kept aside to study the various parameters. All the samples were brown in colour, possessing pungent/salty taste, having characteristic odour, smooth powder. It was observed that more than 50% of all the three samples passed through 80 mesh sieve. Microscopic examination also carried out to see presence of *Trachyspermum ammi* (figure 6), *Apium leptophyllum* (figure 7), *Terminalia chebula* (figure 8), *Zingiber officinale* (figure 9). Glandular hairs, trichomes and elongated cell containing aleurone grain and oil droplets indicated the presence of *Apium leptophyllum*, Vessels and vessel with parenchymatous cells indicated the presence of *Zingiber officinale*, Criss cross fibers and fibers with peg like out growth indicated the presence of *Terminalia chebula*, Unicellular warty trichomes and vittae indicated presence of *Trachyspermum ammi*.

## CONCLUSION

The present study on pharmacognostical character of above herbal drugs will be providing useful information in regard to its correct identity. Ayurvedic medicine has been standardized by intervention with modern scientific quality control measures in the traditional preparation. The above methods are suggested or the standardization of raw plant materials before processing or utilization of plants into formulation. Hence macroscopic parameter, microscopic characteristics may be used quality evaluation of compound formulation. Thus, the results obtained could be used to lay down a set of new pharmacopoeial standards for the preparation of churna,

to obtain optimal efficacy of the medicine. Pharmacognostical characters established for the raw materials could be employed as Q.C. standards for evaluating its identity and can be used for routine analysis. Purity and potency of the raw materials and formulations following the procedure given could be performed in QC/QA laboratory of pharmaceutical house.

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