PHARMACOGNOSTICAL AND PHYSICOCHEMICAL EVALUATION OF CHITRAKA HARITAKI AVALehA: A COMPOUND AYURVEDIC FORMULATION

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ABSTRACT
Chitraka Haritaki Avaleha is a Leha Kalpana (semisolid preparation of drugs, prepared with addition of jaggery and boiled with prescribed decoction) specifically indicated for oral use in treatment of nasal disorders in Ayurveda. It is also indicated in various disorders like Kshaya (Pthisis), Kasa (Cough), Peenasa (Chronic rhinitis/sinusitis), Krimi (Helminthiasis / Worm infestation), Arsha (Haemorrhoids), Swasa (Asthma/dyspnoea) and Agnimandhya (Digestive impairment). In this study, effort has been made to overcome from the controversy regarding ingredients in the finished product of Chitraka Haritaki Avaleha and attempted to standardize the final product as per guidelines of API. In present study it has been used in Nasa Arsha (Nasal Polyposis). The presence of tannins, parenchyma cells, fibers, starch grains, pollen grains, acicular and prismatic crystals of calcium oxalate, rosette crystals, stone cells etc. were the characteristic features observed in the microscopy of prepared formulation. Physicochemical analysis showed that Ash value was 2.5 % w/w, pH was 5.80, Loss on drying was 23.5 % w/w, Alcohol soluble extractive value was 69 %, Water soluble extractive value was 61 % and 97.49 % level of Total sugar in Chitraka Haritaki Avaleha.

INTRODUCTION
Chitraka Haritaki Avaleha is a Leha Kalpana (semisolid preparation of drugs, prepared with addition of jaggery and boiled with prescribed decoction) specifically indicated for oral use in Nasaroga Chikitsa by Chakradutta1 and Bhaisajya Ratnavalli2. It is also indicated in various disorders like Kshaya (Pthisis), Kasa (Cough), Peenasa (Chronic rhinitis/sinusitis), Krimi (Helminthiasis / Worm infestation), Arsha (Haemorrhoids), Swasa (Asthma/dyspnoea) and Agnimandhya (Digestive impairment). In the present study it has been used in Nasa Arsha (Nasal Polyposis). Nasal polyps are most commonly thought to be caused by allergy and recurrent sinus infection resulting into chronic inflammation to the mucous lining of the ethmoidal sinuses causes increased blood vessel permeability which in turn causes edema of the mucosa. Eventually this mucosa, which in effect is the lining of the ethmoids, prolapses out of the sinus. Repeated blowing of the nose encourages growth of the polyp3. An Aushadha (medicine) is one of the treatment modalities mentioned for the treatment of Arsha which can be applied for the disease Nasa Arsha (Nasal polyp). As per literature survey Chitraka Haritaki Avaleha has been used in Kasa and Dushta Pratishhaya, but not in Nasa Arsha. So this is the first study planned to evaluate the efficacy of Chitraka Haritaki Avaleha for its systemic action on Nasa Arsha. It is the need of the hour to come up with a standard formulation without compromising its effectiveness. Standardization of Ayurvedic drugs is taken up with a standard form of Drug Manufacturing Practice in Ayurveda4. So, present work was selected as an initial attempt in this direction to confirm the standards of the prepared formulation Chitraka Haritaki Avaleha as per API1. With following aims and objectives pharmacognostical study of compound formulation Chitraka Haritaki Avaleha and physico-chemical analysis of Chitraka Haritaki Avaleha was carried out.

MATERIALS AND METHODS
The study involved the following operating procedures.

Collection, identification and authentication of raw drugs
The raw drugs except Honey and Jaggery were procured from the Pharmacy, Gujarat Ayurveda University, Jamnagar, Gujarat, India. Honey and Jaggery were procured from local market of Jamnagar, Gujarat, India. The ingredients and the part used are given in the Table 1. The raw drugs were identified and authenticated by the department of Dravyaguna and Pharmacognosy laboratory of IPGT and RA, Gujarat Ayurveda University, Jamnagar, Gujarat, India. The identification was carried out based on the morphological features,
organoleptic characters and powder microscopy of the individual drugs and formulation as per API standards for the authentication.

Preparation of the drug Chitraka Haritaki Avaleha at Pharmacy of Gujarat Ayurved University

Preparation of Yavakoota (Coarse powder)
Chitraka, Amalaki, Gudoochi and Dhashamoola were taken and made into coarse powder separately and then mixed to make a homogeneous mixture. Haritaki was taken as a whole tied in Potali and was kept embedded in whole process of decoction preparation for boiling. At the end of decoction preparation before filtration, Haritaki fruits were taken out and made into paste after removing the seeds.

Preparation of Kwatha (decoction)
Decoction preparation was done as per Sharangadhara Samhita. One part of coarse powder was added with 4 parts of potable water and subjected to heat on medium temperature, until the volume was reduced to 1/4th of its initial quantity. The contents were filtered.

Preparation of Avaleha
In filtered decoction jaggery was added and cooking in medium flame was done in order to make 2 thread condensed sugar mixture when pressed between two fingers. Finally paste of Haritaki was mixed to make homogenous mixture. Then after fine powders of Prakshepa Dravyas were added and stirred continuously and vigorously to form a homogenous mixture. When whole mixture got cooled afterwards honey was added and mixture was finally mixed to get Chitraka Haritaki Avaleha.

Pharmacognostical evaluation
Organoleptic and Microscopic studies of the prepared drug were done as per the guidelines of Ayurvedic pharmacopoeia of India at Pharmacognosy Lab, I.P.G.T and R.A, Jamnagar, Gujarat, India. Little quantity of Avaleha dissolved in the distilled water and placed on slide adding with small quantity of water and observed under the microscope to get the microscopical characters of the ingredients of the Avaleha, then stained with Iodine solution and Sudan III. Microphotographs were taken under the corl zeiss trinocular microscope attached with camera. The diagnostic features obtained were found to be complying with the standards mentioned at respective volumes of API.

Physicochemical analysis of the Chitraka Haritaki Avaleha
Chitraka Haritaki Avaleha was analyzed by using, qualitative and quantitative parameters as per guidelines at Pharmaceutical Chemistry Laboratory of I. P. G.T and R. A., Gujarat Ayurveda University, Jamnagar, Gujarat, India.

RESULTS
Pharmacognostical study of compound formulation-Chitraka Haritaki Avaleha
Organoleptic characters
The organoleptic characters and microscopic characters of Chitraka Haritaki Avaleha are depicted in Table 2.

Microscopic Evaluation
Chitraka Haritaki Avaleha showed presence of tannins, vessels with simple pits, groups of sclereids, spiral vessels, thin walled fibers, multiple simple and compound rounded to oval starch grains, connective and numerous golden yellow pollen grains having 1-3 protuberances, acicular crystals of calcium oxalate, cluster crystals of calcium oxalate, perisperm cells, endosperm cells, mesocarp cells, oil globules, prismatic crystals of calcium oxalate, vessels with bordered pits, thin-walled parenchymatous cells, rosette crystals of calcium oxalate, stone cells, pointed, stratified fibers and trichomes. (Photo Plate-1)

Physicochemical assay of Chitraka Haritaki Avaleha
The prepared drug was analyzed for the physical and chemical parameters such as loss on drying, pH, ash value, sugar content, water soluble extract and alcohol soluble extract. The results are cited in Table 3.

DISCUSSION
Microscopic identification of the botanical ingredients is a standard for statutory purposes in several solid and semi-solid compound formulations. In the present investigation, pharmacognostical and physico-chemical studies were conducted on Chitraka Haritaki Avaleha as per API guidelines. These studies revealed the presence of various important bioactive compounds and proved that these all are medicinally important too. The finished product proved all the ingredients were present in formulation. This showed genuinity and quality of Avaleha. Main ingredient of Chitraka Haritaki Avaleha is Haritaki which contains tannin. Tannins belong to the phenolic class of secondary metabolites. Tannins such as chebulagic acid, chebulinic acid, tannic acid and gallic acid belong the hydrolysable group and are extensively used for medicinal purposes. Terminalia chebula Retz. contains hydrolysable type of tannins. Tannic acid is used to produce tannate salts of certain anti-histamines and anti-tussives to impart increased stability or slow release properties to the API (active pharmaceutical ingredient). Further to this, tannic acid is the principle ingredient in anti-allergen sprays. Orally, tannic acid applied directly can treat sore throat and tonsils and fever blisters. When consumed, tannic acid can mediate bleeding, persistent coughs, cancer etc. A systematic review by Chung et al. (1998) found that tannins have also been reported to exert many physiological effects, such as to accelerate blood clotting, reduce blood pressure, decrease the serum lipid level and modulate immune responses. Sclereids found in Haritaki, Amalaki and Guduchi help to prevent collapse of softer tissues at times of water stress. They are grouped with fibers under the general term sclerenchyma.
1. Tannin content - Haritaki
2. Pitted Sclereids - Haritaki
3. Sclereids - Amalaki
4. Group of Fibers - Amalaki
5. Simple starch grains - Shunthi
6. Annual Vessels - Shunthi
7. Oil globules - Tamalpatra
8. Pollen grains of Nagakesara
9. Compound starch grains - Guduchi
10. Group of sclereids - Guduchi
11. Prismatic crystals - Gokshura
12. Stratified fibers - Gokshura
13. Acicular crystals - Twak
14. Stone cells - Twak
15. Perisperm cells - Maricha
16. Mesocarp cell - Maricha
17. Oil globules - Pippali
Oil globules - Pippali confirmed by sudan III
18. Endosperm cells in surface view-Pippali
19. Cluster crystal of Calcium oxalate-Sukshmaela
20. Starch grains – Chitraka

21. Fibers- Chitraka
22. Bordered pitted vessel- Bilva
23. Starch Grains- Bilva

24. Starch grains- Agnimantha
25. Fibers with pointed ends-Shyonak
26. Prismatic crystals -Patala

27. Thin walled parenchyma- Gambhari
28. Prismatic crystals-Shalaparni
29. Starch and prismatic crystal-Shalaparni

30. Stone cells- Kantakari
31. Stellate Trichomes- Kantakari
32. Round and oval starch grains – Brihati

33. Stellate Trichomes- Brihati
34. Parenchyma cells – Prishnaparni

Photo Plate 1: Microphotographs of Chitraka Haritaki Avaleha
metabolic disorders and infectious diseases in a number of plants. Oxalate is an acid, and its salts occur as an end product of metabolism and Twak (acicular crystals). Oxalic acid (ethanedioic acid), Gokshura, Patala, Shalaparni (prismatic crystal) dynamics pollen with cell walls and plasma membranes. Function of Nagakesara contains within itself sperm cells, complete photosynthetic product in many species by which plants store Starch present in many drugs of Avaleha is the main form parenchyma commonly formed of parenchyma cells. Sclereids, and water. Tissue specialized for food storage is allow the cells to store and regulate
constitutes the “filler” tissue in soft parts of plants. They

Their walls consist of cellulose, hemicellulose and lignin. Sclerenchyma provides the main structural support to a plant. Fibers found in Amalaki, Shyonak and Chitraka has high load-bearing capacity. Parenchyma generally constitutes the "filler" tissue in soft parts of plants. They allow the cells to store and regulate ions, waste products, and water. Tissue specialized for food storage is commonly formed of parenchyma cells. Sclereids, parenchyma and fibers are used to protect other cells. Starch present in many drugs of Avaleha is the main form by which plants store carbohydrate and is a major photosynthetic product in many species. Pollen in Nagakesara contains within itself sperm cells, complete with cell walls and plasma membranes. Function of pollen- Biotic and abiotic pollinator preference and fluid dynamics. Calcium oxalate crystals found in Ela (cluster crystal), Gokshura, Patala, Shalaparni (prismatic crystal) and Twak (acicular crystals). Oxalic acid (ethanedioic acid), and its salts occur as an end product of metabolism in a number of plants. Oxalate is associated with metabolic disorders and infectious diseases. The crystals are especially common in the cells bounding the air chamber of stomata which certainly require some mechanical support. In the case of acicular crystals, so prevalent in monocotyls, it is evident that they give elasticity as well as support against crushing pressure. Perisperm cells and Endosperm cells are identical cells of Trikatu. Mesocarp also is identical cell of Maricha. In experimental studies oil of Piper longum Linn. produced more inhibition of edema than the standard anti-inflammatory drug, ibuprofen. This activity appears to be significant as carrageenan induced paw edema was taken as prototype of exudative phase of inflammation, where development of edema being described as biphasic. The initial phase is attributable to release of various biochemicals, viz. histamine, 5-HT, various kinins in the first hour injection of carrageenan. A more pronounced second phase is related to the release of prostaglandin like substances in 2 to 3 h. The essential oil of Piper longum Linn. reduced the edema induced by carrageenan. Similar pathology occurs in nasal polyp. Tamal has leaf oil the main constituent of which is eugenol (60 – 70 %).
The ingredients were identified and authenticated pharmacognostically and were used for the preparation of Chitraka haritaki avaleha. The formulation was subjected to pharmacognostical and physico-chemical studies. It is inferred that the formulation meets all the standards as reported in the API and useful for further documentation.

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