

Pharmacognostical and Pharmaceutical Analysis of *Dantashodhana Choorna*

Dhara M. Makwana^{1*}, P. K. Prajapati², Manjusha R³, Harisha C R⁴, V J Shukla⁵

¹Department of Shalakya Tantra, IPGT & RA, Gujarat Ayurved University, Jamnagar, India

²Director, IPGT & RA, Gujarat Ayurved University, Jamnagar, India

³Department of Shalakya Tantra Department, IPGT & RA, Gujarat Ayurved University, Jamnagar, India

⁴Department of Pharmacognosy Laboratory, IPGT & RA, Gujarat Ayurved University, Jamnagar, India

⁵Department of Pharmaceutical Chemistry Laboratory, IPGT & RA, Gujarat Ayurved University, Jamnagar, India

Abstract

Introduction: In Ayurveda, many procedures are described for routine oral hygiene. *Dantasharkara* takes place when routine oral hygiene is not maintained. On the basis of signs and symptoms described in classical texts this disease can be correlated with dental calculus. Calculus buildup can be removed with ultrasonic tools but it recurs if oral hygiene is not maintained. *Dantashodhan Choorna* has been mentioned for routine dental cleaning in classical texts. Till date no published data is available regarding evaluation of *Dantashodhanchoorna*. **Methods:** Final product was subjected to Pharmacognostical and physico-chemical analysis such as microscopic study, loss on drying, pH etc.

Results: Pharmacognostical study showed the presence of contents such as; wavy paranchyma cells, bottle necked shape stone cells, blended fibres, yellow content cell with oil globule, cork cells. Preliminary physico-chemical analysis showed that the loss on drying value was found to be 1.47%, pH 6.5 and water soluble extractives 94%. Qualitative study showed the presence of tannins, glycoside etc. High Performance Thin Layer Chromatography (HPTLC) showed 9 and 5 spots at 254nm and 366nm, respectively.

Conclusion: Pharmacognostical and Phytochemical evaluation of *Dantashodhana Choorna* illustrated the specific characters of ingredients which were used in the preparation. Current observations can be considered as standard for future.

Keywords

Dantasharkara, Dantashodhan Choorna, HPTLC, Pharmacognosy, Pharmaceutical Analysis



Greentree Group

Received 08/11/16 Accepted 10/12/16 Published 10/01/17

INTRODUCTION

Dantasharkara is described as one of *Mukharoga* by in Ayurveda¹. This disease takes place when routine oral hygiene is not maintained. *Dantasharkara* means collection of sand like particles i.e., tartar at the junction of teeth and gums and in between the teeth. If the teeth are not cleaned regularly, the food particles (*Mala*), get accumulated and *Kapha* i.e., saliva, are dried by *Vata* and *Pitta* in the mouth. It is rough, hard and is often associated with halitosis². *Dantasharkara* should be scraped without injuring the gums³. *Acharya Sushruta* has mentioned *Dantashodhana Choorna* for routine dental cleaning. This tends to

cleanse and remove the bad smell from the mouth and uncleanliness of the teeth as well as subdue the *Kapha*. It cleanses the mouth and also produces a good relish for food and a cheerfulness of mind⁴. Compositions of *Dantashodhana Choorna* are *Vyosha* (*shunthi, Marich, Pippali*), *Trivarg* (*Twak, Ela, Tamalapatra*), *Tejovti* and *Saindhava* [Table 1]. The drug is used as *Pratisarana*. Drugs used in this formulation are having anti-bacterial, anti-fungal and anti-inflammatory properties. With these properties it not only prevents plaque formation but also helps in curing associated infection and inflammation of gums.

Table 1 Formulation composition of *Dantashodhana Choorna*

| Sr. No. | Name | Botanical / English name | Part used | Praportion |
|-----------------|-----------|-----------------------------------|-----------|------------|
| <u>Vyosha</u> | | | | |
| 1. | ✓ Shunthi | <i>Zingiberofficinale</i> Rose. | Rhizome | 1 parts |
| | ✓ Maricha | <i>Piper nigrum</i> L. | Fruit | |
| | ✓ Pippali | <i>Piper longum</i> L | Fruit | |
| <u>Trivarga</u> | | | | |
| 2. | ✓ Tvak | <i>Cinnamomunzeylanica</i> Bl. | Bark | 1 part |
| | ✓ Ela | <i>Elettariacardamomum</i> Maton. | Fruit | |
| | ✓ Tamala | <i>Cinnamomumtamala</i> Nees. | Bark | |
| 3. | Tejovati | <i>Zanthoxylumarmetum</i> DC. | Bark | 1 part |
| 4. | Saindhava | Rock salt | - | 1 part |

The global acceptance of Ayurvedic system of medicine is increasing day by day. So it becomes the obligation of every individual of this fraternity to ensure the standard of purity, safety and efficacy of both the crude drugs and formulations used in this system

of medicine. With this aim, Pharmacognostical and phytochemical evaluation of *Dantashodhana Choorna* were performed. Preliminary organoleptic features and results of microscopy were

verified and all the ingredients were proved to be authentic.

MATERIALS AND METHODS

Collection of the raw material:

Raw herbal drugs and *Saindhava* were collected from Pharmacy, Gujarat Ayurved University, Jamnagar. Characteristics of the herbal drugs were confirmed by correlating their morphological and microscopical features with relevant literature in pharmacognosy laboratory, IPGT & RA, Gujarat Ayurved University, Jamnagar.

Preparation of the drug:

As specific method of preparation is not mentioned for this drug, it was prepared as per common guidelines described in classics and API for *Choorna* formulation. Physico-chemical and qualitative analysis of the final product were carried out in the pharmaceutical chemistry laboratory of IPGT & RA, Gujarat Ayurved University, Jamnagar under expert guidance.

Microscopic study:

Microscopic evaluation of prepared drug was carried out, first under distilled water for the observation of calcium oxalate crystals and other cellular materials and then stained with Phloroglucinol and ConHCl to

detect the presence of the characteristics of the ingredient drugs and find the probable changes in features if any⁵. Microphotographs were taken by using Carl Zeiss Trinocular microscope⁶. [Plate 1]

Organoleptic study:

Dantashodhana Choorna was evaluated for organoleptic characters like colour, odour, taste, touch. [Table 2]

Table 2 Organoleptic parameters
Dantashodhana Choorna

| Sr. No. | Test | Result |
|---------|--------|--|
| 1. | Colour | Greenish brown |
| 2. | Odour | Light astergent |
| 3. | Taste | Start with salty, pungent followed by bitter |
| 4. | Touch | Fine |

Physico-chemical analysis:

Physico-chemical parameters such as loss on drying, ash value, acid insoluble ash, alcohol soluble extractive, water soluble extractive and pH were determined following standard guidelines⁷. [Table –3]

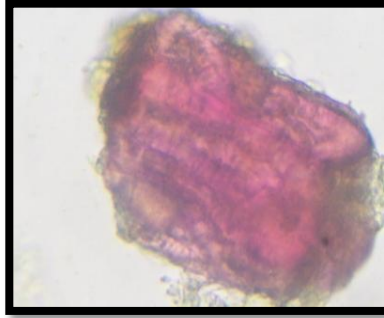
Table 3 Physico-chemical parameters of
Dantashodhana Choorna

| Sr. No. | Test | Result |
|---------|-----------------------------------|------------|
| 1. | Loss on drying (Moisture content) | 1.47% w/w |
| 2. | Ash value | 43.03% w/w |
| 3. | Acid insoluble ash | 0.72% w/w |
| 4. | Water soluble extractives | 94% w/w |
| 5. | Alcohol soluble extractive | 43.8% w/w |
| 6. | pH | 6.5 |

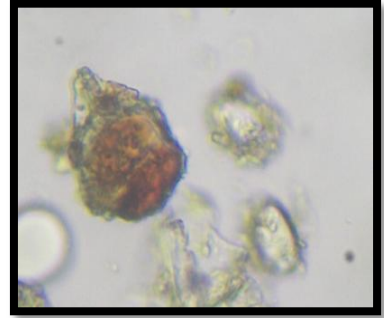
Plate 1 Microscopic characters identified in *DantashodhanaChoorna*



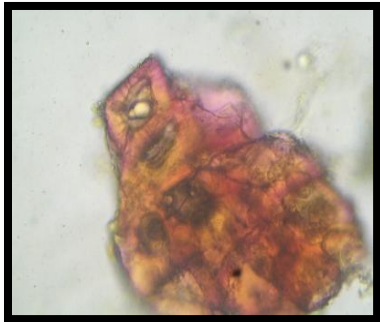
DantashodhanaChoorna



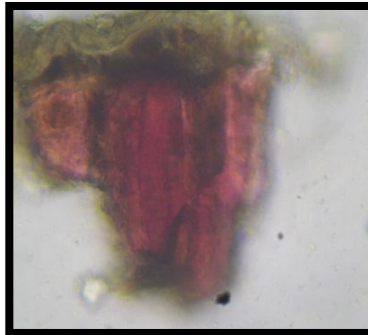
Stone cells of *Maricha* (Stained)



Olirosine content of *Maricha*



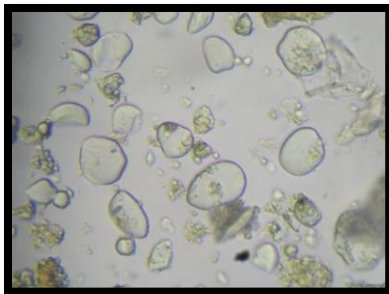
Group of stone cells of *Pippali* with oil globule (Stained)



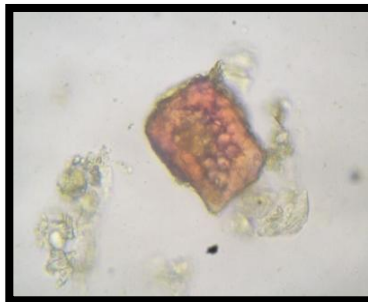
Bottle necked shaped stone cells of *Pippali*



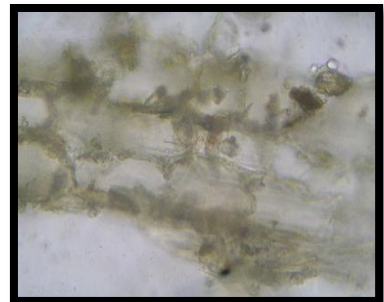
Scalariform vessels of *Shunthi*



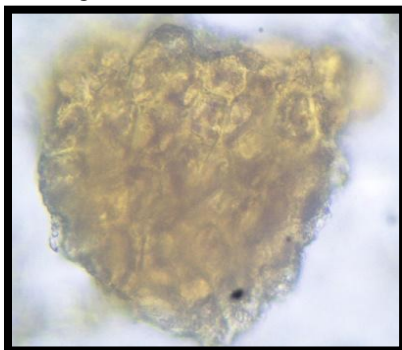
Starch grains of *Shunthi*



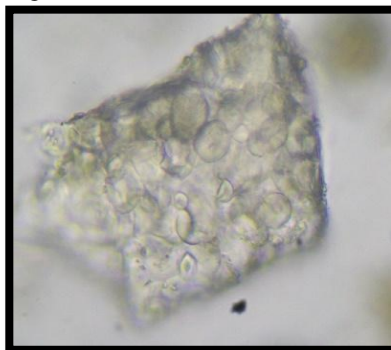
Lignified stone cells of *Twaka*



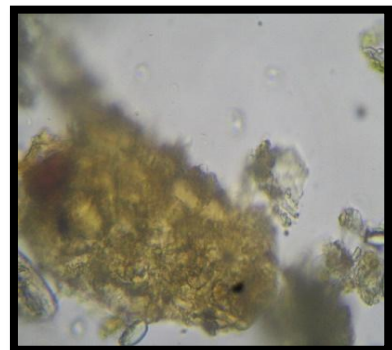
Cork cells of *Twaka*



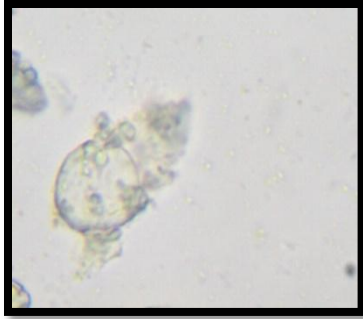
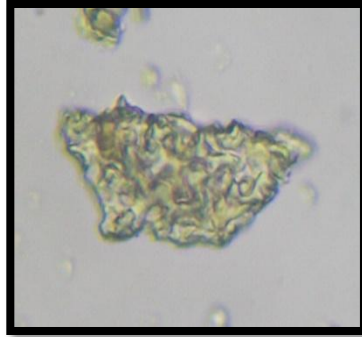
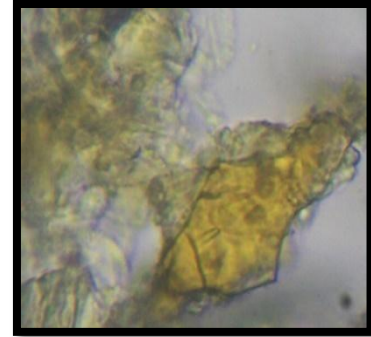
Epicarp cells of *Ela*



Perisperm cells of *Ela*



Epidermal cell of *Tamalpatra* with brown content

Oil globule of *Tamalapatra*Wavy paranchyma cell of *Tejovati*Yellow content of *Tejovati* with oil globule

Qualitative analysis:

Qualitative analysis was carried out on methanolic extract of *Dantashodhana Choorna* to determine the presence or absence of phytoconstituents like alkaloids, tannin and phenolic compounds, flavonoids, saponin and anthraquinone glycosides etc.

[Table 4]

Table 4 Qualitative analysis of *Dantashodhana Choorna*

| Sr. No. | Test | Results |
|---------|--------------------------------|--|
| 1. | Saponification | Abscent |
| 2. | Protein (Biuret test) | Abscent |
| 3. | Amino acid (Ninhydrine test) | Abscent |
| 4. | Alkaloids (Dragendroff's test) | Abscent |
| 5. | Tannin and phenolic compounds | Lead acetate solution HNO ₃ |
| | | White precipitations Reddish to yellow colour |
| 6. | Steroids (Salkowski reaction) | Present |
| 7. | Glycoside | Present |

High Performance Thin Layer Chromatography (HPTLC):

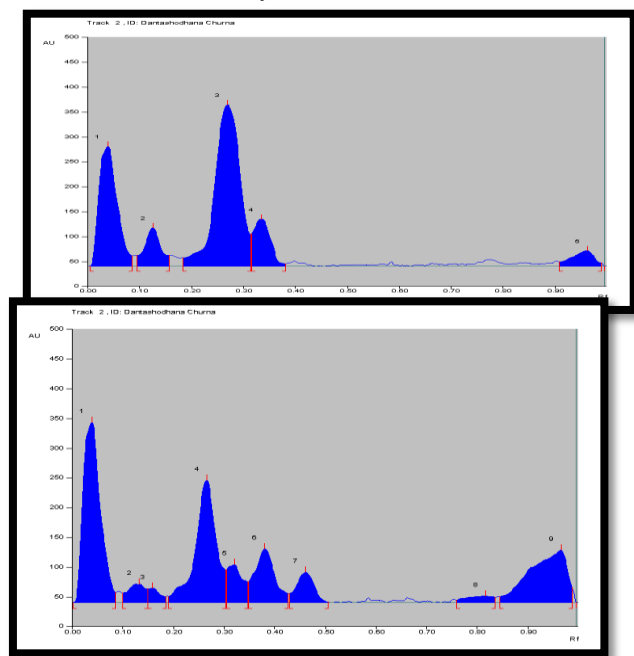
HPTLC was performed as per the guidelines provided in API. Methanolic extract of drug was used for the spotting. Toluene, ethyl

acetate, formic acid in 6:3:1 ratio was used as solvent system and prepared plate was observed under visible light. The colour and R_f values of resolved spots were noted. [Table 5, Plate 2 &3]

Table 5 HPTLC of *Dantashodhana Choorna*

| Sr. No. | Wave length | Number of spots | Maximum R _f values |
|---------|-------------|-----------------|--|
| 1. | 254 nm | 9 | 0.04, 0.13, 0.16, 0.27, 0.32, 0.38, 0.46, 0.82, 0.97 |
| 2. | 366 nm | 5 | 0.04, 0.13, 0.27, 0.33, 0.96 |

Plate 2 HPTLC Study of *Dantashodhana Choorna*



Peak display 366 nm

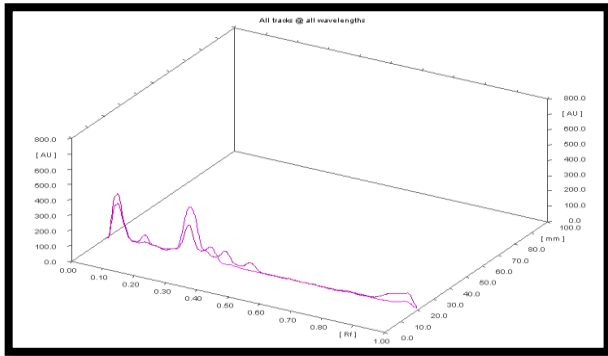


Plate 3 3-D view of HPTLC of *Dantashodhana Choorna*

Pharmacognostical study:

Pharmacognosy study helps in authentication of the commonly used drugs through morphological and histological study. This can prevent the accidental misuse of drugs and adulteration to a greater extent. The present pharmacognostical study revealed the presence of Starch grains, Sacaleri form vessels, Fibers of *Shunthi*, Stone cells of *Pippali*, Dark debris, Stone cells, Oleoresin contents of *Maricha*, Stone cells, Blended fibres of *Twak*, Lignified stone cells filled with starch, Prismatic crystals, Perisperm cells and Epicarp of *Ela*, Epidermal cells with brown content of *Tamala*, Wavy paranchyma cells of *Tejovati* in the ingredients without staining. After staining with Phloroglucinol and HCl characteristic features identified were; Stone cells of *Maricha*, Group of stone cells with

oil globule, Bottle necked shape stone cells of *Pippali*, Cork cells, Lignified fibres of *Twaka*, Lignified fibres of *Ela*, Oil globules of *Tamala*, Yellow content cell with oil globule of *Tejovati*. The presence of all characteristic features signifies the genuinity of the final product.

Physicochemical study:

Preliminary physico-chemical analysis shows, Loss on drying (Moisture content) is 1.47%, ash value is 43.03%, acid insoluble ash is 0.72%. Water soluble and alcohol soluble extractives are 94% and 43.8%, respectively. pH of 5% aqueous solution of the formulation the drug is was 6.5. Moisture content is low; naturally it is desired that the moisture content should be minimum which will help in long storage of the product. Drug is having high solubility in water and comparatively less for alcohol. pH value demonstrates that drug is almost neutral in nature. It is of utmost importance in absorption of drug while using locally in oral cavity and drug will not alter physiology.

Phytochemical analysis:

The phyto-chemical evaluation of *DantashodhanaChoorna* was done and it shows the presence of glycosides, tannins and phenols, steroids. Thus, it can be

inferred that the drug may yield desired pharmacological action.

HPTLC Study:

HPTLC is the most common chromatographic method used by research workers to detect the number of compounds present in product. It also helps to determine the purity of the sample. The results attained in present study show that the active phytoconstituents are more sensitive for long UV radiation that is 366 nm when compared with short UV radiation that is 254 nm.

CONCLUSION

Pharmacognostical and Phytochemical evaluation of *DantashodhanaChoorna* illustrated the specific characters of ingredients which were used in the preparation. As no published pharmacognostical and physico-chemical profiles of *DantashodhanaChoorna* are available; current observations can be considered as standard for future studies.

REFERENCES

- 1 SushrutaSamhita, NibandhaSangraha, Dalhana Comm. by Vd. Y.T. Acharya, Chaukhambha Orientalia, 2005, Nidansthana 16/69; Page-332.
- 2 AshtangHridaya with SarvangaSundari, Padarth Chandrika and Ayurveda Rasayana Comm., Vaidyaratna Pt. Ram Prasad Sharma, Khemraj Shrikrishnadas, 1928, Uttarasthana 21/15,16; Page-532.
- ³SushrutaSamhita, NibandhaSangraha, Dalhana Comm. by Vd. Y.T. Acharya, Chaukhambha Orientalia, 2005, Chikitsasthana 22/36; Page-483.
- 4 Sushruta Samhita, NibandhaSangraha, Dalhana Comm. by Vd. Y.T. Acharya, Chaukhambha Orientalia, 2005, Chikitsasthana 24/8, 9, 10; Page-487.
- 5 Khandelwal KR. Practical pharmacognosy-techniques and experiments. 19th ed. India: NiraliPrakashan; 2008; 26-27
- 6 Trease, G.E., Evans, W.C. Pharmacognosy, 12th Ed. Bailliere Tindall, Eastbourne. U.K. 1983;95-99, 512-547.
- 7 Anonymous (2007). The Ayurvedic Pharmacopoeia of India, 1st ed, Part II, Vol I. Govt. of India. Ministry of Health and Family Welfare, Department of AYUSH; New Delhi, India. p. 140,146,147,163,158