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# PHARMACOGNOSTICAL AND PHARMACEUTICAL ANALYSIS OF *TRIKATU, PANCHAKOLA* AND *SHADUSHNA CHURNA*

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## ABSTRACT

*Trikatu*, *Panchakola* and *Shadushna Churna* are the compound Ayurvedic formulations prescribed in the management of indigestion. Pharmacognostical study accounting powder microscopy of raw drug exposed the quality and genuineness of all the constituents of all *Churna*. Organoleptic features of coarse powder made out of the crude drugs were within the standard range. Loss on drying was 10.58% w/w, 8.49% w/w and 8.905% w/w of *Trikatu*, *Panchakola* and *Shadushna Churna* respectively. The pH observed was 6.8, 6.5 and 6.5 respectively. Total ash of powders was 4.509%, 7.363% and 6.984%. Water soluble extractive of *Churnas* was 16.8% w/w, 13.8% w/w and 17.6% w/w respectively. Alcohol soluble extractive was 22.7% w/w, 8.6% w/w and 8.5% w/w respectively. This shows the presence of certain definite constituents in the *Churna* and is helpful for the easy separation of these constituents.

**KEYWORDS:** *Trikatu Churna*, *Panchakola Churna*, *Shadushna Churna*, Pharmacognosy, Pharmaceutics, HPTLC.

## INTRODUCTION

In Ayurveda, the drugs are selected for performing any type of work according to its *Gunas* (properties). The *Dravyas* in Ayurveda are multidimensional in nature. All the formulations in Ayurveda, altogether are designed taking into consideration a diverse number of aspects.

The formulations may at times contain a single or scores of ingredients, belonging to the same source or even may not. The combination of the ingredients is also done in a specialized fashion. Besides, the action manifested by a drug in presence of others is quite different than those exhibited by it singly. Thus, the formulations in Ayurveda are skilfully fabricated together that each holds a distinct mechanism but together in synergy they work in accord to put on a display a specific mode of action. There are many formulation in Ayurveda, where the drugs are grouped together both on the basis of morphological as well as pharmacological qualities.

*Trikatu* is the amalgamation of *Shunthi*, *Maricha* and *Pippali*.[1] When it combined with *Chavya*, *Chitraka* and *Pippalimoola*, it converted into *Shadushna*.[2] When *Marich* is detached from that, it come to be *Panchakola*.[3] Henceforth, in the present study three groups viz. *Trikatu, Panchkola* and *Shadushna* were taken into consideration.

*Trikatu* and *Panchakola* are mainly found in all the Ayurvedic texts. While *Shadushna* first time mentioned in Bhavaprakasha Nighantu. Then after it is available in Yogaratnakara, Bhaishajya Ratnavali, Vangasena Samhita, Chakradutta, Kaiyadeva Nighantu, Madanapala Nighantu, Priya and Shaligram Nighantu.

**Importance of present study**

Substances differ in their *Gunas* (attributes) which reflects through the physical as well as chemical properties. The Ayurvedic Pharmacopoeia of India has already developed the standards for single drugs i.e. *Shunthi, Maricha, Pippali, Pippalimoola, Chavya* and *Chitraka* of this compound. Hence, attempts have been made for development of preliminary analytical profile of *Shadushna Churna* (mixture of these six) before its administration and comparison pharmacognostical as well as the physico-chemical properties of *Trikatu, Panchakola* and *Shadushna Churna.*

## MATERIALS AND METHODS

**Collection, Identification and Authentication of raw materials**

Raw drugs of *Trikatu, Panchakola* and *Shadushna Churna* were procured from Jamnagar and were identified and authenticated at Pharmacognosy laboratory.

**Pharmacognostical evaluation**

As per Ayurvedic Pharmacopeia of India, All the drugs were identified and authenticated by the Pharmacognosy Lab. The identification was carried out based on the organoleptic features and powder microscopy of the individual drugs. Later, pharmacognostical evaluation of all *Churnas* were carried out. All *Churnas* dissolved in small quantity of distilled water, studied under the Carl zeiss trinocular microscope attached with camera, with stain and without stain respectively.[4] The microphotographs were also taken under the microscope.

**Preparation of Drug**

All *Churnas* were prepared as per classical method as mentioned in Bhavaprakasha Nighantu. All ingredients were taken in prescribed ratio equal in quantity (Table 1, 2 & 3).

**Table 1: Composition of *Trikatu Churna.***

| No. | Name of Drug | Botanical name | Part used | Proportion |
|---|---|---|---|---|
| 1. | *Shunthi* | *Zingiber officinale* Roscoe. | Dried Rhizome | 1 part |
| 2. | *Maricha* | *Piper nigrum* Linn. | Fruit | 1 part |
| 3. | *Pippali* | *Piper longum* Linn. | Fruit | 1 part |

**Table 2: Composition of *Panchakola Churna.***

| No. | Name of Drug | Botanical name | Part used | Proportion |
|---|---|---|---|---|
| 1. | *Shunthi* | *Zingiber officinale* Roscoe. | Dried Rhizome | 1 part |
| 2. | *Pippali* | *Piper longum* Linn. | Fruit | 1 part |
| 3. | *Pippalimoola* | *Piper longum* Linn. | Rhizome | 1 part |
| 4. | *Chavya* | *Piper retrofractum* Vahl. | Root | 1 part |
| 5. | *Chitraka* | *Plumbago zeylanica* Linn. | Root | 1 part |

**Table 3: Composition of *Shadushna Churna.***

| No. | Name of Drug | Botanical name | Part used | Proportion |
|---|---|---|---|---|
| 1. | *Shunthi* | *Zingiber officinale* Roscoe. | Dried Rhizome | 1 part |
| 2. | *Pippali* | *Piper longum* Linn. | Fruit | 1 part |
| 3. | *Pippalimoola* | *Piper longum* Linn. | Rhizome | 1 part |
| 4. | *Chavya* | *Piper retrofractum* Vahl. | Root | 1 part |
| 5. | *Chitraka* | *Plumbago zeylanica* Linn. | Root | 1 part |
| 6. | *Maricha* | *Piper nigrum* Linn. | Fruit | 1 part |

**Analytical study**

*Trikatu, Panchakola* and *Shadushna Churna* were analyzed by employing various analytical parameters. Physicochemical analysis was also carried out. Organoleptic characteristics (colour, odour, taste, touch) were assessed (Table 4) along with physicochemical analysis

such as loss on drying, pH value, water soluble abstractive, alcohol soluble abstractive and ash value tests were carried out and depicted in (Table 8).

**HPTLC**

Ethanol extract of *Trikatu, Panchakola* and *Shadusha Churna* was used for HPTLC. The chromatogram was then developed on Methanol: Ethyl acetate: Chloroform in 8 steps over a development distance of 80 mm by employing Stepwise development technique. The results obtained were represented as Bar graph (Tableau Desktop version 10.4.3.) by taking into consideration the total no. of spots obtained in each sample at 254 nm and 366 nm.[5],[6]

## OBSERVATIONS AND RESULT

### Pharmacognostical Evaluation

Result of organoleptic characters are shown in table 4.

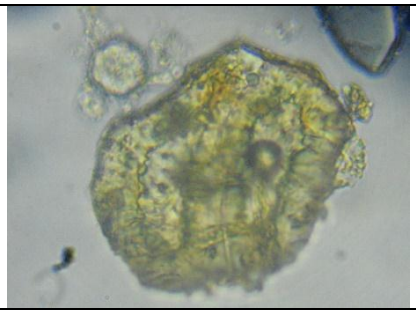
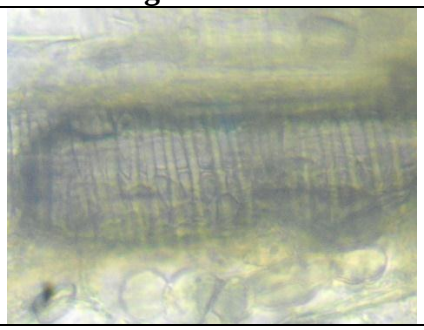
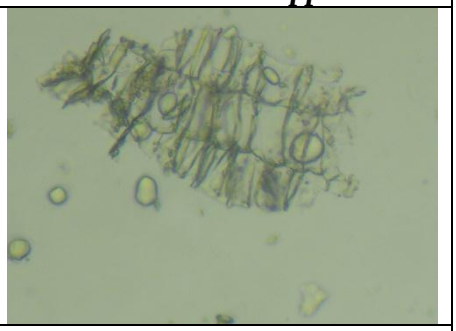
**Table 4: Organoleptic parameters.**

| No. | Organoleptic parameter | *Trikatu Churna* | *Panchakola Churna* | *Shadushna Churna* |
|---|---|---|---|---|
| **1.** | Texture | Fine | Fine | Fine |
| **2.** | Color | Yellowish brown | Light brown | Light brown |
| **3.** | Odour | Strong pungent | Pungent | Strong pungent |
| **4.** | Taste | *Katu* | *Tikshna – Kashaya* | *Katu – Kashaya* |

### Microscopic Evaluation

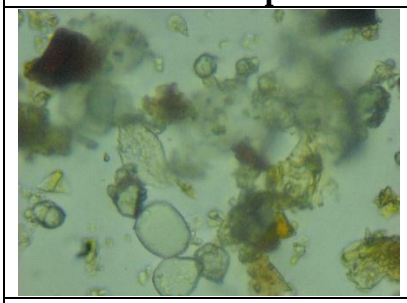
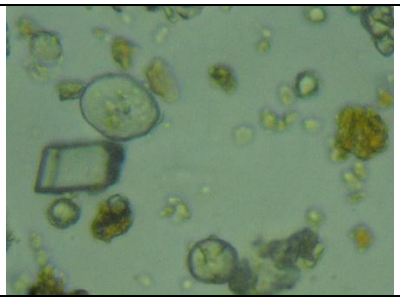
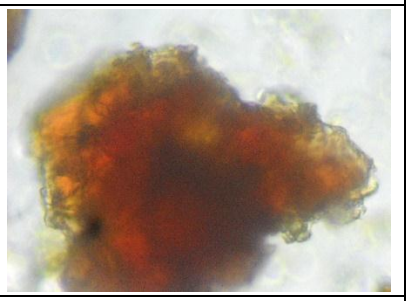
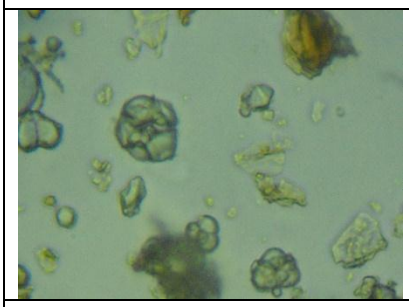
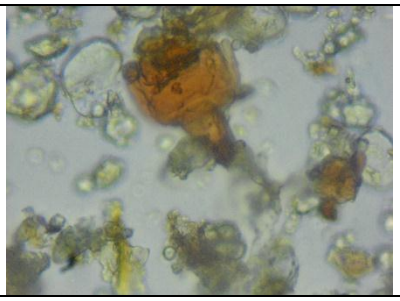
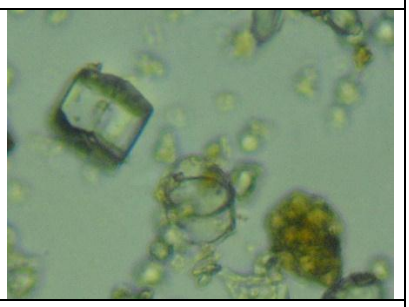
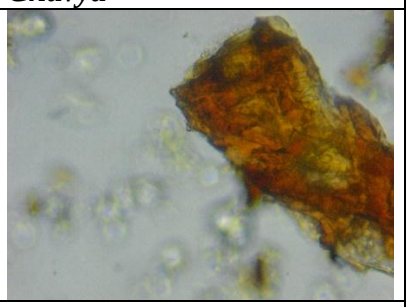
The diagnostic microscopic characters of *Trikatu Churna* showed Simple fiber of *Shunthi*, Starch grains of *Shunthi*, Stone cell of *Pippali*, Black debris of *Pippali*, Scalariform vessels of *Shunthi*, Cork cell of *Shunthi*, Stone cell of *Maricha*, Lignified stone cells of *Pippali*, Black debris of *Maricha*, Iodine stained starch grains of *Shunthi*. (Table 5)

**Table 5: Microscopic Characters of *Trikatu Churna.***

| | | |
|---|---|---|
|  |  |  |
| **Simple fiber of *Shunthi*** | **Starch grains of *Shunthi*** | **Stone cell of *Pippali*** |
|  |  |  |
| **Black debris of *Pippali*** | **Scalariform vessels of *Shunthi*** | **Cork cell of *Shunthi*** |
|  |  |  |
| **Stone cell of *Maricha*** | **Lignified stone cells of *Pippali*** | **Black debris of *Maricha*** |

The diagnostic microscopic characters of *Panchakola Churna* showed Starch grains of *Shunthi*, Prismatic crystals of *Chitraka*, Tannin contains of *Chitraka*, Compound starch grains of *Pippalimoola*, Brown contents of *Pippalimoola*, Rhomboidal crystals of *Chavya*, Stone cells of *Pippali*, Fibers of *Shunthi*, Cork cells with brown content of *Pippalimoola*, Annular vessels of *Pippalimoola*, Fibers of *Chitraka*, Stone cells of *Pippali*, Scalariform vessels of *Shunthi*, Pitted vessels of *Chitraka*, Lignified scleroids of *Chitraka*, Lignified fibers of *Chavya*, Lignified annular vessels of *Pippalimoola*, Oil globules of *Pippali*. (Table 6).

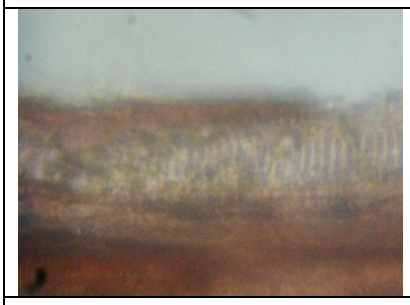
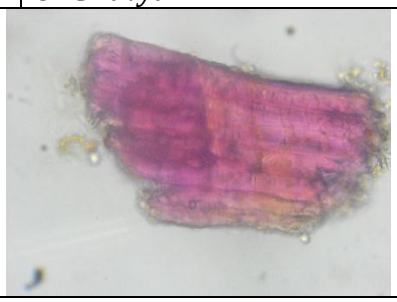
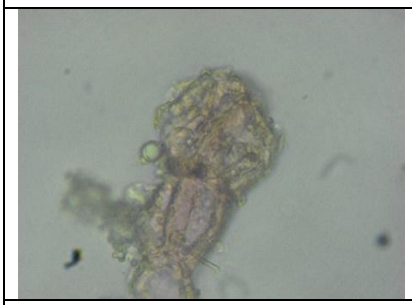
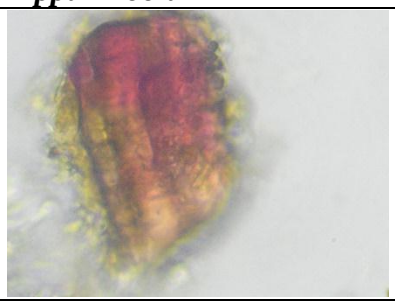
**Table 6: Microscopic Characters of *Panchakola Churna.***

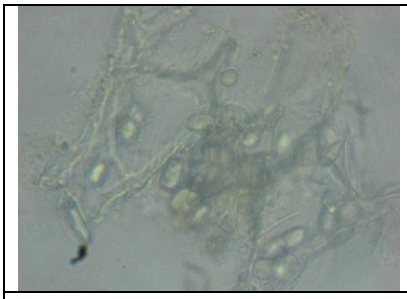
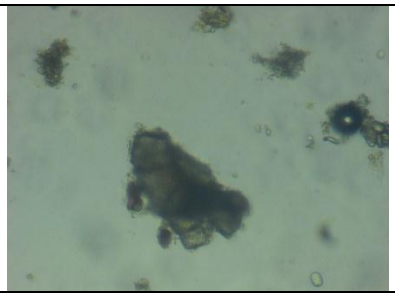
| | | |
|---|---|---|
|  |  |  |
| **Starch grains of *Shunthi*** | **Prismatic crystals of *Chitraka*** | **Tannin contains of *Chitraka*** |
|  |  |  |
| **Compound starch grains of *Pippalimoola*** | **Brown contents of *Pippalimoola*** | **Rhomboidal crystals of *Chavya*** |
|  |  |  |
| **Stone cells of *Pippali*** | **Fibers of *Shunthi*** | **Cork cells with brown content of *Pippalimoola*** |
|  |  |  |
| **Annular vessels of *Pippalimoola*** | **Fibers of *Chitraka*** | **Stone cells of *Pippali*** |

The diagnostic microscopic characters of *Shadushna Churna* showed Starch grains of *Shunthi,* Black debris of *Pippali,* Simple Fibers of *Shunthi,* Black debris of *Chavya,* Fibers with phloem content of *Chavya,* Stone cells of *Pippalimoola,* Lignified vessels of *Shunthi,* Lignified scleroids of *Pippalimoola,* Lignified stone cells of *Chavya,* Group of stone cells of *Maricha,* Stone cells of *Pippali,* Oleoresin of *Shunthi,* Parenchymal cells along with starch grains of *Shunthi,* Black debris of *Maricha,* Tannin content of *Chitraka,* Stone cells of

*Chitraka*, Lignified fibers of *Chitraka*, Bottle neck stone cells of *Pippali*, Pitted vessels of *Chavya*, Cork cells with brown content of *Chavya*. (Table 7).

**Table 7: Microscopic Characters of *Shadushna Churna.***

| | | |
|---|---|---|
|  |  |  |
| **Starch grains of *Shunthi*** | **Black debris of *Pippali*** | **Simple Fibers of *Shunthi*** |
|  |  |  |
| **Black debris of *Chavya*** | **Fibers with phloem content of *Chavya*** | **Stone cells of *Pippalimoola*** |
|  |  |  |
| **Lignified vessels of *Shunthi*** | **Lignified scleroids of *Pippalimoola*** | **Lignified stone cells of *Chavya*** |
|  |  |  |
| **Group of stone cells of *Maricha*** | **Stone cells of *Pippali*** | **Oleoresin of *Shunthi*** |

| | | |
|---|---|---|
|  |  |  |
| **Parenchymal cells along with starch grains of *Shunthi*** | **Black debris of *Maricha*** | **Tannin content of *Chitraka*** |
|  |  |  |
| **Stone cells of *Chitraka*** | **Lignified fibers of *Chitraka*** | **Bottle neck stone cells of *Pippali*** |

**Physicochemical Evaluation**

Result of Physicochemical evaluation are shown in table 8.

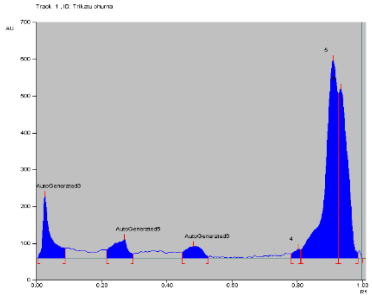
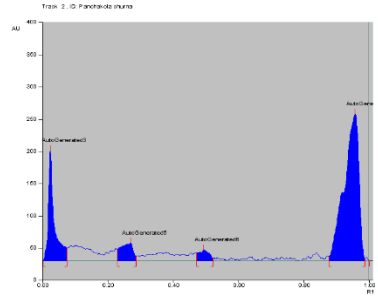
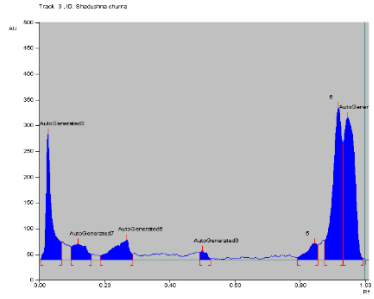
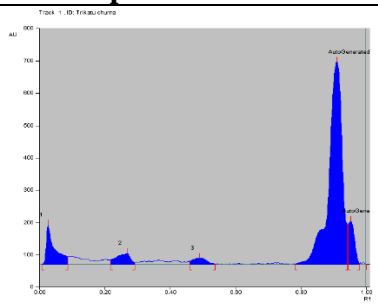
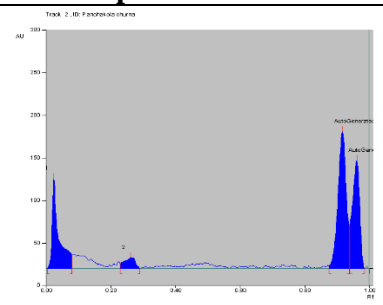
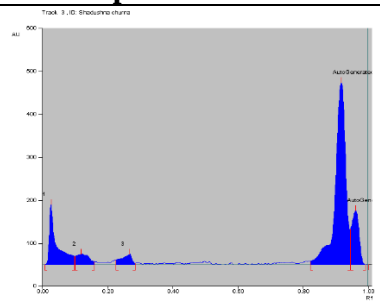
**Table 8: Physicochemical evaluation.**

| Sr. No. | Parameters | *Trikatu Churna* | *Panchakola Churna* | *Shadushna Churna* |
|---|---|---|---|---|
| 1. | % of loss on drying | 10.58 % w/w | 8.49 % w/w | 8.905 % w/w |
| 2. | Ash value | 4.509 % | 7.363 % | 6.984 % |
| 3. | water soluble extractive | 16.8 % w/w | 13.8 % w/w | 17.6 % w/w |
| 4. | alcohol soluble extractive | 22.7 % w/w | 8.6 % w/w | 8.5 % w/w |
| 5. | pH value | 6.8 | 6.5 | 6.5 |

**HPTLC Study Result**

HPTLC of *Trikatu Churna* under 254 nm showed 6 spots and under 366 nm showed 5 spots with recorded Rf values. HPTLC of *Panchakola Churna* under 254 nm showed 4 spots and under 366 nm showed 4 spots whereas HPTLC of *Shadushna Churna* under 254 nm showed 7 spots and under 366 nm showed 5 spots. (Table 9)

**Table 9: HPTLC Densitogram of the drugs.**

| *Trikatu Churna* | *Panchakola Churna* | *Shadushna Churna* |
|---|---|---|
|  |  |  |
| **6 spots at 254 nm** | **4 spots at 254 nm** | **7 spots at 254 nm** |
|  |  |  |
| **5 spots at 366 nm** | **4 spots at 366 nm** | **5 spots at 366 nm** |

## DISCUSSION

Pharmacognostical evaluation showed that all the Yoga contains all the ingredients which were observed in the microscopic characters, this shows the purity and quality of the product. Phytochemical analysis showed that material gains moisture during storage, which eventually may affect the quality of product. Average value of Loss on drying was found within normal limits, which indicates prompt care taken during packaging and storage of product.

The obtained values of *Trikatu* were found within normal limits as compared to the article by Shailajan Sunita et al[7], Akhileshkumar et al[8] and Mudiganti Ram Krishna Rao et al.[9] Likewise the values of *Panchakola Churna* were found within normal limits as compared to Mridul Ranajan et al.[10] As per scholar's knowledge no study has been done on *Shadushna Churna*. Thus the obtained values of these teats were found within normal limits in *Trikatu*, *Panchakola* and *Shadushna Churna*, which indicates good quality of products.

*Trikatu Churna* was having minimum Ash value and *Panchakola* Maximum i.e. 4.509% and 7.363% respectively, while in *Shadushna* it was 6.984%; same way water soluble extract (%) and Alcohol soluble extract was as mentioned in the table no.8. This shows that when drug are mixed with each other they starts acting as yoga, not an individuals and here, the result is

somehow average to three. There are some values in *Trikatu* and *Shadushna* are vary from *Panchakola*, so here it can be considered as *Maricha* as the reason for that.

## CONCLUSION

Pharmacognostical evaluation of *Trikau, Panchakola* and *Shadushna Churna* illustrated the specific characters of ingredients which were used in the preparation. The results of Physico-chemical analysis have shown the values of all three components were similar to standards, which supports authentication, good quality and purity of drug.

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