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ORIGINAL RESEARCH ARTICLE

Pharmacognostical and Pharmaceutical Assay of *Balachaturbhadra churna* - A Compound Ayurvedic Formulation

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ABSTRACT

BalachaturbhadraChurna is an important and widely practiced formulation in Ayurvedic pediatric practice which works on respiratory disorders, fever, diarrhoea and vomiting of children. In the present study an attempt has been made to develop pharmacognostical and pharmaceutical standards for BCB. The pharmacognostical study reveals the presence of starch grain cells, calcium oxalate, tannin and fibres. Physico-chemical parameters show that percentage of water soluble material is more than alcohol soluble extract. The phyto-chemical evaluation of *Balachaturbhadra churna* shows that the presence of carbohydrates, steroids, cardiac glycosides, flavanoids, alkaloids, tannins and phenols. The preliminary HPTLC study of the compound reveals the components are more sensitive to short UV 254nm having 17 spots compared to long UV 366nm with 14 spots. Evaluation of *Balachaturbhadra churna* can be used as a quality control tool for manufacturing and processing of BCB.

Key words: *Balachaturbhadra churna*, HPTLC, pharmacognostical and pharmaceutical standards.

INTRODUCTION

Ayurveda, the Indian traditional system of medicine has been curing the ailments of living beings since ages. The pediatric health in Ayurveda is dealt under the discipline of *Kaumarbhritya*. From the view of a child's tenderness, dependency on others and inability to speak as well as act, the dose of medicine for children should be very small and appropriate to the disease [1].Children being more vulnerable, special care has to be taken in selecting the drugs and formulations.

A very few formulations have been mentioned in Ayurvedic texts with its specific use for children. *BalachaturbhadraChurna* is one such important and widely practiced formulation which works on respiratory disorders, fever, diarrhoea and vomiting of children [2].

It is purely an Ayurvedic herbal preparation containing four drugs namely *Musta* (*Cyprus rotundus*Linn.), *Pippali*(*Piper longum*Linn.), *Ativisha* (*Aconitum heterophyllum*Wall.) and *Karkatashringi* (*Pistaciaintegerrima* Stew.). There are only a few works carried out regarding the standardization of the compound formulation *Balachaturbhadra churna.* Lack of standardization of poly-herbal formulations creates difficulty in validating the efficacy and maintaining quality of the product. There is no consistency in batch to batch production of herbal /traditional drugs. It is important to ensure the standard and quality right from the raw drugs to the finished product. Hence an attempt has been

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made to study *BalachaturbhadraChurna* by pharmacognostical, preliminary phytochemical, physico-chemical parameters and to develop HPTLC (High-Performance Thin Layer chromatography study) fingerprints of the compound formulation *BalachaturbhadraChurna.*

MATERIALS AND METHODS

Collection of raw drugs

Raw drug materials were collected from the raw drug store of pharmacy, Gujarat Ayurved University.The ingredients and the part used are given in (**Table 1**).

Table 1:Constituents of *Balachaturbhadra churna*

Name of drug	Botanical name	Part used	Proportion
Musta	*Cyprus rotundus* Linn.	Rhizome	1 part
Pippali	*Piper longum* Linn.	Fruit	1 part
Ativisha	*Aconitum heterophyllum* Wall	Root	1 part
Karkatashringi	*Pistaciaintegerrima* Stew.	Gall	1 part

Method of preparation:

The rhizome of *Cyprus rotundus*Linn, fruits of *Piper longum*Linn, roots of *Aconitum heterophyllum*Wall. and gall of *Pistaciaintegerrima*Stew. were collected. Drugs were dried properly by shade drying, powdered by micro–pulverizer and stored in an air–tight container. The *BalachaturbhadraChurna* was prepared by mixing the powder of above four ingredients in equal Proportions.

Microscopic study of *BalachaturbhadraChurna*:

The study was carried out at Pharmacognosy dept., I.P.G.T& R.A.,Gujarat Ayurved University, Jamnagar,Gujarat.

2gms of *BalachaturbhadraChurna* was mixed with distilled water and was mounted on slides for the study. The characters were studied with and without staining. Staining was done with phloroglucinol and conc. HCl. Microphotographs was taken using Carlzeisstrinocular microscope [3].

Analytical study:

Analytical study was carried out at Pharmaceutical Chemistry Laboratory of I.P.G.T& R.A., Gujarat Ayurved University, Jamnagar, Gujarat.

Organoleptic parameters were assessed. Preliminary Phyto-chemical[4]investigations likeMolish's test, Salkowski test, Keller-killiani test, Foam test, Flavonoid test, Dragendroff's test, test for tannins and phenols were performed.Physico-chemical analysis [5] like loss on drying, ash value, water and alcohol soluble extract, pH value and particle size were carried out by following standard procedure. High Performance Thin layer chromatography (HPTLC) [6] studies were carried out with acid hydrolysedmethanolic extract. Following procedure was adopted in chromatography.

Chromatographic conditions:

The following Chromatographic Conditions were used.

1)Stationary phase : Silica gel GF 254(E.Merck) precoated TLC plates

2)Mobile phase : Toluene:Ethyl acetate:Acetic acid (7:2:1 v/v/v)

3)Sample volume : 5µl

4) Sample for HPTLC:Methanol extract of BalchaturbhadraChurna

5) Spray reagent : Vaniline sulfuric acid

Instrumental Conditions:

Application mode : CamagLinomat V

Development Chamber : Camag Twin trough Chamber.

Plates : Precoated Silica Gel GF_{254} Plates.

Chamber Saturation : 30 min.

Development Time : 30 min.

Development distance : 7 cm.

Scanner :Camag Scanner III.

Scanning mode : Linear at 254 nm and 366 nm

Photo documentation : CAMAG reprostar

Detection : Deuterium lamp, Tungstun lamp

Data System : Win cats software

Drying device : Oven

U.V. Spectrum : 200 nm to 700 nm

RESULTS

Pharmacognostical study of *BalachaturbhadraChurna*

Organoleptic evaluation

The sample was light brown in colour with characteristic spicy pungent smell and predominant *kashayaTikta rasa* (**Table 2**).

Table 2: Organoleptic characters of B*alachaturbhadraChurna*

Colour	Light brown
Odour	Spicy pungent
Taste	*Kashaya - Tikta* (astringent – bitter)
Consistency	Fine powdered

Microscopic characters:

Powder microscopy of *BalachaturbhadraChurna* shows striking characters of all 4 individual constituents which is summarized in (**Table 3**).

Table 3: Observation of various microscopic characters of *BalachaturbhadraChurna*

From the Drug	Characters
Musta	*Starch grains without helium [fig.1] *Dark brown colouring matter [fig.2] *Annular vessels [fig.3] *Lignified fibres [fig.4]
Pippali	*Starch grains without helium [fig.5] *Stone cells [fig.6] *Oil globules [fig.7]
Ativisha	*Simple & compound starch grains [fig.8] *Cork cells [fig.9] *Prismatic crystals of calcium oxalate [fig.10] *Parenchyma cells [fig.11]
Karkatashringi	*Tannin content material [fig.12] *Fragments of pitted vessels [fig.13] *Vascular bundles along with tannin cells [fig.14] *Epidermal cells [fig.15]

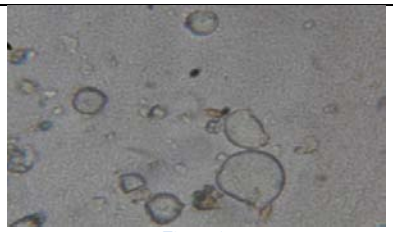
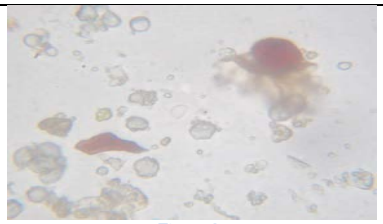


Figure 1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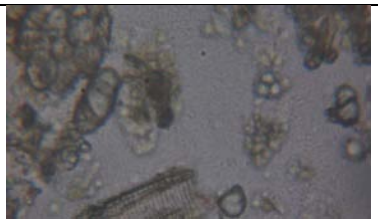
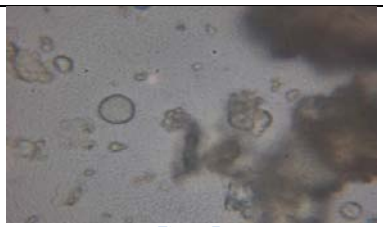


Figure 3


Figure 4


Figure 5


Figure 6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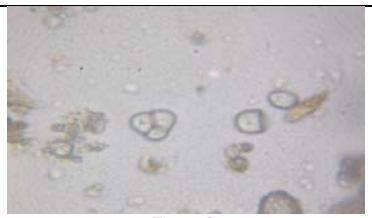
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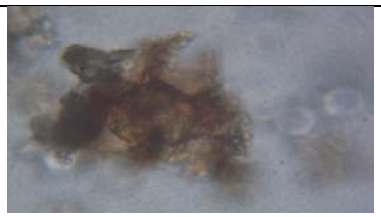
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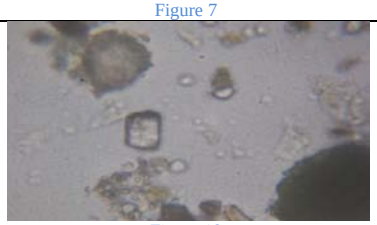
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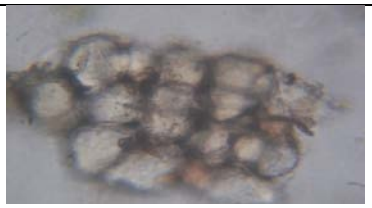
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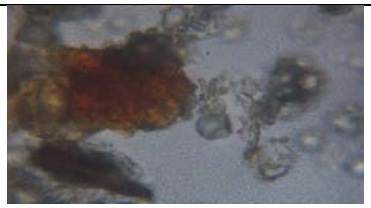
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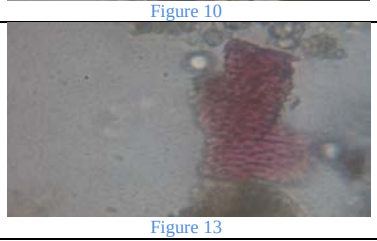
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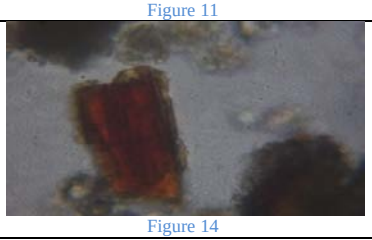


Figure 14

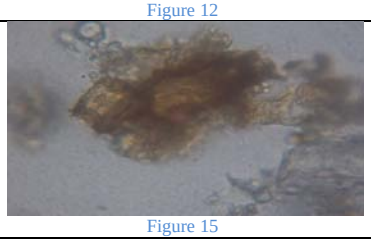


Figure 15

Pharmaceutical study of *Balachaturbhadra churna*:

Physico-chemical parameters like loss on drying, ash value, water and alcohol soluble extract etc were carried out and the results are depicted in (**Table 4**).

Table 4: Observation of various Physico-chemical parameters of*Balachaturbhadra churna*

S. No	Name of test	*BalachaturbhadraChurna*
1	Loss on drying (%w/w)	4.7
2	Ash value (%w/w)	5.75
3	Water soluble extract (%w/w)	29.3
4	Alcohol soluble extract (%w/w)	27.3
5	pH value	6 (acidic)
6	Particle size	

	Total quantity taken	10.069
	a. mesh >60	a. 3.209
	b. mesh 61-85	b. 2.345
	c. mesh 86-120	c. 1.360
	d. mesh >120	d. 3.019
	Total quantity obtained	9.9233

Preliminary phyto-chemical analysis

Various preliminary phyto chemical tests were carried out to analyse*BalachaturbhadraChurna*and the observations are listed in (**Table 5**).

Table 5: Observation of Preliminary phyto chemical analysis of *Balachaturbhadra churna*

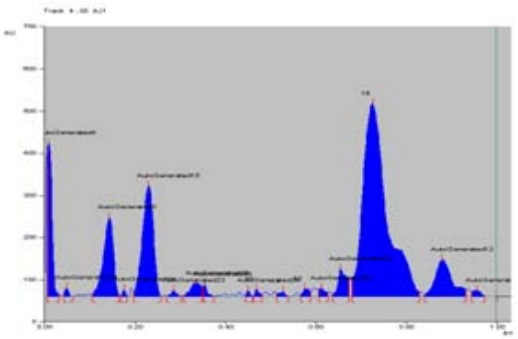
S. No	Name of test	*BalachaturbhadraChurna*
1	Molish's test (carbohydrates)	+
2	Salkowski reaction (steroids)	+
3	Keller-killiani test (Deoxysugars) (cardiac glycosides)	+
4	Foam test (saponin glycosides)	-
5	Flavonoids	+
6	Dragendorff's test (Alkaloids)	+
7	Tannins and phenol	+

HPTLC

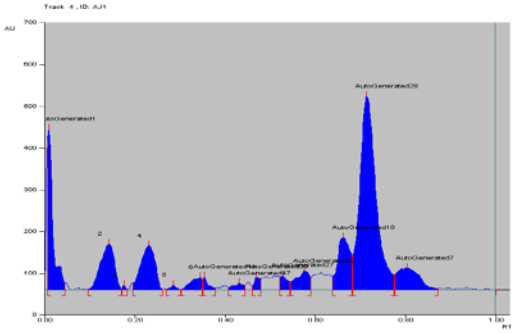
On performing HPTLC the chromatogram showed 17 peaks with R_f values 0.01, 0.05, 0.14, 0.18, 0.23, 0.29, 0.34, 0.35, 0.45, 0.47, 0.53, 0.58, 0.61, 0.65, 0.73, 0.88, 0.95 at 254nm; while at 366nm the chromatogram showed 14 spots with R_f values 0.01, 0.14, 0.18, 0.23, 0.29, 0.34, 0.35, 0.43, 0.47, 0.53, 0.58, 0.66, 0.71, 0.80 (table 6). Commonly seen $R_f$values at both 254nm and 366nm were 0.14, 0.18, 0.23, 0.29, 0.34, 0.35, 0.47, 0.53, and 0.58.

Table 6: R_f values of *Balachaturbhadra churna*

Visualizing condition	No. of spots	R_f value
254 nm	17	0.01,0.05, 0.14, 0.18, 0.23, 0.29, 0.34, 0.35, 0.45, 0.47, 0.53, 0.58, 0.61, 0.65, 0.73, 0.88, 0.95
366 nm	14	0.01, 0.14, 0.18, 0.23, 0.29, 0.34, 0.35, 0.43, 0.47, 0.53, 0.58, 0.66, 0.71, 0.80



254 nm peak display



366 nm peak display

DISCUSSION

The multifaceted drug in *Ayurvedic* pediatric practice, *Balachaturbhadrachurna*which is widely used has been analyzed. Study on *Balachaturbhadrachurna* is a step towards pharmacognostical and pharmaceutical standardization of the drug.

The pharmacognostical study reveals the presence of starch grain cells, calcium oxalate, tannin and fibres. All these are common in all the ingredients. The presence of all contents of raw drugs in the final product shows the genuinity of the final product.

All the pharmaceutical parameters analysed showed values permissible for the churna.The Physico-chemical parameters show that percentage of water soluble material is more than alcohol soluble extract. It also shows presence of slightly acidic nature of *Churna* which may help in augmenting the *Jatharaagni*(digestive fire).

The phyto-chemical evaluation of *Balachaturbhadrachurna*was done and it shows that the presence of carbohydrates, steroids, cardiac glycosides, flavanoids, alkaloids, tannins and phenols. Thus it can be inferred that the drug may yield desired pharmacological action.

The preliminary HPTLC study of the compound reveals the components are more sensitiveto short UV 254nm having 17 spots compared to long UV 366nm with 14 spots. Solvent system shows good separation of components so it can be used for further analysis. Further the HPTLC results can also be compared with standards of individual raw material for obtaining and concluding standards for *Balachaturbhadra churna.*

CONCLUSION

Though the ground work requisites for the standardization of *Balachaturbhadra churna* is covered in the current study, additional important analysis and investigations are required for the identification of all the active chemical constituents of the test drug to substantiate the clinical efficacy. The parameters of this study can be used for the authentication and further research.

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