Int J Ayu Pharm Chem

RESEARCH ARTICLE

www.ijapc.com

e-ISSN 2350-0204

# Pharmacognostical and Pharmaceutical Evaluation of *Balachaturbhadra Vati* - A Well-Known Drug for Paediatric Disorders

Suhas A. Chaudhary[1]*, Shingadiya Rahul K.[2], Patel K. S.[3], Kori V. K.[4], Rajagopala S.[5], Harisha C.R.[6] and Shukla V. J.[7]

[1]Dept. of Kaumarbhritya, Shri Gulabkunverba Ayurveda Mahavidyalaya, Gujarat Ayurved University, Jamnagar, India.

[2]Dept. of RS and BK, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, India.

[3]Professor, Dept. of Kaumarbhritya, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, India.

[4, 5]Dept. of Kaumarbhritya, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, India.

[6]Pharmacognosy Lab; Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, India.

[7]Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, India.

## Abstract

It is important to treat every disease in childhood period at the earliest as it may hamper the proper growth and development of child. Recurrent cold can correlate with disease *Pratishyaya* in Ayurveda, which is a causative factor for another disease as it can produce *Kshaya*. Due to diseased condition in childhood, school absenteeism and expenditures of medicine are the burden on the family that ultimately affects the civilization. *Balachaturbhadra Churna* is a compelling medicine for the childhood disorders. But due to bitter taste and short shelf life, the powder form converts to tablet form by introducing *Balachaturbhadra Vati*. The present work was planned to standardize the finished product *Balachaturbhadra Vati* to conform its identity, quality and purity. In pharmacognostical work Annular vessels, Compound Starch grains, Group of stone cells with yellow content, Prismatic crystals of *Ativisha*; Annular vessels, Fragment of annular vessels, Fragments of sclary form, Silica deposition, Starch grain with hylem of *Musta*; Black debrice, Oil globule, stone cell of *Pippali;* Dark brown content, Fibres, Scleroids of *Shringi* were observed. Organoleptic features of BCV are solid in consistency, light ash grey colour,

bitter odour, bitter-astringent taste, round and bi-convex in shape were observed. The pH value of BCV was 8, Acid insoluble ash was 1.89 %w/w, Water-soluble extract was 26.2 %w/w, Loss on drying was 5.66 %w/w, Ash value was 9.4 %w/w, Alcohol soluble extractive (%w/w) was 12.72 %w/w and High Performance Thin Layer Chromatography at 254nm and 366nm resulted into 4 and 1 spots, respectively.

## Keywords

*HPTLC, Pharmacognosy, Pharmaceutics, Recurrent respiratory diseases, Balachaturbhadra Vati.*

Greentree Group

Received 16/10/15 Accepted 30/10/15 Published 10/11/15

## INTRODUCTION

Early intervention is necessary of any disease in childhood. It may hamper the proper growth and development of child is clearly described by Acharya Charaka, that *Avighata* (dis-interruption) as *shareera vriddhikara bhava* (growth and development factors)[1]. Due to the ill health, school absenteeism of child affects its educational capability and intellectuality. On the other hand, expenditures of medicine are the burden on the family that ultimately affects the society. *Pratishyaya* is potential *Nidanarthakara Vyadhi* (causative factor for another disease) as can produce *Kshaya*[2]. Therefore, it is important to treat disease *Pratishayaya* in childhood period at the earliest.

Respiratory complaints like recurrent cold and cough are most common clinical condition in contemporary medical science. They precisely mentioned under the broader heading of Respiratory Tract Disorders - group of different symptoms and diseases[3]. According to Ayurveda, symptom recurrent cold can clearly co-related with disease *Pratishyaya*[4]. According to its name, *Balachaturbhadra Churna* is a compelling medicine for the childhood disorders like respiratory disorders, fever, diarrhoea and vomiting of children[5]. *Balachaturbhadra Churna* is a combination of four drugs *Musta*, *Pippali*, *Ativisha* and *Shringi*.

It is a well-known and very effective formulation in paediatric practice but children are unwilling to take this *Churna* owing to its bitter taste observed in clinical practice. On the other hand, shelf life of *Churna* is short as compared to *Vati* form[6]. In addition, there is no research work carried out on the modification of compound formulation *Balachaturbhadra Churna* to *Balachaturbhadra Vati*. In the present study, the powder form converts to tablet form by introducing *Balachaturbhadra Vati* (BCV).

Aim of the study was to conform, identity and purity of raw drugs by Pharamacognostical evaluation and examine the quality of finished product by Pharmaceutical study. The present work was planned to standardize the finished product *Balachaturbhadra Vati*.

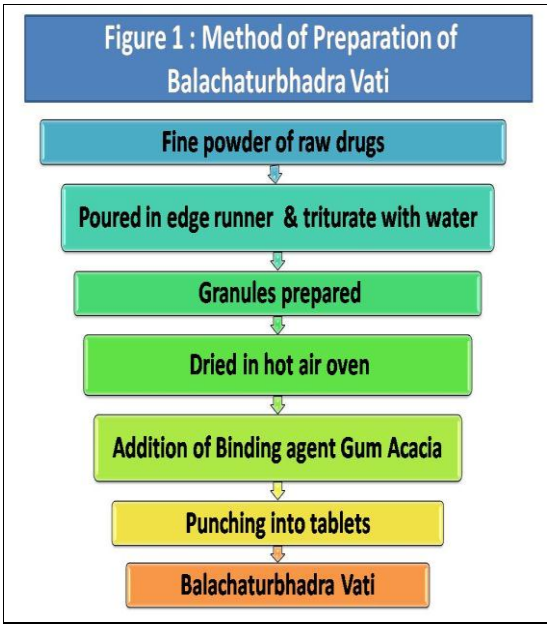
## MATERIALS AND METHODS

### Drug Material:

All the four raw drugs were collected from Pharmacy of GAU, Jamnagar. The ingredients of BCV[7] and the part used are given in [Table 1].

**Table 1** "Ingredients of *Balachaturbhadraka Vati"*

| Sr. No. | Sanskrit Name | Botanical Name | Parts used | Quantity |
|---|---|---|---|---|
| 1 | *Musta* | *Cyprus rotundus* Linn. | Dry Rhizome | 1 part |
| 2 | *Pippali* | *Piper longum* Linn. | Dry fruit | 1 part |
| 3 | *Ativisha* | *Aconitum heterophyllum* Wall. | Dry Root (tuber) | 1 part |
| 4 | *Shringi* | *Pistacia integerrima* Stew-ex. Brordis. | Dry Gall | 1 part |




**Method of Preparation of BCV:**

Granulation[8] and compressing[9] method was introduced for the preparation of tablets. Addition of *Gum Acacia* was 10% as binding agent. Manual compressing tablet machine was used for making of final product. Method of preparation is mentioned in [Figure 1].

**Method of Pharmacognostical evaluation:**

Two grams of BCV 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 were taken using Carl Zeiss Trinocular microscope attached with camera with stain and without stain[10]. The microphotographs were taken under the microscope. pharmacognostical evaluation of prepared drug BCV were carried out at the Pharmacognosy Laboratory, I.P.G.T. and R.A., Jamnagar, where identification of ingredients was carried out. The identification was carried out based on the morphological features, organoleptic features and powder microscopy of the finished product.

**Method of Physico-chemical Evaluation:**

Physico-chemical analysis and physical investigations were carried out by following standard procedure. HPTLC of BCV was carried out after making appropriate solvent system with Methanolic extract of BCV at the Pharmaceutical Chemistry lab, I.P.G.T. and R.A. Gujarat Ayurved University, Jamnagar.

***The following Chromatographic Conditions were used:***

Stationary phase: Pre-coated silica gel $GF_{254}$ aluminium plates (5mm bands, 5mm apart and 1cm from the edge)

Mobile phase: Toluene: Ethyl acetate: Glacial acetic acid: Formic acid (5:5:1:0.5 v/v/v/v)

Sample volume: 5µl

Sample for HPTLC: Methanol extract of *Balchaturbhadra Vati*

Spray reagent: Vaniline sulfuric acid

***Instrumental Conditions:***

Application mode: Camag Linomate V sample (Applicator fitted with a 100 µL Hamilton syringe)

Development Chamber: Camag Twin trough Chamber (20 x 10 $cm^2$)

Plates: Pre-coated Silica Gel $GF_{254}$

Chamber Saturation: 30 min.

Development Time: 30 min.

Development distance: 7 cm.

Scanner: Camag Scanner II (ver. 3.14)

Scanning mode: Linear at 254 nm and 366 nm

Photo documentation: CAMAG reprostar

Detection: Deuterium lamp, Tungstun lamp

Data System: Win cats software (ver. 3.17)

Drying device: Oven

U.V. Spectrum: 200 nm to 700 nm

## RESULTS AND DISCUSSION

**Pharmacognostical study**

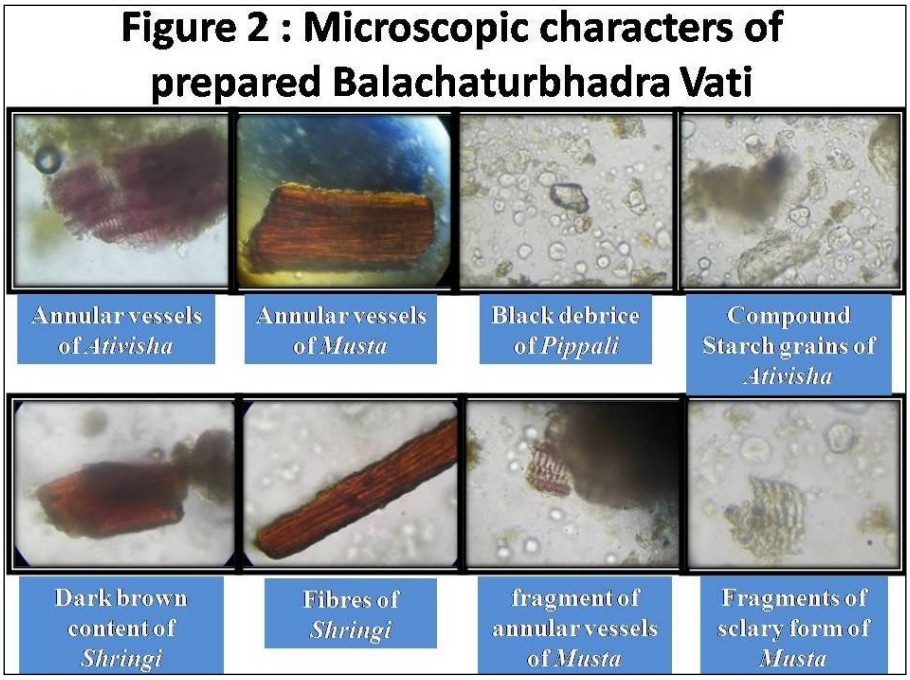
Microscopical evaluation is very primary process in initial identification of ingredients as well as in the detection of adulterations**.** In powder microscopy of final product - Annular vessels, Compound Starch grains, Group of stone cells with yellow content, Prismatic crystals of *Ativisha*; Annular vessels, Fragment of annular vessels, Fragments of sclary form, Silica deposition, Starch grain with hylem of *Musta*; Black debrice, Oil globule, stone cell of *Pippali;* Dark brown content, Fibres, Scleroids of *Shringi* were observed. All the ingredients were authentic. No adulterant found in the prepared drug. [Figure 2 and Figure 3]

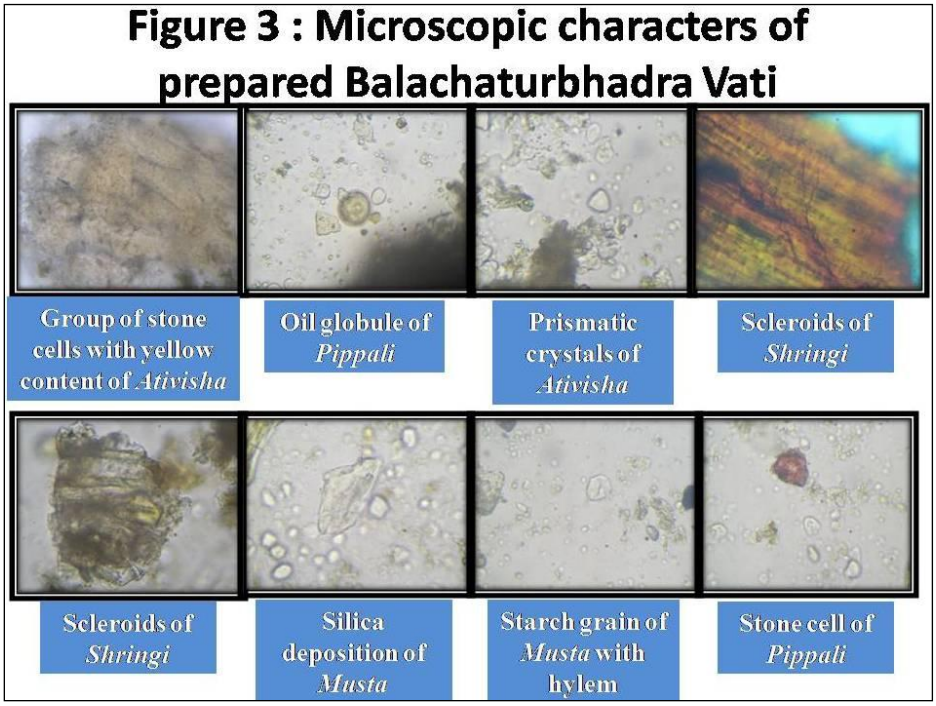
**Table 2** "Organoleptic parameters"

| Sr. No. | Parameters | Present study |
|---|---|---|
| 1. | Consistency | Solid |
| 2. | Colour | Dark greyish |
| 3. | Odour | Slight bitter - Astringent |
| 4. | Taste | Bitter-Astringent |
| 5. | Touch | Rough |
| 6. | Shape | Round, Bi-convex |

**Table 3:** "Physico-chemical parameters"

| Sr. No. | Parameters | Results |
|---|---|---|
| 1. | pH (5% aqueous sol) | 8 |
| 2. | Loss on drying (at 110°C) (%w/w) | 5.66 |
| 3. | Ash value (%w/w) | 9.4 |
| 4. | Acid insoluble ash (%w/w) | 1.89 |
| 5. | Water soluble extractive (%w/w) | 26.2 |
| 6. | Alcohol soluble extractive (%w/w) | 12.72 |




**Organoleptic study:**

Organoleptic features like consistency was solid as the drug form was tablet, light ash

green colour may be due to *Pippali*; bitter-astringent taste was revealed all four ingredients; bitter odour may be due to *Ativisha* and *Shringi*; rough touch and round and bi-convex in shape were observed [Table-2].

**Physico- chemical Parameters:**

Physico-chemical parameters like pH[11] was 8 showed BCV is non-acidic in nature. Loss on drying[12] parameter was 5.66 %w/w as the product was made by dry fine powders and very less humidity. Ash value was found to be[13] 9.4 %w/w, water soluble extract[14] was 26.2 %w/w, alcohol soluble extract[15] was 12.72 %w/w, acid insoluble ash[16] was 1.89 %w/w as most of the drug dilute in the acid. [Table-3].

**Physical parameters:**

Physical parameters of the tablet like average diameter of 12.51 mm, average width of 4.18 mm, in uniformity[17] - average weight of 504.5 mg, hardness[18] was 4.67 kg/cm$^2$, disintegration time[19] was 17.10 min and friability[20] 0.88% was found as in [Table 4].

**HPTLC Studies**

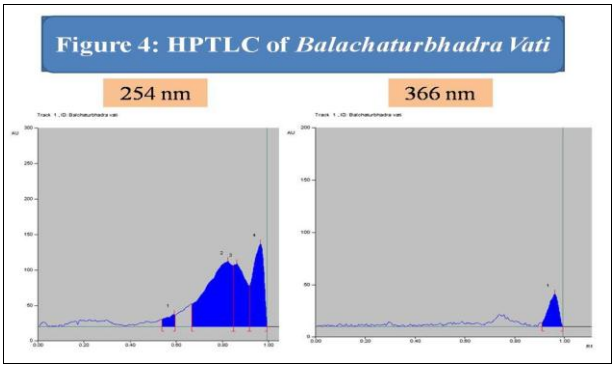
On performing HPTLC, visual observation under UV light showed few spots but on analysing under densitometer much more was observed. At 254nm the chromatogram showed 4 peaks, at 366nm the chromatogram showed only one peaks [Table-5 and Figure-4].

**Table 4** "Physical parameters"

| Sr. No. | Parameters | | Results |
|---|---|---|---|
| 1. | Diameter (mm) | Max. | 12.62 |
| | | Min. | 12.40 |
| | | Avg. | 12.51 |
| 2. | Width (mm) | Max. | 4.62 |
| | | Min. | 3.94 |
| | | Avg. | 4.18 |
| 3. | Weight of tablet (mg) | Max. | 512 |
| | | Min. | 491 |
| | | Avg. | 504.5 |
| 4. | Hardness (kg/cm$^2$) | | 4.67 |
| 5. | Disintegration time (min) | | 17.10 |
| 6. | Friability (%) | | 0.88 |

**Table 5** "Comparative results of HPTLC"

| | 254 nm (4 spots) | 366 nm (1 spot) |
|---|---|---|
| **Rf values** | 0.54, 0.67, 0.85, 0.92 | 0.91 |




## CONCLUSION

BCV is a potent medicine in the management of respiratory disease.

Preliminary the morphological features, organoleptic features and final product microscopy of the individual drug results confirm the genuinity without adulterant. For authantification, all the ingredients were compared with the parameters mentioned in API but the drug form was changed from *Churna* to *Vati*, which is not mentioned in API (Ayurvedic Pharmacopeia of India). So, the parameters found in present study can be used for the authentication and further research. Additional important analysis and investigations are required on BCV for the identification and separation of active ingredients with the help of various Biomarkers. Further, the HPTLC results can also be compared with standards of individual raw material for obtaining and concluding standards for BCV. Physico-chemical parameters were analysed but still need validation through repeated experiment on different batches with quantity of ingredients. These groundwork requisites for the standardization of BCV covered in the current study require additional important analysis and investigations for the identification of all the active chemical constituents of the test drug to substantiate the clinical efficacy.

## ACKNOWLEDGEMENT

Author is thankful to his guide and co-guides for their encouragement towards research work. Also giving thanks and appreciate to Dr. Harisha for his timely suggestions and hard work during identification process of raw drugs.

## REFERENCES


1. Agnivesha, Charaka, Yadavji Trikamaji Acharya editor. (2011) Charaka Samhita, Chakrapani commentary. reprint edition, Chaukhambha Surbharti Prakashana. pg. 332

2. Chakrapani Dutta, Agnivesha, Charaka, Yadavji Trikamaji Acharya editor. (2011) Ayurvedadipika commentary on Charaka Samhita. reprint edition, Chaukhambha Surbharati Prakashana. pg. 227

3. Suhas A. Chaudhary, Patel KS, Kori VK , Rajagopala S. (2014) Management of doshika kasa in sub-acute and chronic stage with Vyaghri haritaki avaleha in children. Ayurpharm Int J Ayur Alli Sci. 3(4), 97-111.

4. Amarasimha. (2001) Amarakosha, PDF version, encoded by Avinash Sathye Soham updated in 2001- 2/6-49

5. Chakrapani Dutta, Prof. Ramanath Dwivedi. (2005) Chakradutta, Vaidya Prabha Hindi commentary. Balaroga Chikitsa (64:22), Chaukhambha Surabharati Prakashan, pg.395

6. Anonymous. (2009) Gazette of India (extraordinary) Part-II, section 3, sub-section (i), vide G.S.R. 764(E), dated 15th/20th October.

7. Govinddas Sen, Mishra BS, Shastri AD, Shastri RD editor. (2010) Bhaishajya Ratnavali. *Paribhasha Prakarana*, Chaukhamba Prakashan, pg. 51.

8. Troy DB editor. (2005) Remington – the science and practice of pharmacy. vol.1, 21st edition, Lippincott Williams and wilkins, Indian edition, pg.896

9. Troy DB editor. (2005) Remington – the science and practice of pharmacy. vol.1, 21st edition, Lippincott Williams and wilkins, Indian edition,pg.901

10. Anonymous.( 2008) The Ayurvedic Pharmacopoeia of India. Part 2, Vol 1, 1st ed. New Delhi: Ministry of Health and Family welfare, Department of AYUSH, Government of India; pg.136-139.

11. Anonymous. (1999) The Ayurvedic Pharmacopoeia of India. Part 1, Vol. I, 1st edition,Ministry of health and family welfare, Govt. of India, Appendix-3.3.

12. Anonymus. (2004) The Ayurvedic Pharmacopoeia of India. Part 1, Vol. IV, 1st edition, Ministry of health and family welfare, Govt. of India, Appendix-2.2.9.

13. Anonymus. (2004) The Ayurvedic Pharmacopoeia of India. Part 1, Vol. IV, 1st edition Ministry of health and family welfare, Govt. of India, Appendix-2.2.3.

14. Anonymus. (2004) The Ayurvedic Pharmacopoeia of India. Part 1, Vol. IV, 1st

edition Ministry of health and family welfare, Govt. of India, Appendix-2.2.7.

15. Anonymus. (2004) The Ayurvedic Pharmacopoeia of India. Part 1, Vol. IV, 1st edition Ministry of health and family welfare, Govt. of India, Appendix-2.2.6.

16. Anonymus. (2004) The Ayurvedic Pharmacopoeia of India. Part 1, Vol. IV, 1st edition Ministry of health and family welfare, Govt. of India, Appendix-2.2.4.

17. Troy DB editor. (2005) Remington – the science and practice of pharmacy. vol.1, 21st edition, Lippincott Williams and wilkins, Indian edition,pg.917.

18. Troy DB editor. (2005) Remington – the science and practice of pharmacy. vol.1, 21st edition, Lippincott Williams and wilkins, Indian edition,pg.916.

19. Troy DB editor. (2005) Remington – the science and practice of pharmacy. vol.1, 21st edition, Lippincott Williams and wilkins, Indian edition,pg.917.

20. Troy DB editor. (2005) Remington – the science and practice of pharmacy. vol.1, 21st edition, Lippincott Williams and wilkins, Indian edition,pg.916.