



## Research Article

www.ijrap.net



### PHARMACEUTICAL STANDARDIZATION OF *BAKUCHI VATI*: A MODIFIED DOSAGE FORM OF *DHATRYADI YOGA*

Bharat Rathi <sup>1\*</sup>, Renu Rathi <sup>2</sup>

<sup>1</sup>Professor, Department of Rasashastra & Bhaishajya Kalpana, Mahatma Gandhi Ayurved College, Hospital & Research Centre, Salod (Hirapur), Wardha, Maharashtra, India

<sup>2</sup>Professor, Department of Kaumarbhrtya, Mahatma Gandhi Ayurved College, Hospital & Research Centre, Salod (Hirapur), Wardha, Maharashtra, India

Received on: 20/11/16 Revised on: 19/12/16 Accepted on: 06/01/17

**\*Corresponding author**

E-mail: bharatrathi174@gmail.com

DOI: 10.7897/2277-4343.08112

#### ABSTRACT

Lots of medicinal formulations have been mentioned in Ayurvedic compendia to compete with need of all time availability, easy dispensing, palatability and efficacy. There are some demerits of these formulations such as large amount of dose, unpleasant palatability, less shelf life and difficulty in portability. Modification in the formulations without changing its efficacy is need of hour in today's era for the feasibility, palatability, minimum dose, easy administration, increased bioavailability and better shelf life. Present study was planned to Pharmaceutical standardization of Dhatriyadi Yoga (a formulation of *Emblia officinalis* (Gaertn) mentioned in Gadanigraha and indicated in Shvitra (Leucoderma). This formulation is advised in powder form but it becomes inconvenient in terms of shelf life, palatability and fixed dose administration, hence it is converted into tablet form as Dhatri-Khadira Bhavit Bakuchi vati. Pharmaceutical preparation and analytical study of Dhatri-Khadira Bhavit Bakuchi vati was carried out at Dattatraya Ayurved Rasashala, Mahatma Gandhi Ayurveda Collage Hospital and Research center, Salod (H) Wardha, Maharashtra. The formulation was first tasted for organoleptic parameters such as odour and colour, physico-chemical analysis and microbial specifications testings were performed. Modified Bakuchi vati had brown color with no specific smell, average weight gain 8.53%. Analytical standards for Bakuchi vati such as loss on drying at 105°C, total ash, acid insoluble ash, alcohol soluble extractives, water soluble extractive, pH, hardness and tablet disintegration time were 7.5%, 7.8%, 2%, 17.6%, 15 %, 5.05 (10% aqueous solution), 4 kg and 15 minutes respectively.

**Keywords:** Shvitra, Dhatriyadi Yoga, Dhatri-Khadira Bhavit Bakuchi vati, Standardization

#### INTRODUCTION

Bhaishajya (medicine) is the weapon offered by Ayurveda from our mother nature to conquer the overspreading deadly diseases. This Bhaishajya is the pride and part of Ayurveda, and is one among Chikitsa Chatuspada (four pillars of therapy), without which the extirpation of disease is not possible<sup>1</sup>. Bhaishajya in accordance to the requirement is flourished by undergoing different modulations. These efforts designed a new branch Bhaishajya Kalpana, an Ayurvedic pharmaceutical science.

Bhaishajya Kalpana or the medicinal formulations are performed to potentiate properties of drugs. It aids a physician to utilize Bhaishajya in various forms and styles to fight the disease. Thousands of medicinal formulations have been developed in Ayurveda which can be made and used according to need, availability of drugs, easy dispensing, palatability and efficacy. In the same sequence Acharya have mentioned different dosage forms by using similar herbs according to their efficacy, dose and palatability. But there are some demerits of these formulations too e.g. large amount of dose, unpleasant palatability, less shelf life and difficulty in portability. However, in today's era much more importance is given for the feasibility, palatability, minimum dose, easy administration, increased bioavailability and shelf life. As per the need of time our scholars have modified the formulations without changing its efficacy with above merits but it is important to establish its effectiveness according to new era.<sup>2</sup>

Few formulations in ancient classical texts are advised to prepare freshly and administered along with specific herbal juices or decoctions. It is difficult to prepare fresh juice and decoctions on day to day basis. Such formulations need to be modified in suitable dosage form without changing their basis of ingredients and mode of action. One of such formulation is Dhatriyadi Yoga (a formulation of *Emblia officinalis* Gaertn) indicated in Shvitra (Leucoderma). The present study was planned to Pharmaceutical standardization of Dhatriyadi Yoga mentioned in Gadanigraha.<sup>3</sup> According to this reference, Bakuchi churna (powder of *Psoralea corylifolia* Linn) is advised to take along with Dhatri and Khadira Kwatha (decoction of *Acacia catechu* Willd) as Anupana for treatment of Shvitra. But as it becomes inconvenience, it is converted into tablet form for easy consumption by giving Bhavana of Dhatri and Khadira Kwatha to Bakuchi churna. Standardization of formulation is the need of the hour to generate evidence for existing literature and for reproducibility. Standardization of the tablets prepared from levigation of Bakuchi powder with decoction of Dhatri and Khadira (Dhatri-Khadira Bhavit Bakuchi vati) was carried out in three batches and parameters for quality assurance were studied.

#### MATERIALS AND METHODS

Raw materials such as Bakuchi (*Psoralea corylifolia* Linn), Dhatri (*Emblia officinalis* Gaertn), Khadira (*Acacia catechu* Willd) were collected from Dattatraya Ayurved Rasashala Sawangi Wardha. (Figure 1 to 3) Identification and authentication were done by taxonomist. Pharmaceutical preparation of Dhatri-Khadira Bhavit Bakuchi vati was carried

out at Dattatraya Ayurved Rasashala, Mahatma Gandhi Ayurveda Collage Hospital and Research center, Salod (H) Wardha, Maharashtra. Organoleptic characters, physicochemical

analysis, microbial contamination was studied in analytical lab as per API standards.

**Table 1: Ingredients of Bakuchi vati (Dhatryadi yoga)**

S.N.	Sanskrit name	Latin Name/English name	Part used	Quantity
1.	Bacuchi	<i>Psoralea corylifolia</i> Linn	Seed	500 gm
2.	Dhatri	<i>Emblca officinalis</i> Gaertn	Fruit pulp	500 ml Kwatha for each Bhavana
3.	Khadira	<i>Acacia catechu</i> Willd	Stem bark	

**Preparation of Bakuchi Vati:**

Bakuchi seeds were taken, cleaned properly, powdered and sieved through mesh number 80 to obtained fine powder. Course powder of Dhatri fruit pulp and Khadira twak (stem bark) each 125gm were taken in vessel and to this 16part water was added. Decoction was prepared by reducing it to 1/4<sup>th</sup> and filtered through a cotton cloth. (Figure 4) This Dhatri Khadira Kwatha was used as Bhavana Dravya (liquid media for trituration). In similar way seven Bhavana were given to the Bakuchi powder. (Figure 5) At the end, powder was dried in dryer, granules were prepared followed by preparation of Vatis (tablets) of equal size (500 mg) with the help of tablet punching machine. Prepared tablets were packed in a container. (Figure 6) Similarly three batches were prepared.

**Analytical Study**

Analytical study was done to establish the basic standards for *Bakuchi vati* as there are no pharmacopeia standard guidelines. The formulation was first tasted for organoleptic parameters such as odour and colour. (Table 3) Physicochemical analysis includes loss on drying at 105°C, Total ash, Acid insoluble ash, Alcohol soluble extractives, water soluble extractive, pH, hardness and disintegration time. (Table 4) Microbial specifications were tasted to validate its safety for internal as well as external use. *Enterio bacteriaceae*, Total fungus count, *E-coli*, *Salmonella*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* were performed as par CCRAS parameters. (Table 5) Analysis of samples were conducted as par API standards in analytical lab of Mahatma Gandhi Ayurveda Collage Hospital and Research Center, Salod (H) Wardha, Maharashtra.

**OBSERVATION AND RESULTS**

**Table 2: Quantity of ingredients and yield obtained in preparation of Bakuchi vati**

Batch No	Name of the drug	Quantity	Bhavana Dravya	Frequency	Duration of Bhavana	Quantity obtained	% weight gain
A-1	Bakuchi churna	500 gm	Dhartri Khadira Kwatha	7 times	3 hours	550 gm	10
A-2	Bakuchi churna	500 gm	Dhartri Khadira Kwatha	7 times	3 hours	536 gm	7.2
A-3	Bakuchi churna	500 gm	Dhartri Khadira Kwatha	7 times	3 hours	542 gm	8.4
	Average	500 gm	-	7 times	3 hours	542.66	8.53

**Table 3: Average result of Organoleptic parameters of Bakuchi vati**

Parameters	Pharmacopoeia standard	Committee standard	Observations	Inference
Color	Not available	Brown	Brown	Acceptable
Odor	Not available	Odorless	Odorless	Acceptable
Taste	Not available	Unpleasant & acrid	Unpleasant & acrid	Acceptable

**Table 4: Average results of Physico-chemical parameters of Bakuchi vati**

Parameters	Pharmacopoeia standard	Committee standard	Observations (Average of three batches)	Inference
loss on drying at 105°C	Not available	Not more than 13%	7.5%	Acceptable
Total ash	Not available	Not more than 9%	7.8%	Acceptable
Acid insoluble ash	Not available	Not more than 2%	2%	Acceptable
Alcohol soluble extractives	Not available	Not less than 13%	17.6%	Acceptable
Water soluble extractive	Not available	Not less than 11%	15 %	Acceptable
pH	4.35 – 5.20	-	5.05 (10% aqueous solution)	Acceptable
Hardness	Not available	4 – 6 kg	4 kg	Acceptable
Tablet Disintegration time	Not available	5 to 20 minutes	15 minutes	Acceptable

**Table 5: Average results of Microbiological specification of Bakuchi vati**

Parameters	Pharmacopoeia standard	Observations	Inference
Total viable count	Maximum 10 <sup>5</sup> / gm	No growth	Acceptable
Enterobacteriaceae	10 <sup>3</sup> / gm	Absent	Acceptable
Total fungus count	Maximum 10 <sup>3</sup> / gm	Absent	Acceptable
E-coli	Maximum 10 / gm	Absent	Acceptable
Salmonella	None	Absent	Acceptable
Staphylococcus aureus	Absent	Absent	Acceptable
Pseudomonas aeruginosa	Absent	Absent	Acceptable



Figure 1: Bakuchi Seeds



Figure 2: Khadira twak



Figure 3: Dhatri fruit pulp



Figure 4: Dhatri-Khadira Decoction



Figure 5: Bhavana Process



Figure 6: Bakuchi vati

## DISCUSSION

Different pharmaceutical preparations are scientifically designed by ancient Ayurvedic seers. Ample examples of preparations suggest the advancement of Ayurvedic pharmaceutical science and may explore new horizon for finding newer formulations. Present formulation is used in the form of Churna (powder) along with decoction of Dhatri and Khadira. Powder is a fine powder obtained after thoroughly pounding a dry drug and filtering it through a clean cloth. Herbal powders preserve their potency up to 6 months if kept in air tight containers.<sup>4</sup> Moreover there is a possibility of deterioration of powder if the powder is exposed to the moisture conditions. Decoction has less shelf life and it is difficult in modern life style to prepare fresh decoction every time. Moreover, decoction can't be taken at working place which will hamper regular dose administration. Hence to overcome these difficulties Bakuchi churna was modified into Vati (tablet) with Bhavana of Dhatri and Khadira Kwatha which fulfilled the classical combination. Vatis were made by grinding the fine powder of the Bakuchi churna with the Dhatri-Khadira kwatha to form a soft paste. Tablets having average weight 500 mg were prepared by tablet punching machine as it helps in maintaining uniform size and weight which is needed for fix dose administration. Vatis can be preserved for two years if kept in air tight container.<sup>5</sup> Thus it is having the advantages of long shelf life, portability, fixed dosage forms and global acceptance.<sup>6</sup>

Vatis were prepared in three batches by giving Bhavana of Dhatri-Khadira Kwatha for seven days daily for three hours to generate standard manufacturing procedure, to check its reproducibility and pharmaceutical variability. Bhavana is the process by which powders of drugs are ground to a soft mass with liquid media and allowed to dry.<sup>7</sup> Bhavana is an important Samskara (processing) mentioned in classics and can be helpful in developing pharmaco-therapeutically potent new molecules. It is a specific procedure in which the material (powder) is thoroughly mixed with the liquid media (decoction, herbal juice etc.) and levigation is carried out till complete absorption of

liquid into the powder.<sup>8</sup> It helps transformation of the coarse powder into finer state by particle size reduction and impregnation of properties of Bhavana Dravya and homogenization leading to modification of properties of the end product. Most important feature of Bhavana process is that, even a small dose of a drug may be made to produce a very maximum bioavailability. The potency of the single or compound drugs may be further potentiated by conducting the Bhavana process, using their own Swarasa (juice).<sup>9</sup>

As a rule, Bhavana is advocated to be carried out in sunlight. Ultraviolet rays in sunbeam are photochemically active and said to be responsible to initiate chemical reactions. For photochemical reactions, photo sensitizers are essential; and earlier scholars had opined the probable role of Bhavana drava as photo sensitizers.<sup>10</sup>

Standardization was carried out in lab and analytical standards were set by quality control department. Colour of *Bakuchi* powder was brown, and *Bhavana Dravya Dhatri-Khadira Kwatha* was also brownish hence prepared tablets were also of brown colored and possessed no smell.

Loss on drying at 105°C indicates presence of moisture content. If moisture content is more than permissible limit, then the formulation is more likely to get infected by fungal growth. Moreover, unwanted changes can also occur due to presence of more moisture. In the prepared batches moisture content is much less i.e. this formulation has more stability. Acid insoluble ash represents presence of inorganic content which is not expected in herbal formulation. The obtained value of Acid insoluble ash in all the batches is negligible. Insignificant difference is observed in alcohol soluble extractives which may be due to Bhavana of Dhatri-Khadira Kwatha. Water soluble extractive value is also nearly same in all three batches. This value is related with assimilation of Vati with liquid media such as water. The physical parameter such as pH was determined to determine basic nature of sample as the action of enzymes is affected by pH and pH is an important factor in taste and safety.

Each medicine has an optimum pH value, and if the pH value is too high or too low, it likely indicates the medicine wont taste right or that safety has been compromised.<sup>11</sup> Moreover pH value is related with dissolution time of medicines, every medicine has specific dissolution rate at specific pH. Observed pH of Bakuchi vati is 5.05 and it can be interpreted that dissolution and absorption rate of Bakuchi vati is most favorable at this pH level.<sup>12</sup> More exploratory studies are needed to clarify this claim.

Shvitra is a cutaneous, acquired condition with localized loss of pigmentation of the skin that may occur after any number of inflammatory skin conditions, burns, intraregional steroid injections, post-dermabrasion etc. It is largely a cosmetic problem, and is neither infectious nor contagious.<sup>13</sup> Abundance herbs are mentioned in the Ayurvedic texts, many of which are readily available today. Several of these herbs have been studied in Indian laboratories. Interestingly, properties identified in the lab often support the identified Ayurvedic properties. Khadira is having bitter and astringent taste and having a specific curing effect on skin diseases.<sup>14</sup> Khadira, as a decoction, is recommended for treatment of leucoderma.<sup>15</sup> Laboratory studies have identified constituents shown to regenerate liver cells, as well as providing anti-fungal and anti-inflammatory effects.<sup>16</sup> Recent research work revealed that Dhatri effectively inhibits UVB-induced photo-aging in human skin fibroblast via its strong ROS (reactive oxygen species) scavenging ability which is useful in skin disorders and beauty care.<sup>17</sup> Dhatri has beneficial role in cancer, diabetes, liver treatment, heart trouble, ulcer, anemia, and Dhatri act as antioxidant, immunomodulatory, antipyretic, analgesic, cytoprotective, antitussive and gastroprotective.<sup>18</sup> All these properties are necessary while treating leucoderma.

Bakuchi is mentioned as an effective drug for Shvitra in all Ayurveda compendia Seeds have an agreeable aromatic odour and pungent bitter taste. The chief active principle of the seeds is an essential oil which has significant role in treating leucodermic patches.<sup>19</sup> It is also of value in the treatment of skin disorders, including vitiligo. Bakuchi is most valued ingredient in Ayurvedic herbal medicine as a tonic remedy and is used to improve general vitality. The plant yields a useful medicinal oleoresin, it treats kidney disorders, impotence, lumbago. The seed and fruit contain psoralen.<sup>20</sup> It is also used externally to treat various skin ailments including leprosy, leucoderma and hair loss. Psoralea comprises of a substance called psoralen that is a vigorous element to enhance pigmentation of the skin and hence useful in treating vitiligo, a disease in which patches of the skin loses its pigments. Psoralens improve the flow of blood and enhance the activity to produce melanin (pigments) on the unhealthy areas of the skin. Seeds of the psoralea fruits are beneficial in treating different skin problems such as leprosy and leucoderma.<sup>21</sup> Both the fruit as well as the seed of the plant enclose psoralen, which is valuable for enabling the skin to create new pigments when out in the open to sunlight and hence is effectively used to cure diseases such as vitiligo and psoriasis.<sup>22</sup> For more potentiating seven Bhavanas of Dhatri-Khadira Kwatha were given to the Bakuchi churna. This may hasten the rate of curing in Shvitra.

As all the batches were prepared by taking required hygienic care and utilizing sterilized instruments, thus result of microbial content study showed absence of Enterobacteriaceae, fungus count, E-coli, Salmonella, Staphylococcus aureus and Pseudomonas aeruginosa. The pharmaceutical standards for Bakuchi vati are not available hence the analytical results of present study may prove exposure towards establishing analytical standards for Bakuchi vati.

## CONCLUSION

Standard Bakuchi vati can be prepared from seven Bhavana's of Dhatri-Khadira Kwatha, each for three hours. Prepared Bakuchi vati will be brown in color with no specific smell and average weight gain will be 8.53%. Analytical standards for Bakuchi vati such as loss on drying at 105°C, total ash, acid insoluble ash, alcohol soluble extractives, water soluble extractive, pH, hardness and tablet disintegration time are 7.5%, 7.8%, 2%, 17.6%, 15 %, 5.05 (10% aqueous solution), 4 kg and 15 minutes respectively. Analytical findings of present study can be considered as reference standard for Bakuchi vati.

## REFERENCES

1. Charaka, Charaka Samhita, Acharya YT (editor), Chaukhamba Prakashan, New Delhi. Reprint ed. 2004, Khudangachatuspad adhyaya, Sutra Sthana 9/3, p. 61
2. Charaka, Charaka Samhita, Shastri K (editor), Chaukhambha Bharti Academy, Varanasi, Reprint 2007, Yoniviyapat Chikitsa sthana 30/331, p.887
3. Shodhal, Gadnigrah, Tripathi I (editor), Chaukhamba Sanskrit Sansthan Varanasi, Ed. reprint 2011, Vidyotini Hindi Vyakhya Vol II Verse no 241, p.806
4. Sharangadhar, Sarngadhar Samhita, Srikantha Murthy KR (editor), Chaukhambha Orientalia Varanasi, Reprint ed. 2012, first section, Verse no 51-53,p.8
5. Anonymous, Ayurvedic Formulary of India. The Controller of Publications Civil Lines, New Delhi, 2<sup>nd</sup> Revised English Ed., 2003.Vati and Gutika prakarana, p.179
6. Angadi R, Bhaishajya Kalpana Vijnana, Chaukhamba Surbharati Prakashan, Varanasi, Reprint 2011, Chapter 27 , p. 217
7. Prasad PNVR, Illustrated Bhaishajya Kalpana Vijnana, Choukhamba Krishnadas Academy, 1st ed. 2008, Chapter4Aushadha Kalpana , p.206
8. Sharma S, Rasatarangini, Shastri K (editor), Motilal Banarasidas, New Delhi, 11<sup>th</sup> ed. 1979,Paribhashavigyaniya, 2/29, p.21
9. Charaka, Charaka Samhita, Shastri K, Chaturvedi G, Chaukhambha Bharti Academy, Varanasi, Reprint ed. 2007,Danti Dravanti Kalpa, Kalpa sthana 12/47-48, p.945
10. Rao SPR. Role of photochemistry in Marana Sanskara with reference to Bhavana and Mardana. J AYU 1985; 3:23-28.
11. www.horiba.com/application/material-property-characterization/water-analysis/water-quality-electrochemistry-instrumentation/the-story-of-ph-and-water-quality/the-story-of-ph-measurement-of-ph-in-many-files-foods-medicines-cosmetics-and-medical-care/ last accessed on 10/04/2016 at 6.30 PM
12. http://compoundingtoday.com/Newsletter/Science\_and\_Tech\_1111.cfm last accessed on 11/04/2016 at 9.52 AM
13. http://www.keralaayurveda.biz/content/leucoderma-svitra-its-ayurvedic-management, Last accessed on 05/04/2016 at 4.20 PM
14. Sharma PC. et al Database on medicinal Plants used in Ayurved, C.C.R.A.S. Vol 2, reprint 2005, p.216
15. Charaka, Charaka Samhita. Sharma PV (editor), Chaukhamba Orientalia publication, Varanasi, 3rd ed. 1996, Kusthta Chikitsa,Chikitsa Sthana. 7/166,p.14
16. Williamson E. Major Herbs of Ayurveda, Churchill Livingstone Publication,1<sup>st</sup> ed 2002: p.13-15.
17. Adil MD, Kaiser P, Satti NK, Zargar AM, Vishwakarma RA, Tasduq SA, Effect of Emblica officinalis (fruit) against UVB-induced photo-aging in human skin fibroblasts. J Ethnopharmacol. Oct 28; 2010;132(1):109-14.
18. Sairam K, Rao CV, Babu MD, Kumar KV, Agrawal VK, Goel RK, Antiulcerogenic effect of methanolic extract of

- Emblica officinalis: an experimental study, *J Ethnopharmacol*, 2002;82(1):1-9
19. Sharma PC. et al Database on medicinal Plants used in Ayurved, C.C.R.A.S. Vol 2, reprint 2005, p.90
20. Abeysekera AM, Gunaherath KB, Gunawardena AR, Jayaweera CD. Studies on the composition and standardization of “Bakuchi oil”, An Ayurvedic medicinal oil prepared from *Psoralea corylifolia* L. Used in the treatment of Vitiligo. *Int. J. Res. Ayurveda Pharm* May –Jun 2012, 3(3);411-415
21. Dhanik A, Sujatha N, Rai NP. Clinical evaluation of the efficacy of Shvitrahara kashaya and lepa in vitiligo. *J AYU* Jan-Mar 2011;32(1):66-69
22. <http://vitiligo-organics.com/ingredients/psoralea-corylifolia-for-vitiligo.htm>, Last accessed on 05/04/2016 at 4.25 PM

**Cite this article as:**

Bharat Rathi, Renu Rathi. Pharmaceutical standardization of Bakuchi vati: A modified dosage form of Dhatriyadi yoga. *Int. J. Res. Ayurveda Pharm.* 2017;8(1):57-61 <http://dx.doi.org/10.7897/2277-4343.08112>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IJRAP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJRAP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IJRAP editor or editorial board members.