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Role of *Dhataki Pushpa* in *Sandhaan Kalpana*

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ABSTRACT

Woodfordia fruticosa (Dhataki) is a deciduous shrub found abundantly in Arunachal Pradesh, Mizoram and West Bengal. It is commonly known as Fire Flame Bush because of its bright red flowers. Flowering mainly occurs in February to April. These flowers have various medicinal and pharmacological uses. These are helpful in treating diarrhoea, bleeding disorders like menorrhagia, wounds, bleeding piles etc. and have hepatoprotective and antioxidant properties. There is a large demand of these flowers in pharmacies in the preparation of *Aasavas* and *Arishtas* as a fermenting agent as they have property of self generating alcohol. The use of *Dhataki* flowers in the fermentation processes has been documented for the first time in *Ashtang Hridya*. *Acharya Charak* has also mentioned *Dhataki Pushpa* among *Aasava Yonis* (fermenting agent). It is considered as the backbone of *Ayurvedic* medicinal industries dealing in fermentation processes and is highly valued in the Indian System of Medicine. So, in this review paper, the role of *Dhataki Pushpa* in *Sandhaan Kalpana* has been discussed.[1]

Key words: *Woodfordia fruticosa, Dhataki, Sandhaan Kalpana, Aasava, Arishta.*

INTRODUCTION

India is well recognised for its traditional medicinal system. The origin of *Ayurveda* dates back to the *Vedic* period and is practised till date owing to its holistic approach with equal emphasis on the body, mind and spirit in treating and preventing diseases. Different *Ayurvedic* herbal formulations have been described in our *Ayurvedic* texts, *Sandhaan Kalpana* being one of the important herbal dosage forms because of its medicinal as well as nutritive values.

Sandheeyte Yad Iti Sandhaanam ||(Shabdkalpadrum)

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According to *Shabdkalpdrum*, the literal meaning of the term *Sandhaan* is the process of fermentation.[2]

Draveshu Chirkaalastham Dravyam Yatsandhitam Bhaveta |

Aasav Arishtheshahavedastu Prochyate Bheshaja Uchitam || (Sa. Ma. Kha. 10/1)

According to *Acharya Sharangdhar*, in the *Sandhaan* process, *Dravadravya, Madhura, Prakshepa* and *Sandhaan Dravyas* are kept altogether in sealed inert vessel in favourable conditions for specified time period for fermentation. Each of these ingredients contribute to the final product but *Dhataki* flowers are the most important for the *Sandhaan Kalpana*.[3] 17 out of 18 *Arishtas* mentioned in the monograph of the Indian Ministry of Health and Family welfare contain *Woodfordia fruticosa*. Tannins, flavonoids, anthraquinone, glycosides, gallic acids, ellagic acid and polyphenols are the main chemical constituents of these flowers. The self generated alcohol by addition of these flowers helps in the extraction of maximum active pharmaceutical ingredients and also facilitates the preservative action. Apart from this, *Sandhaan*

ISSN: 2456-3110 REVIEW ARTICLE April 2024

Kalpana also possesses the property of higher stability, palatability and efficiency.[4]

Chronological references of *Sandhaan Kalpana*

1. ***Vedic* Period:** The reference of *Sandhaan Kalpana* dates back to the *Vedic* Period. *Vedic* literature gives the clear idea of its high advancement during that period. A major part of the *Rig Veda* of the ninth *Mandala* gives detail of the fermented *Soma Rasa*. There is the reference of *Aasavas* and *Arishtas* in *Ramayana* and *Mahabharata* also.[5]
2. ***Sushruta Samhita*:** *Acharya Sushruta* has described the *Sandhaan Kalpana* in the purview of different *Shalya Karma*. He has described total of 11 *Aasavas* and *Arishtas* and 46 *Madhya Varga.*[6]
3. ***Charak Samhita*:** *Acharya Charak* has described 84 fermentative products and 9 *Aasav Yonis*.[7]
4. ***Ashtaang Hridya* and *Ashtaang Sangraha*:** The role of *Dhataki* flowers in the fermentation processes has been documented for the first time in *Ashtaang Hridya*. A total of 14 *Aasavas* and *Arishtas* have been quoted in *Ashtaang Hridya* and *Ashtaang Sangraha*. [8]
5. ***Kashyap Samhita*:** 6th chapter of part 1 contains the reference of 60 *Aasava* and A*rishtas*.[9]
6. ***Sharangdhar Samhita*:** Definitions, general principles, classification based on source or raw material of fermentation is mentioned.[10]
7. ***Yoga Ratnaakar*:** There is the description of *Aasavas* and *Arishtas* in *Madhya Kalpana.*[11]
8. ***Bhaishajya Ratnaavali*:** There is the mention of the duration of time for the completion of fermentation process i.e., 15 days.[12]
9. **AFI**: Total of 40 *Aasavas* and *Arishtas* have been mentioned in Part 1 and Part 2.[13]

Taxonomical classification of *Woodfordia fruticosa*[14]

Taxonomical Rank / Taxon

Kingdom - Plantae

Division - Magnoliophyta

Class - Magnoliopsida

Order - Myrtales

Family - Lytheraceae

Genus - *Woodfordia*

Species - *fruticosa*

Synonyms[15]

- *Tamrapushpi*: Because of the red coloured flowers.
- *Agnijwala:* Red colour of the flowers resembles the red flames of fire.
- *Dhatupushpika:* Because of the property of *Dhatu, Shareer Poshan.*
- *Parvatiya:* Mainly found in the hilly regions.
- *Guchha Pushpika*: Flowers grow abundantly in bunches.
- *Sidhupushpi*: Because of the fermentation properties.

Morphology of the *Dhataki* flowers[16]

Dhataki Dhatupushpi Ch Tamra Pushpi Ch Kunjara |

Subhiksha Bahupushpi Ch Vahinijwala Ch Saa Smritaa ||

Dhataki Katuka Sheeta Madkritatuvra Laghu ||

(Bha.Pra.Haritkyaadi varga / 185)

Brilliant red coloured flowers are arranged in the fully grown leafy shrub in the form of paniculate cymose clusters, hence named as FIRE FLAME BUSH. Flowering season is February to April. The flowers are collected and dried and are used by various pharmaceutical companies for the fermentation processes. These flowers have become so popular in the fermentation units and are considered as backbone of *Ayurvedic* Medicinal industries.

Fermentation helps in rupturing the cells of flowers and exposing their contents to micro-organisms for transformation. It creates an active transport system that moves the dissolved constituents from herbal material to the solvent.

Ras Panchak of *Dhataki* Flowers[17]

Ras : *Kshaya*

ISSN: 2456-3110 REVIEW ARTICLE April 2024

Guna : *Laghu, Ruksha*

Virya : *Sheeta*

Vipaka : *Katu*

Prabhaava : *Stambhana*

Chemical composition of *Dhataki* flowers which explain their role in fermentation[18]

Various attempts have been made to study the role of *Dhataki* flowers in fermentation. Different reports show the isolation of yeast cells from *Dhataki* flowers. Manwar et al., (2013) could isolate *Saccharomyces cerevisiae* which is an alcohol producing yeast from the flowers.

Studies of Das *et al.* show that the flowers of *Dhataki* contain 20-25% of tannins which are susceptible to conversion to simple phenols and alcohols in the presence of enzymes during the anaerobic fermentation in preparation of *Aasavas* and A*rishtas*.

Fermentation is a metabolic process which is catalysed by enzymes where organisms convert starch or sugar to alcohol. An endogeneous invertase named Fructofuranosidase is found in the *Dhataki* flowers which help in the hydrolysis of sucrose to alcohol which is the final product of *Sandhaan Kalpana*.

Madhura Dravya like jaggery acts as the source of carbohydrate for initiation of fermentation process. Rate of fermentation and the quality of final product depends upon the nature and concentration of carbohydrates. *Acharya Charak* and *Acharya Sharangdhar* have mentioned 39-40% of carbohydrate as the best percentage for fermentation process. Hence, the alcohol thus produced is self generated and has longer shelf life and better therapeutic effects due to the faster absorption in gut.

Modern concept of Fermentation[19]

The word fermentation is derived from the Latin word *fevere*, which means boiling. The carbon dioxide bubbles liberated during the process of fermentation gives the boiling appearance to the liquid. Fermentation is an anaerobic, enzymatic metabolic process which brings about chemical changes by transforming complex organic compounds into simpler and nutritious compounds. Incomplete oxidation of sugar occurs in the absence of oxygen by the enzymes invertase and zymase which are secreted by the yeast cells. One molecule of glucose on fermentation liberates two molecules of ATP, two molecules of alcohol called ethanol, two molecules of CO_2 and two molecules of water.

Fermentation process completes in two steps:

- In the first step, sugar gets converted into glucose and fructose.

$C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$

(Sugar) (Water) (Glucose) (Fructose)

- In the second step, fructose gets converted into ethanol and carbon dioxide.

$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

Although this modern technique is widely used these days in industries for the preparation of various alcoholic beverages as intoxicating liquid rather than medicine but the concept of *Sandhaan Kalpana* dates back to *Veda* or *Purana* period and was used as the medicinal liquid. Therefore, the appropriate use of this dosage form is a great boon to the modern era for treating various ailments.

DISCUSSION

Ayurveda plays an important role in living a healthy and long life. *Sandhaan Kalpana* is one of the unique A*yurvedic* alcoholic formulations which are prepared by using natural fermentative agents.

To understand the role of *Dhataki* flowers in the process of fermentation, studies have been carried out which show that dried flowers contain more colonies of yeast cells as compared to fresh flowers.

In modern science also the process of fermentation is gaining pace in various fields of biotechnology, pharmacy and microbiology but the natural source of fermenting agents are not used here.

The *Ayurvedic Aasava* and A*rishta* have more therapeutic usefulness due to various advantages like quick action, palatability and longer shelf life.

ISSN: 2456-3110 REVIEW ARTICLE April 2024

Therefore, these preparations are gaining importance these days.

Conclusion

Ayurveda is an ancient Indian system of medicine based on natural and holistic approach to physical and mental health. Natural products and traditional methods are used in the manufacturing of herbal products. Although modern techniques are used in the manufacturing of these products in large scale in different pharmaceutical units but *Aasava* and *Arishta* are prepared by traditional method even today by the addition of *Dhataki* flowers as fermentation agents. Our *Acharyas* were well aware of these natural products and their history date back to the *Vedic* era. Due to the easy availability and efficacy in the fermentation processes, *Dhataki* flowers are widely used in the preparation of *Aasava* and *Arishtas*. Therefore, this study has laid emphasis on their role in *Sandhaan Kalpana* in *Ayurveda*.

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