Research Article

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PHARMACEUTICAL ANALYTICAL STUDY OF DHAVADI BHASMA

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ABSTRACT

Introduction: The quality of drugs is the prime and basic need of present pharmacies to safeguard the well-being and efficacy of drugs when it comes to herbal origin. The Ayurveda system of medicine stretched worldwide due to the increased side effects of synthetic drugs, lack of remedies for several chronic diseases, microbial resistance, high cost of synthetic drugs, developing diseases, and, most importantly, bacterial diseases transferred through polluted water. Bhasma (ash) form is a potent Ayurvedic pharmaceutical with biologically active and powerful healing preparation. These Bhasma (ash) possess a wide range of therapeutic efficacy and are considered superior because of their small dose, quick action, palatability, and longer shelf life. Dhavadi Bhasma is one of the Jalashuddhikarana yogas (formulations) mentioned in the Kriyakoumudi-A Malayalam textbook of Visha chikitsa (treatment), which helps to enhance its properties and retain its benefits. Aims: The present study focuses on the pharmaceutical-analytical study of Dhavadi Bhasma (ash) with various parameters. Materials and Methods: The method of preparation and the comprehensive standardization of Dhavadi Bhasma formulation is done per the standard testing protocol and accentuates its properties and actions in Jalashuddhikarana (water purification). Observation and results: Dhavadi Bhasma, explained by Kriyakoumudi, contains eight drugs, all of which have Vishahara (anti-poisonous) and Krimigna (anti-bacterial) properties and can be used in water purification.

Keywords: Dhavadi, Bhasma, pharmaceutical-analytical

INTRODUCTION

The human brain comprises 95% water, 82% blood, and 90% lungs. A 2% drop in our body's water supply can trigger signs of dehydration, hairy short-term memory, trouble with fundamental calculation, and difficulty focusing on smaller concerns[1]. Jala Mahabhoota (water) is one of Panchamahabhoota's (five elements) theories, which are fundamentals of our body and nature. Among them. In Ayurvedic perception, water is considered Jeeva (life), and Jivana is the spirit of life. The whole ecosphere is made up of Jala (water), and hence, avoiding water entirely is not possible[2]. Man can stay alive for five weeks without food but not more than five days without Jala (water)[3]. Water is essential to all living beings, but humans need it to be drunk and purified. But, in the era of natural resource insufficiency, man uses it irrationally for various purposes without even thinking of its availability and purity.

Ayurveda classics such as Samhita Nighantu have written many water purifiers using various methods for drinking purposes. Dhavadi Bhasma is used in Kerala tradition and mentioned in the Kriyakoumudi, a Malayalam textbook of Visha chikitsa, in Jalashuddikarana Yogas[4]. Dhavadi Bhasma has been explained as having a depurative effect on the water, thereby maintaining its purity. The drugs in the Dhavadi Bhasma possess pharmacological actions like anti-bacterial, anti-fungal, anti-poisonous, depurative action, etc. Hence, with the help of the Vishagna property of Dhavadi Bhasma, it acts on toxins and reduces and removes the impurities and toxins from polluted water[5].

Bhasma (ash) is a unique formulation belonging to Ayurveda. This group of medicines has quick action, palatability, and longer shelf life as well, and it can work even in a smaller dose; it acts on pathogenesis and controls incurable diseases effectively, and jala is a life-giving fluid it can also be a life-taking toxic fluid because around 3.1% of deaths in the world are due to unhygienic and poor-quality of water. The WHO estimates that 80% of diseases worldwide are waterborne[6]. Dhavadi Bhasma is one of the unutilized new formulations indicated in the Jalashuddikarana. The present study focuses on the pharmaceutical-analytical study of Dhavadi Bhasma with various parameters before using it to purify water.

Table 1: Drugs used in Dhavadi Bhasma[5]

Drugs	Botanical Name	Family Name
Dhava	*Anogeissus latifolia* (Roxb. ex DC.)	Combretaceae
Arjuna	*Terminalia arjuna* Linn	Combretaceae
Paribhadra	*Erythrina variegata* Linn	Fabaceae
Asana	*Pterocarpus marsupium* Roxb.	Fabaceae
Aragwadha	*Cassia fistula* Linn.	Caesalpiniaceae
Somavalka	*Acacia Suma* Roxb.	Mimosaceae
Nirgundi	*Vitex negundo* Linn.	Verbenaceae
Mushkaka	*Schrebera swietenioides* Roxb.	Oleaceae

Table 2: Chemical constituents of the drugs used in Dhavadi Bhasma

Drugs	Chemical Constituents
Dhava	Ellagic acid, alanine, phenylalanine,4-tri-O-Methylflavellagic acid-4'B-D-glucoside, quinine and shikimic acids, gallotannins and tannin, gallic acid, ellagic acid [7], polysaccharide acid
Arjuna	Triterpenoid saponin, Arjunolic acid, b-sitosterol, Ellagic acid, Arjunic acid, Arjunine, Calcium, Aluminium, and Magnesium [8], arjunaarachidic stearate, arjunic acid, tannins, arjunone, arjunetin, arjunolone, arjunglucosides i & ii; arjunoside i, ii & iv, arjunolic acid [9]
Paribhadra	Erythraline, Erythrinine, Erysovine, Erysodine, Erysonine, Erysotrine, nororientaline, erybidine, ferulic and caffeic acids, hypaphorine and its methyl ester, isoquinoline alkaloids erythrosotidienone and erythromotidienone [10]
Asana	Kino tannic acid. B-cudesmol, carpusin, propterol, marsupinol, propterol-B, a flavone, new sesquiterpene alcohol- selin -4(15)-en-1ß, 11- diols, pterostilbene, chalcone derivative, psuedobaptigenin, liquiritigenin, non-glucosidal tannin, kinoin and kino-red, protocatechuic acid [11]
Aragwadha	Fistucacidine, rhein glycoside and fistulic acid, rhein glycoside and fistulic acid [12]
Somavalka	Benezeldehyde, salicylic acid, methyl-salicylate, benzyl alcohol, analdehyde
Nirgundi	vanillic acid, p-hydroxybenzoic acid, luteolin, three flavone glycosides, glycosidic iridoids [13]
Mushkaka	Betulinic and oleanolic acids, acetic acid, formic acid, methyl alcohol

Figure 1: Dhava

Figure 2: Arjuna

Figure 3: Asana

Figure 4: Paribadra

Figure 5: Aragwadha

Figure 6: Somavlka

Figure 7: Nirgundi

Figure 8: Mushkaka

Figure 9: Prepared Dhavadi Bhasma

MATERIALS AND METHODS

All the cleaned, dried raw drugs were collected. They were weighed separately on an electronic weighing machine. Then, they are made into small pieces. All the ingredients such as Dhava [*Anogeissus latifolia* (Roxb. ex DC.)], Arjuna [*Terminalia arjuna* Linn], Paribhadra [*Erythrina variegata* Linn], Asana [*Pterocarpus marsupium* Roxb], Aragwadha [*Cassia fistula* Linn.], Somavalka [*Acacia Suma* Roxb.], Nirgundi [*Vitex negundo* Linn..], Mushkaka [*Schrebera swietenioides* Roxb.] was taken in equal quantity and burnt with the help of flame to become ash form and was left for cooling after completely burnt. Thus, the prepared formulation is stored in a clean, sterile, air-tight glass bottle. This preparation is done in the Rasa Shastra and Baishajja Kalpana laboratory at S.D.M. College of Ayurveda Udupi, Karnataka, India.

Organoleptic characters - The sample's colour, odour, and appearance are noted using sensory organs.

Particle size by powder microscopy - Characters were observed using a Zeiss AXIO trinocular microscope attached to a Zeiss AxioCam camera under bright field light.

Determination of pH, loss on drying at 105 °C, total ash, acid insoluble ash, water soluble ash, alcohol soluble extractive, and water-soluble extractive were tested as mentioned in API.[14]

RESULTS AND DISCUSSION

The results of Dhavadi Bhasma's analytical study are mentioned in Table 3.

Table 3: Results of standardization parameters

Parameter	Results n=3%w/w
	Dhavadi Bhasma (Avg±SD)
Colour	Ash grey
Odour	Odourless
Taste	Bitter
Particle size	5-50 µm
pH	12.0
Loss on Drying at 105 ^{0}C	0.0
Total Ash	96.77±0.50
Acid Insoluble Ash	18.46±0.01
Water soluble Ash	8.45±0.02
Sulphated Ash	88.65±1.16
Alcohol soluble extractive value	4.21±0.01
Water soluble extractive value	14.76±0.1

Dhavadi Bhasma is a combination of 8 drugs made into ash form and used to purify water. The drugs used in this yoga have an overall effect of laghu (light), ruksha (dry/non-unctuousness), tikshna (sharpness), and guna (properties). While considering the Rasa of these eight drugs in combination, the maximum is in the order of tikta (bitter), katu (pungent), and kashaya (astringent) Rasa, respectively. All these three Rasas possess shodhana (purification) and kledana and shamana properties[5]. By taking advantage of these qualities, it can reduce the sliminess and froth of the water. As an add-on benefit, the parameters like colour and odour have been reduced. Tikta and katu rasa are specially krimigna (anti-bacterial) and have vishagna (anti-poisonous) properties[15], which help clear the poisons in the water and the microbes are cleared.

Dhavadi Bhasma was standardized to determine quality, safety, and efficacy. The organoleptic observation shows that the prepared Dhavadi Bhasma is ash grey, with no specific odour and a slightly bitter taste. The Dhavadi Bhasma attained a particle size of 5-50 µm by complete burning.

The increased pH showed that the Dhavadi Bhasma is helpful in purifying water with more alkalinity. The alkaline water can precipitate alkali like calcium carbonate/bicarbonate, etc., and they have the capacity to form chelates with metals dissolved in potable water. At this juncture, we strongly advocate alkaline water, which can play an important role in detoxifying metallic contaminations. As mentioned, the Dhava stem bark (filtering apparatus) shows significant results in the removal of mercury (99.8%), lead (99.9%), arsenic (34.18%), and fluoride (57.05%) from the polluted water [16]. The phyto-compounds of the bark of Arjuna contain arjunic acid, arjungenin, and arjunetin, which acts as an anti-bacterial [17]. Also, the chemical constituents of all the ingredients ellagic acid, pterosupin, marsupinol, lupeol, kinotannic acid, lapachol, apigenin, p-coumaric acid, triacontanol, which acts as anti-bacterial and anti-fungal [5].

In this regard, pH plays an important role. It acts as the most robust base and reacts completely with water to produce the hydroxide ion. It helps to remove many contaminants from drinking water. These contaminants include arsenic (also known as arsenate), nitrate, chromate, fluoride, uranium, etc. Moisture content was found to be nil, which is beneficial for formulation to be free from microbial contaminations. There is a higher acid insoluble ash value, which may be due to some insoluble silicates; also, pH helps to sediment the particles in the water.

The solubility test indicated the bioavailability, and it was seen that the water-soluble ash was found to be 14%, which was more than the alcoholic soluble ash value of 4%. The water-soluble value plays a vital role in the assessment of crude drugs. The less soluble value indicates the addition of exhausted material, adulteration, or incorrect processing during drying or storage. The alcohol-soluble value of ash also indicated the same purpose as the water-soluble value of ash. These values show that the constituents of the drugs are more soluble in water, which indicates the presence of more water-soluble contents in plants.

CONCLUSION

Pharmaceutical standardization is the first step toward the standardization of any drug. Classical pharmaceutical procedures of Dhavadi Bhasma showed converting the macro elements into therapeutically effective microform medicines. And increasing pH also helps sediment the particles in the polluted water. The combination of these drugs having the chemical compositions that act on the contaminated water also, when applied systematically in the form of Bhasma, can be more effective than the most advanced chemical methods of purification, and the Bhasma based on modern parameters has become the essence of time as it allows us to study its quality and potency and assists in contradicting toxicity and helps in purification of water, thus allowing the study to accomplish worldwide acceptance. And further experimental study needs to be done.

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