

A Review Article on Sandhan Kalpana

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Abstract

Since Ayurveda has been practiced for thousands of years, one of the best dosage forms is Sandhana kalpana, or biologically fermented formulations. Specific prearranged conditions are met in order to prepare these medications, resulting in fermentation. Products thus leave behind self-produced ethyl alcohol, which enhances the medicinal and pharmacological properties of these preparations (Asava–Arishta). The active ingredients of herbal medications are also extracted, and alcohol and acetic acid are prepared in accordance with the necessary indications. Consequently, these formulations exhibit favourable therapeutic efficacy, rapid absorption and action, and a longer shelf life in comparison to other Ayurvedic herbal remedies. In order to support scholars who are exposed to these dosage forms, this review attempts to gather some basic information about Sandhan Kalpana.

Keywords: Asava, Arishta, Sandhan Kalpana.

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INTRODUCTION

For centuries, Natural products have been a vital source for sustaining life. Even today, natural products are becoming more and more significant as alternative medicines and source of pharmacotherapeutics, either directly or indirectly through the extraction of Active components with proven biological activity from their raw materials are isolated. The usage of herbal products has experienced an upsurge of interest during the past few decades [1].

Under the term Bhaishajya Kalpana (BK), pharmaceuticals are dealt with in Ayurveda. BK deals with a variety of pharmaceutical preparations, especially Panchvidhya Kashaya Kalpana (Primary preparations) and secondary preparations such Churna (powder), Sneha (Medicated oils), Avaleha (linctus), and Asava and Arishta (Alcoholic preparations) [2]. Among these dosage forms, "Sandhana kalpana" is a special one in which acidic and alcoholic fermented formulations are made [3]. To create these medicines, the liquid basic drugs (juices or decoctions) are preserved for fermentation as mentioned in the classics [4].

In this technique, ethyl alcohol is produced internally by the source material employed in the pharmaceutical operation and is not externally added (in these dosage forms). Ethyl alcohol is not the only product produced here; rather, it is a component of many other chemical compounds. Additionally, alcohol/acetic acid is prepared (according to required indications) and the active ingredients of herbal drugs are extracted. As a result, these formulations, when compared to other Ayurvedic herbal remedies, have a longer shelf life, fast absorption and action, and good therapeutic efficacy [5]. This review aims at compiling some fundamental facts about Sandhan Kalpana, that may further assist in strengthening the knowledge of academics who are subjected to such dose forms.

MATERIAL AND METHOD

Chronological appraisal of Sandhan Kalpana:

The fermentation method can be found chronologically in every phase of Indian civilization, that is, from the Vedic period to the present. In the past, testing of drugs during production and after they were finished relied on subjective parameters, but in the present, the quality of finished drugs is evaluated using a

variety of analytical and advanced biotechnological techniques [6].

Rig Veda: The Rig Vedic text of the ninth mandala has a significant section on fermented Soma Rasa. The topic includes around 610 verses. A special concoction known as Somarasa is a sweet liquid that is purported to be a result of the fermentation process. Along with Somarasa (Rigveda -2/14/01), the fermenting process was used to create Sura, another alcoholic beverage, in the Rigveda. The production of an acidic fermentation product called curd, which was frequently included in the everyday diet, made the inhabitants of this era widely known [7].

Atharva Veda: It is made clear that the madya utilised for treatment is known as arista, and that the preparation method is called Abhishava prakriya.

Yajur Veda: Yajur veda comprises numerous citations describing various Ahara Kalpanas, including Sandhana Kalpana.

Ramayana: The advanced phases of comprehension and application of Sandhana Kalpana are established in Sudara Kanda of the Ramayana, which gives a clear notion of a range of Sandhana items manufactured and consumed for intoxication purposes. Here is where the term "Asava" is first used.

Kautilya Artha Shastra: Two different types of Sandhana kalpana preparations made from fruit juice and molasses, when kept for a specific amount of time, are mentioned in the Kautilya Arthashastra (Suraadhayay 1, 2, and 3). Some of these preparations are transformed into particular liquids and are referred to by the terms Medaka, Prasanna, Asava, and Arishta [8].

Charak Samhita: In this period, several original revelations were made about preparation of different herbal formulations as medicines. According to literary analysis, many Asava Arishta were wellknown to physicians at that time. The Charaka Samhita describes the nine herbal sources—Phala (fruits), Dhanya (cereals), Mula (roots), Pushpa (flowers), Twak (bark), Sara (exudate), Kanda (branches), Patra (leaves), and Sharkara (sugar)— for the manufacture of fermented medications, including the definition of fermentation, requirements for the container, locations to keep the basic drugs, fermentation duration, and subjective criteria for testing the final product [9].

Sushruta Samhita: Numerous fermented preparations known as Sandhana Kalpana were recommended for use during surgical procedures as both an anaesthetic and a medication to cure various illness problems. This ancient manuscript provides thorough documentation on a total of 21 fermented drugs, including Asava-Arishta, and 46 Madya products, including Madya, Sura, Prasanna, Jagala, Surasava, Madhvasava, Shukta, and Dhanyamla. The addition of botanical ash (Apamarga, Palasha ash) to

Asava-Arishta's components can be attributed to Sushruta Samhita [10].

Ashtang Hridya and Ashtang Sangreha: In this time, the study of herbal medicine reached its height of development, as seen by the variety of Sandhana kalpanas that were created. Dhataki Pushpa (*Woodfordia fruticosa*) is used as a fermentation initiator for the first time in Ashtanga Hridaya together with other components [11]. The container, the place, the period, and the criteria for assessing the result are all explicitly stated in numerous formulations, typically in line with earlier classics, demonstrating that physicians were well aware of the fermentation processes. The five ingredients identified to be utilised to make Madya and Sandhana kalpana are Draksha (grapes), Ikshu (sugar cane), Makshika (honey), Shali (rice), and Vrihi (grains) [12]. A total of 17 Asava-Arishta in Ashtanga Sangraha and 8 in Ashtanga Hridaya are cited [13].

Kashyap Samhita: In this classic, the word "Abhishava" is used to denote a fermented food in seven fundamental kalpanas (dosage forms). However, we were unable to locate any reference of a specific fermentation process in the preparation technique [14].

Chakradatta: In Chakradatta, a number of Asava-Arishta category products are mentioned, including ayamakanjika for the treatment of grahani, siddhamla kalpana for the treatment of amavata, and many more. It is possible to view this as Acharya Chakrapani's most notable contribution [15].

Gada Nigraha: A few concepts were presented in this ancient manuscript to formulate different herbal compound remedies. These formulas were widely used in the treatment of illnesses. In the chapter Asavadhikar, 60 Asava-Arishtas (fermented medications) are enumerated [16].

Sharangdhar Samhita: Definition, overall guidelines, precautions to take in the absence of precision, and several classifications depending on the source or raw material of fermentation are all included¹⁷. The most important contribution of this book is the establishment of a guideline for cooking Asava-Arishta when definite proportion of component are not given [18].

Yogaraj Narayan: Yogaraj Narayan provides a thorough explanation of Asava-Arishtas in madya Kalpana [19]. The narrations of Asava-Arishta in the prior ancient treatise are comparable to all of these descriptions. However, it's noteworthy to observe that this book has more Sandhana Kalpana formulations overall than the preceding masterpieces.

Bhaishajya Ratnavali: This manual provides information about Sandhana formulations in a way that makes it easier for physicians to utilise it on a regular basis. There are 50 Sandhana kalpanas cited in this book,

of which 15 are Asava, 29 are Arishta, 2 are Chukra, 2 are Sura, 1 is Shukta, and 1 is a Kanji kalpana [20].

Ayurvedic Formulary of India: 40 Asava-Arishta are fully described in Parts I and II of the Ayurvedic Formulary of India, including their pharmaceuticals and therapies. The production method of Asava-Arishta is outlined at the beginning of each chapter in this book by the Department of AYUSH, Government of India, along with a systematic description of each formula's constituents and their proportions [21].

Classification of Sandhan Kalpana:

“Sandhan” the term literally means ‘union’, combination or restoring. In this case, medicines are mixed and are permitted to be in the same state for a set amount of time. This fermentation process facilitates the chemical and biochemical reactions with breakage and reunion of the bonds in the preparation to form a new compound. Madhya was utilised in ancient India as part of a ritual sacrifice to the Gods. Soma and Sura were the two main alcoholic drinks, and two Indian divinities had the same names. The former was consumed chiefly by Brahmins during their conduct of devotional rites and is reported often in Rig-Veda. Sandhan is classified under two groups based on the nature of final product i.e. Madya Vargiya Sandhan Kalpana and Amla Vargiya Sandhan Kalpana.

Madya Vargiya Sandhan Kalpana (Alcoholic Preparations) [22]:

Asava: Along with various herbal components and fermentation agents like as jaggery, honey, sugar, etc., a cold infusion, extracted juice, or plain water is taken in an earthenware jar. The vessel is then sealed and kept still in a neutral atmosphere. When ready, filter it and put it in glass containers for storage [23]. In other words The

alcoholic beverage produced without heating the drug in water (Dravapradhan) is Known as Asava. It enhances taste, lowers sleeplessness, boosts mental stamina, increases physical strength, and promotes happiness.

Arishta: Decoction of herbal substances is used in place of cold infusion etc., and the same technique is performed. The alcohol made from "Pakwaushadham," a source of boiling or cooked material (Dravyapradhan) is known as Arishta. It serves as an appetiser, pittarodhak, kapha-vaat naashak, mild laxative, etc. Additionally helpful in grahani, paandu, shosha, arsha, jwara, and grahani. As well as in Shool, Adhmaan, Udara rog, Ajeerna [24].

Sidhu: There are two forms of sidhu: Apakwa (Shita) rasa Sidhu: Sweet liquids like sugarcane juice that have been fermented without being heated. Pakwarasa Sidhu: Made by boiling sweet juice and fermenting it [25]. The effects of pakva rasa seedhu enhance a person's voice, strength, and skin tone. It is helpful in kaphaj vyadhees such as medo roga, shopha, arsha, udar rog, and snehaj vikaras. In contrast, Sheetarasa Seedhu has less qualities and possesses excellent lekhan karma [26].

Sura: Sura is a fermented alcoholic beverage made from cooked grains like rice and barley. Prasanna, the clear supernatant fluid of Sura, is another classification for it. A little bit thicker than Prasanna is Kadambari. Compared to Kadambari, Jagala shows lower and is thicker. Compared to Jagala, Medaka is thicker. Vakkasa, Surabija, or Kinwa are the residues that continue to remain after filtering [27]. It is beneficial in kasa, arsha, grahani, and mutraghat. Additionally, it is vaatnaashak. It is beneficial to boost lactation, physical strength, blood, and hunger [28]. The body's meda and kapha levels are likewise raised by it. It benefits shotha, gulma, and mutrakruchcha [29].

Table 1

| S. No | Layers | Definition | Properties and Uses |
|-------|----------------------|--|---|
| 1 | . Prasanna | "Prasanna" refers to the transparent liquid that forms in the top layer of Sura [30]. | It contains rochak (improves flavour), chhardi nashak (antiemetic) properties, and soothes stomach and grief pain along with this it is kapha-vaat naashak. Aanaha (tight abdomen), arsha (haemorrhoids), and vibandha (constipation) are other conditions for which it is beneficial [31]. |
| 2 | . Kadambri | This liquid has a higher density than prasanna [32]. | The classics don't specify any further particular properties |
| 3 | . Jagal | 'Jagal' refers to the thick portion below Kadambari [33]. Alcohol is present in this part, although in lower concentration. | It enhances kapha, decreases vaata, quenches thirst, and possesses Hridya qualities. It is helpful in arsha (abdominal distension), kshay (cachexial condition), and pravaahika (loose, sticky stools) [34]. |
| 4 | . Medas | This layer lies beneath the jagal. It is significantly denser than the one above it and contains a very little amount of alcohol [35]. | The properties of Medas are similar to Jagal. |
| 5 | . Vakkas or Suravija | 'Vakkas' refers to the vessel's bottom layer. Alcohol is not present in this stratum [36]. It can also be used as Fermenting agent therefore it is also known as Surabija. | - |

Varuni: The alcoholic beverage made from Tala and Kharjura juice is known as Varuni [37] It helps with peenas, aadhman (expanded belly) shool, Shwasa and Kasa. In addition to that it has the properties like Hridya (cardiac tonic), Laghu (as compared to Sura), vibandnashak [38].

Amla Vargiya Sandhan Kalpana (Acidic Formulations):

Shukta: The product, which is made from fruits, tubers, and roots along with Sneha and Lavana is known as Shukta [39]. It is raktapittakara, chedan, and vaiswarya, which boosts the ability to digest food, as well as kapha, paandu, and krumi nashak [40].

Tushodhaka: Yava that has not been cooked is crushed with Tusha (Satusha) and preserved for Sandhana. It possesses deepan and hrudya properties along with this it is krumi and paandu naashak [41].

Souviraka: Fermentation of boiled Yava after removing its husk (Nistusha) is known as Souviraka. The characteristics of Souviraka are Bhedana, Dipana, Arsha (piles), Kaphaghna, Grahani (malabsorption syndrome), Udavarta (condition in which vayu moves upward), Adhmana (flatulence with gurgling sound), and Asthishula (bone pain) [42].

Kanji: Horse gramme and Shaali Dhanya, a particular variety of rice, are prepared in four times the amount of water and then filtered. The obtained liquid is held for fermentation, and the sour liquid that results from this procedure is known as Kanji [43].

Sandaki: Raddish, mustard, turmeric, asafoetida, black pepper, and cumin seed pieces are all placed in an earthenware container with water. Then, for 7 days, the mixture is kept still in the sealed jar at a neutral location. After filtering this combination, a liquid is formed that is known as sandaki [44].

Factors responsible for the accurate initiation of Sandhan Kalpana:

Temperature: There is a minimal amount of temperature variance at the process location where sandhana kalpana initiated. To fulfil this purpose in ancient times, containers for the preparation of Asava-Arishta were put in Dhanya Rashi (Kanakbindu Arishta - Charaka Chikitsa Sthana 7/76-79), Bhugarbha, Chaulyagara (Kharjurasava - Gada Nigraha 7/266-274), Koshthasara (Kumaryasava - Gada Nigraha 6/1-14). With the help of

this approach, the ideal temperature, direct avoidance of light and air, etc., were retained. In general, the ideal temperature needed to start fermentation is between 20 and 35 °C [45, 46].

Containers: All classical texts advocated the use of clay and wooden vessels for the fermentation process, but they have drawbacks since wooden containers need to be prepared and earthen pots are prone to breaking. Consequently, these pots were replaced by steel and plastic containers as pharmaceuticals technology advanced. Studies were conducted to analyse the finished product physicochemically and organoleptically in order to answer the issue of whether it would be as effective with the particular kind of containers. It is determined that steel and plastic containers are suitable for Sandhana Kalpana [47, 48].

Duration: As stated in Sushruta Sutra Sthana 45/203 and Sushruta Chikitsa Sthana 12/12-17, the word "jatarasam" implies the conclusion of fermentation and production of the proper product. Fermentation times vary depending on formulation and can range from as short as seven days (Ashtashatarishta - Charaka Chikitsa Sthana 12/32-33) to as long as 180 days (Guggulu Asava Gada Nigraha 6/213-221) [49].

Proportion of Carbohydrate: In Sandhana Kalpana products, carbohydrates serve as the primary source of nourishment. The kind and amount of carbohydrates present influence the rate of fermentation and the end product, such as biomass and primary and secondary metabolites, that are formed. The viscosity of a solution increases with an increase in the concentration of carbohydrates in the liquid [49]. It has been noted by Acharya Charaka and Sharangadhara that the fermentation process in Sandhana kalpana uses 39.06% of sweet ingredients, often carbohydrates. But it is advisable to add just 40% of the sweet substances in order to start the simple and early fermentation; the remaining amount is added once the fermentation process has started [50].

Significance of Sandhan Dravya (Fermentor):

Initiating the fermentation process, the fermentor serves as a repository for microorganisms. A detailed study of ancient literature indicates that Sandhana dravya (Fermentor) in Sandhana kalpana fulfils the following roles (Table 2).

Table 2

| Fermentor | Formulation | Reference |
|-----------------|---------------|---|
| Dhataki Pushpa | Abhyarishtha | Ashtanga Hridaya Chikitsa Sthana 08/66 |
| Madhuka Pushpa | Kutajarishtha | Sharangadhara Samhita Madhyam Khanda 10/44-46 |
| Surabeeja/Kinva | Sura | Sushruta Samhita Chikitsa Sthana 10/8 |

Sidhi Lakshanas (Signs to identify the completion of Process) [51]:

1. There is no sound perceptible when one places their ear to the vessel from the outside.

2. When all of the prakshep dravya has accumulated at the bottom of the container.
3. When a match is lit within the vessel, it continues to burn.

4. The liquid acquires the ideal flavour, colour, and smell.
5. A small amount collected in a glass test tube should be clear; if any particles are present, the procedure is deemed to be incomplete, and the vessel has to be capped and allowed to finish the fermentation process.

DISCUSSION AND CONCLUSION

Ayurvedic medicine is poised to recover its once-famous status because of its preventative and therapeutic properties, lack of side effects, and holistic approach. The renowned Ayurvedic formulations known as "sandhana kalpas" are frequently used for a variety of medicinal purposes.

In this work, an effort has been made to evaluate the preparation process and the characteristics of the sandhana kalpas. We were compelled to present this evaluation paper to every Ayurvedic stakeholder due to Sandhana Kalpana's supremacy in Ayurvedic practise. Under the heading of crucial concerns in this discipline, authors have debated the fundamental requirements for the preparation of Sandhana kalpana. The method for preparing other Kalpas, such as varuni, sura, and other amla vargiya sandhan kalpas, has not been described in as much detail, such as the vessel material to be used, the amount of fermenting agent to be added, the temperature, etc. This review has shown that the process for making asav-arishta has been described in comprehensive detail in all the classical texts.

The qualities of the aforementioned formulations can be applied to routine clinical practise such as Sura, although giving it internally is the most common form of Prayoga, a few uncommon Bahya Prayogas, such as Sura as Parisheka Dravya in Kaphaja Shopha, Shleshmanubandha Vatavyadhi, Naigameshagraha, Anjana Dravya in Kandu as Upadrava in all Shleshmaja Akshiroga, Sirotkata, and Marga Sechana Dravya in Vishadushit. It can also be used in Stanya Kshaya in Lactating women, when they have less milk production. Shukta may be utilised in krumi vikar, mutra vaha srotas related vyadhis, and other kaphaj vyadhees, whereas Seedhu can be used by talkers due to its swarya property. Kanji has very good effects in vaata kaphaj vikaras, as also in mukhadaurgandhya, kham, etc. Sandaki improves taste and Pittakaphhara in nature.

Asava and arishta are used to treat a wide range of issues in paediatric medicine, including those involving the nervous system, blood and circulatory system, respiratory system, digestive and excretory system, urinary system, reproductive system, immune system, skin issues, worm infections, general illnesses, and infectious diseases, among others. It was therefore necessary to review the characteristics of various Sandhan Kalpnas, which was done well in this study.

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