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Research Article

PHARMACEUTICAL PREPARATION AND PRELIMINARY ANALYSIS OF *SHWETA PARPATI* MENTIONED IN DIFFERENT CLASSICS

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ABSTRACT

Rasa Shastra, a crucial branch of Ayurveda, emphasizes the therapeutic applications of herbo-mineral and metallic preparations. *Shweta Parpati* (SP), mentioned in many Ayurvedic classics, is renowned for treating conditions such as *Mutrakricchra* (urinary problems), *Ashmari* (renal stones), *Yakritvikara* (hepatic disorders) etc. This study aims to prepare and evaluate five different samples of SP based on classical references to ensure their quality and difficulties in pharmaceutical preparation. **Materials and Methods:** Five methods selected from texts like *Siddhabheshajamanimala* (SBM), *Bhaishajya ratnavali* (BR), *Rastantrasaar & Siddhaprayoga Sangraha* (RTSSPS), *Siddhayogasangraha* (SYS), *Rasoddharatantra* (RDT) were followed, utilizing *Suryakshara* (potassium nitrate), *Sphatika* (potash alum), *Gandaka* (sulphur), *Navasadara* (ammonium chloride), *Tankana* (borax), *Karpura* (camphor), and *Gandaka ka shudda tijab* (sulfuric acid) in different proportions, pharmaceutical steps, and ingredient combinations. Ingredients were meticulously processed, heated, and solidified under controlled conditions. Yield and analytical parameters of each formulation were recorded according to API reference. **Results:** SBM reference produced brittle flakes with brownish spots, yielding 71.42%. BR resulted in very hard flakes with 54.66% yield. RTSSPS achieved thin, brittle flakes with nearly 89.77% yield. SYS produced hard flakes, yielding 73.68%. RDT yielded arduous flakes with a 69.85% yield. Analytical results showed significant variations in physicochemical properties, highlighting the diverse impacts of these traditional texts on preparation techniques. **Conclusion:** Standardizing these methods is essential to ensure consistency and reliability in clinical applications. Future research should focus on refining these techniques and exploring their clinical benefits in more depth.

INTRODUCTION

Parpati, derived from the Sanskrit word "*Parpata*" meaning *Papad* or thin wafer, refers to Ayurvedic formulations known for their distinctive shape and uniform appearance. These formulations hold a unique place in Ayurvedic medicine as *Rashoushadi*. The *Parpati Kalpana* primarily mentioned in the context of G*rahani Roga* in *Chakradatta* by *Acharya Chakrapaanidatta* (11th century). [1]

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Shweta Parpati (SP), referred to by various names in Ayurvedic classics such as *Sheetala Parpati* in *Siddha Bheshaja Manimala* (SBM)[2], *Kshara Parpati* in *Siddha Yoga Sangraha* (SYS)[3], SP in *Bhaishajya Ratnavali* (BR)[4] and *Rasoddhara Tantra* (RDT)[5], and both *Shweta*[6] and *Sheetala Parpati*[7] in *Rastantrasaar & Siddhaprayoga Sangraha* (RTSSPS), maintains consistent therapeutic actions across these references, addressing issues related to urinary, gastrointestinal, renal, and respiratory disorders. Unlike other *Parpatis* that use *Parada* and G*andaka*[8] as key ingredients, SP employs different ingredients. However, recent texts mention SP as an example of *Nirghanda moorchitha Parpati* (without *Gandaka* preparation of *Parpati*), yet references from RTSSPS and SBM indicate that sulfuric acid and *Gandaka* (sulphur) are used as ingredients.

This discrepancy should be considered when making such statements.

This study aims to prepare five types of SP as described in classical texts like SBM (SP1), BR (SP2), RTSSPS (SP3), SYS (SP4), and RDT (SP5), ensuring quality and addressing pharmaceutical challenges. The organoleptic properties, yield, and analytical parameters (loss on drying[9], pH[10], water-soluble extractive[11], total ash[12], acid-insoluble ash[13] solubility in water[14]) of each formulation were recorded providing a foundation for future studies and serving as a reference for further exploration of SP.

MATERIALS AND METHOD

Procurement of Raw Drug

Raw drugs such as G*andaka*, *Sphatika, Navasadara, Karpura,* and *Tankana* were procured from the NIA Pharmacy, Jaipur, while *Suryakshara* and sulfuric acid were obtained from the Drug Testing Laboratory (DTL) of NIA, Jaipur.

Pharmaceutical study

The pharmaceutical study was conducted in the practical laboratory of Department of Rasashastra and Bhaishajya Kalpana, NIA, Jaipur.

Preparation of SP1

Table 1: Showing ingredients of SP1 Preparation

S. No.	Ingredients	Quantity
1.	*Suryakshara*	96 g
2.	G*andaka*	2 g

G*andaka* and *Suryakshara* were separately ground into powder using porcelain *Khalwa Yantra*. The *Suryakshara* powder was then transferred into a *Mruttika Sharava* (mud plate) and heated over a moderate fire on a gas stove, constantly stirred with a spoon held by a holder until it became liquid. Throughout the procedure, the temperature was monitored using a temperature gun. The fire was then extinguished, and G*andaka churna* (sulphur powder) was added and stirred thoroughly. The mixture was poured from a modest height onto a marble surface, which had been cleaned with a clean cloth, and allowed to cool and harden. Finally, it was stored in an airtight container. (Fig.1)

Preparation of SP2

Table 2: Showing Ingredients of SP2 Preparation

S.No.	Ingredients	Quantity
1.	*Suryakshara* (potassium nitrate)	50 g
2.	*Sphatika* (potash alum)	25g

The specified ingredients, *Sphatika* and *Suryakshara*, were placed in a porcelain *Khalwa Yantra* and ground into a fine powder using a pestle. Once a uniform consistency was achieved, a portion of the mixture was transferred into a *Mruttika Sharava* and heated over a *Teekshnagni* (intense flame) on a gas stove, with constant stirring using a spoon held by a holder until it became fluid. Throughout the process, the temperature was monitored using a temperature gun. The molten mixture was then poured from a modest height onto a marble surface, which had been thoroughly cleaned with a clean cloth, and allowed to cool and solidify. Finally, it was stored in an airtight container. (Fig.2)

Preparation of SP3

Table 3: Showing ingredients of SP3 preparation

S. No.	Ingredients	Quantity
1.	*Suryakshara* (potassium nitrate)	50 g
2.	Concentrated H_2SO_4 (Sulphuric acid)	5 ml (9.035 g)

Suryakshara was finely powdered using a porcelain *Khalwa Yantra*, and concentrated sulfuric acid was carefully measured and transferred into a glass beaker. The *Suryakshara* powder was then gradually introduced into the beaker containing sulfuric acid and thoroughly mixed using a glass rod. The mixture was subsequently heated over a gentle flame on a gas stove until fumes were released and the mixture became molten. This molten mixture was then poured from a low height onto a marble surface, previously cleaned with a clean cloth, allowed to cool, and then collected in an airtight container. (Fig.3)

Preparation of SP4

Table 4: Showing ingredients of SP4 preparation

S. No.	Ingredients	Quantity
1.	*Suryakshara* (potassium nitrate)	80 g
2.	*Sphatika* (potash alum)	10 g
3.	*Navasadara* (ammonium chloride)	5 g

All the ingredients were placed in a porcelain *Khalwa Yantra*, where they were ground and blended to form a homogeneous mixture. A portion of this mixture was then transferred to a *Mruttika Sharava* and heated over moderate heat on a gas stove, with continuous stirring using a spoon held by a holder, until it liquefied. Throughout the process, the temperature was monitored with a temperature gun. The liquefied mixture was then poured from a low height onto a marble surface, which had been cleaned with a clean cloth, and allowed to solidify. Finally, the solidified mixture was stored in an airtight container. (Fig.4)

Preparation of SP5

Table 5: Showing ingredients of SP5 preparation

S.No.	Ingredients	Quantity
1.	*Suryakshara* (potassium nitrate)	80 g
2.	*Sphatika* (potash alum)	20 g
3.	*Navasadara* (ammonium chloride)	12 g
4.	*Karpura* (camphor)	12 g
5.	*Tankana* (borax)	12 g

Firstly, all ingredients were meticulously placed into the porcelain *Khalwa Yantra*, where they were finely powdered to achieve a uniform consistency. Subsequently, the powdered mixture was transferred to a *Mruttika Sharava* and heated over moderate heat on a gas stove. Throughout this process, a spoon was used to stir the mixture continuously until it liquefied into a smooth, homogeneous blend. In the final stage of preparation, the heat source was promptly turned off, and *Karpura* was carefully incorporated into the liquefied mixture. This addition was meticulously stirred to ensure even distribution and integration. The liquefied mixture was then cautiously poured onto a cool marble surface from a low height and left undisturbed to cool and solidify naturally. Finally, the solidified mixture was stored in an airtight container. (Fig.5)

Analytical Study

Prepared samples were subjected to organoleptic tests and physicochemical analysis. Preliminary physicochemical parameters, including loss on drying, pH, water-soluble extractive, total ash, and acid-insoluble ash, were assessed according to the standard protocol outlined in the Ayurvedic Pharmacopoeia of India (API) at the Drug Testing Laboratory of the Department of Rasashastra and Bhaishajya Kalpana, NIA-Jaipur.

OBSERVATION AND RESULT

During the preparation of SP1 within 4 minutes, the mixture began to liquefy at 158°C, and after 10 minutes, it fully melted at a temperature of 294°C. During the addition of G*andaka churna* to the *Suryakshara* mixture, it caught fire. The product developed some light brown spots on the *Parpati*, the mixture melted easily over moderate heat, resulting in the formation of very thin, flake-like *Parpati* without significant difficulty. The yield of the final product was 70g. (Fig.1)

During the preparation of SP2 within 5 minutes, the mixture started to melt, then solidified and stuck to the *Sharava* at 180°C. After 10 minutes, it began to melt again at 250°C. After 15 minutes, it reached a butter-like consistency at 313°C. At 20 minutes, a yellow tinge was observed as the melting process progressed. However, it did not melt completely compared to other *Parpati* preparations (425°C), making the *Parpati* preparation difficult and resulted in very hard flake. The yield of the final product was 41g. (Fig.2)

During the preparation of SP3 the initial mixing of *Suryakshara* and sulfuric acid produced white fumes with a nitric acid smell. Upon heating, the mixture began to liquefy at 109°C within 2 minutes, accompanied by the escape of nitric acid fumes. After melting for 2 minutes, the mixture started to condense, continuing to emit fumes at 130°C. In the following minute, the mixture turned a yellowish color, the fumes ceased, and it completely melted at 150°C. As a result, the thin flake *Parpati* was successfully formed without any difficulty. The yield of the final product was 51g. (Fig.3)

During the preparation of SP4 within 4 minutes, the mixture started to liquefy at 170°C. Over the next 5 minutes, it completely melted, taking on a slight yellowish hue at 319°C. The smell of ammonia was noticed during the melting process. The solution melted entirely without any issues. The *Parpati* formed smoothly without any difficulty. The yield of the final product was 70g. (Fig.4)

During the preparation of SP5 within 7 minutes, the mixture began to liquefy at 210°C, subsequently solidifying and adhering to the *Sharava*. Upon continued heating, it commenced popping, accompanied by the release of white fumes. Over the following 14 minutes, it melted and attained a *Navaneeta*- like consistency, acquiring a slight yellowish hue at 291°C. Upon adding *Karpura*, the mixture ignited. The material did not melt completely (508°C), leading to the formation of lump-like powder on the *Parpati* flakes, making the preparation of *Parpati* exceedingly difficult. The yield of the final product was 95g. (Fig.5)

Table 6: Showing Initial weight of ingredients, duration of preparation, maximum heat/temperature given and final yield of each sample shall also be tabulated here as shown below

Sample	Initial weight of ingredients	Duration of preparation	Max temperature	Final yield	Percentage gain/loss in weight
SP1	98 g	15 mins	294°C	71.42%.	28.58% loss
SP2	75 g	25 mins	425°C.	54.66%	45.34% loss
SP3	59.035g	12 mins	150°C	89.77%	10.22% loss
SP4	95 g	10 mins	319°C	73.68%	26.32% loss
SP5	136 g	30 mins	508°C	69.85%	30.15% loss

Table 7: Showing organoleptic characters of 5 samples of SP

	SP1	SP2	SP3	SP4	SP5
Colour	White with brownish tinge	Pinkish white	Bright white	Creamish White	Pinkish white with small lumps
Taste	Sour alkaline	Sour alkaline	Salt, sour, alkaline	Salt, sour, alkaline	Sour alkaline
Odour	NSO	NSO	NSO	NSO	NSO
Texture/ Consistency	Brittle flake	Hard flake	Thin flake, brittle	Moderately hard flake	Very hard flake

NSO: No specific odour

Table 8: Showing analytical test results of 5 sample of SP

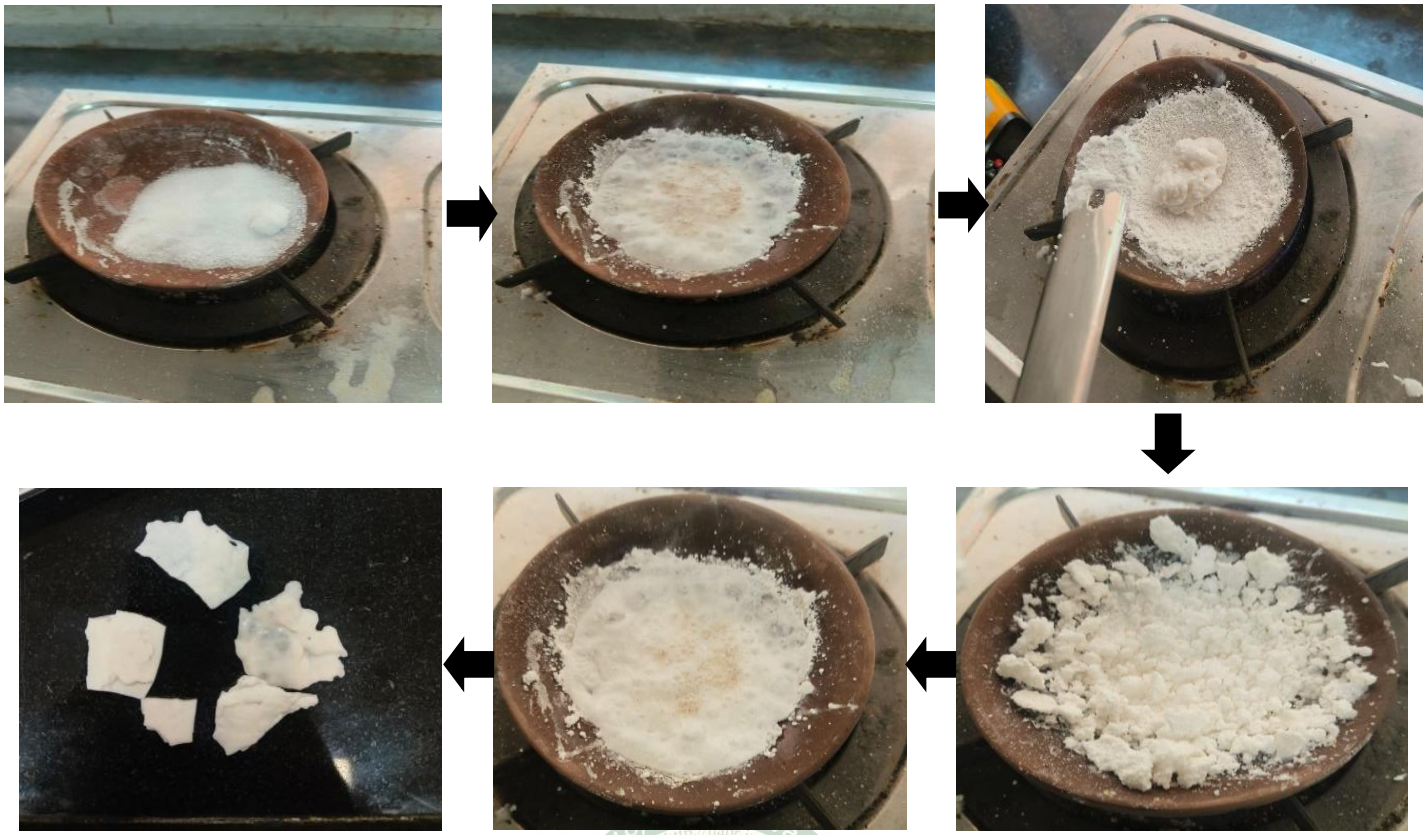
	SP1	SP2	SP3	SP4	SP5
Loss on Drying	0.2%	0.1474%	0.5923%	0.3944%	0.4466%
pH	7.97	3.52	1.32	3.68	3.78
Water soluble extractive (w/w)	98.72%	99.86%	95.63%	96.96%	99.30%
Total ash(w/w)	54.51%	78.47%	57.90%	75.50%	44.32%
Acid insoluble ash(w/w)	1.49 %	2.81%	2.50%	4.12 %	1.08%
Solubility (5 g sample in 100 ml Distilled water)	Within 5 mins with brownish residue	Within 11 mins	Within 3 mins	Within 5 mins	Within 9 mins

FIGURES

Figure1. Showing steps involved in SP1 preparation

[Figure 1.1. *Suryakshara* is kept in mild fire, Figure 1.2. Melting of *Suryakshara* mixture, Figure 1.3. Addition of *Gandaka churna*, Figure 1.4.catching of fire by molten material after adding *Gandaka churna*, Figure 1.5.Brownish spots over formed *Parpati*, Figure 1.6. Formation of SP1 *Parpati*]

Figure 2: Showing steps involved in SP2 preparation



[Figure 2.1.Mixture of *Suryakshara* and *Sphatika*, Figure 2.2. Melting of mixture material, Figure 2.3. Solidification of melted mixture, Figure 2.4. Popping of solidified material, Figure 2.5. mixture started to melt again, Figure 2.6. formation of SP2 *Parpati*]

Figure 3: Showing steps involved in SP3 preparation

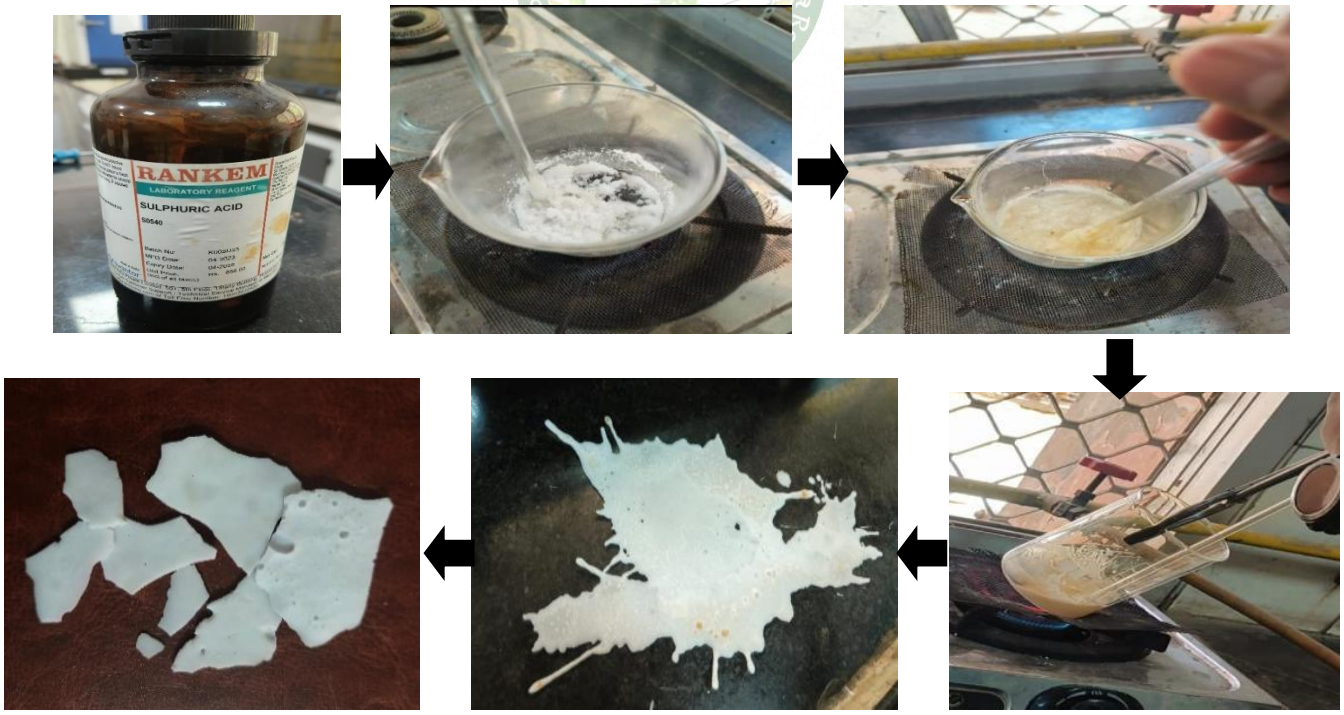
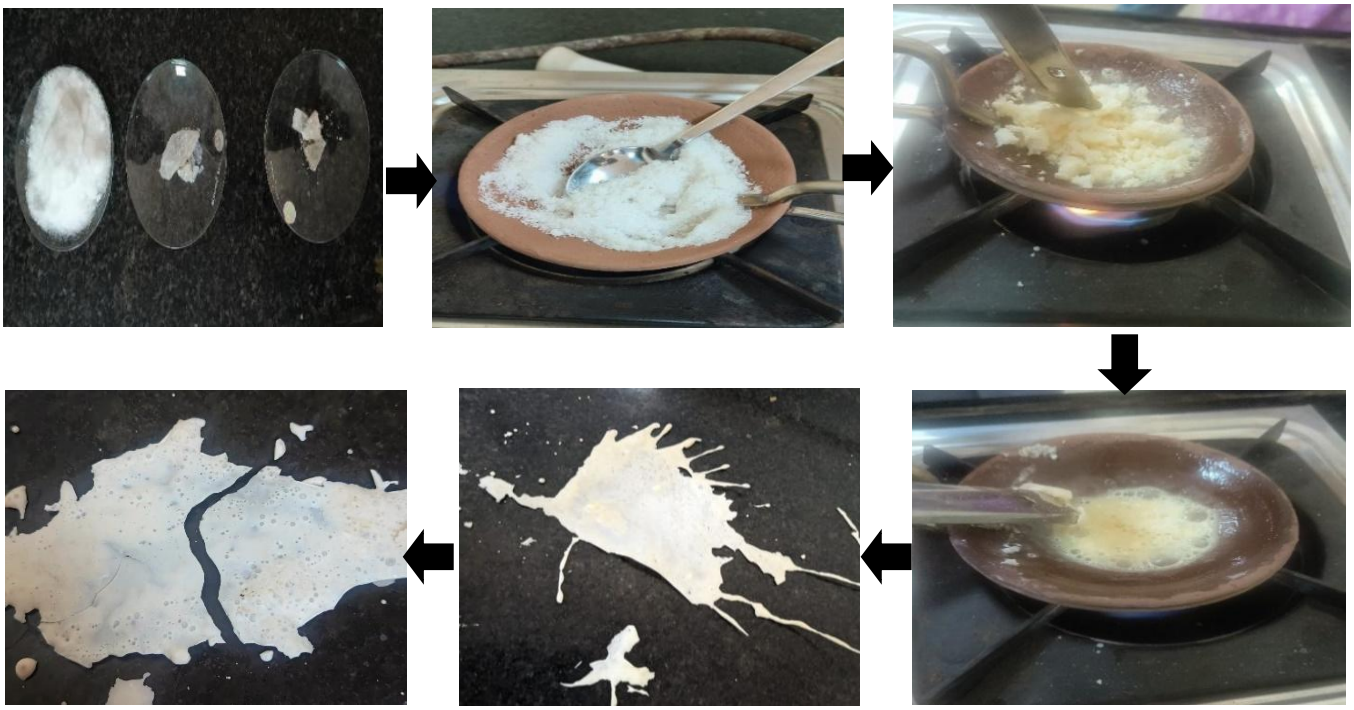


Figure 3.1. Picture of H2SO4. Figure 3.2. Mixture of H2SO4 *Suryakshara* Figure 3.3. Colour changes during heating process Figure 3.4. Complete melting of ingredients Figure 3.5. formation of SP3 *Parpati* Figure 3.6. Final product of SP3]

Figure 4: Showing steps involved in SP4 preparation



[Figure 4.1. Ingredients of SP4, Figure 4.2. Melting of mixture material, Figure 4.3. Solidification of melted mixture, Figure 4.4. Complete melting of materials, Figure 4.5. Pouring of mixture over marble, Figure 4.6. formation of SP4 *Parpati*]

Figure 5: Showing steps involved in SP5 preparation

[Figure 5.1. Ingredients of SP5, Figure 5.2. Through mixing of all ingredients except *Karpura*, using *Khalva yantra* Figure 5.3. Mixture showing *Navaneeta* consistency, Figure 5.4. Melting of materials, Figure 5.5. Pouring of mixture over marble, Figure 5.6. Formation of SP5 *Parpati*]

DISCUSSION

The detailed examination of the preparation and evaluation of five samples of SP highlights the distinct methodologies and the critical role of specific ingredients in achieving therapeutic effects. Each method uses different combinations of ingredients such as *Suryakshara, Sphatika,* G*andaka, Navasadara, Tankana, Karpura,* and Sulfuric acid, showcasing the complexity of Ayurvedic pharmaceutics. In the SP1

method, the presence of brownish spots suggests potential chemical reactions, underscoring the need for careful handling to prevent unwanted interactions. G*andaka churna* should be added immediately after removing the heat to prevent irreversible solidification. Adding G*andaka churna* will cause the mixture to ignite, so continuous stirring and prompt pouring of the molten material are essential to achieve the desired uniform shape and quality of the final product. The SP2 method required more heat (425°C) due to difficulties in melting the ingredients with moderate heat. This method produced a harder flake, highlighting the need for precise temperature control and uniform grinding. It resulted in greater loss compared to other samples, mainly due to crystallization and decomposition reactions, including the decomposition of potassium nitrate into potassium nitrite and oxygen gas, and the loss of hydration from potash alum. Additionally, material sticking to the *Sharava* and manual stirring challenges further increased losses, making the application of pressure to the poured material during *Parpati* formation crucial for achieving the desired shape and consistency. In SP3, the incorporation of *Suryakshara* and concentrated sulphuric acid achieved a high yield, emphasizing the efficiency of this technique. Strict temperature control and high-quality equipment minimized loss and prevented degradation of active ingredients compared to the classical *Loha darvi*. The use of sulfuric acid facilitated easy melting and formation of thin flakes, demonstrating its role in achieving desired consistency. The SP4 method required meticulous temperature control and continuous stirring to prevent sticking or caramelization. The SP5 method, which includes *Tankana* and *Karpura*, produced a very hard flake. Challenges faced were achieving complete melting, managing lump formation in the powder, and dealing with time-consuming and complex preparation steps. Additionally, the difficulty in reaching the melting point of the ingredients necessitated the use of *Teekshnagni* (high temperature-508°C). Pressure application during *Parpati* formation was crucial to attain the desired shape.

Precautionary measures for all *Parpati* preparations include wearing a mask to prevent inhalation of smoke from melted material, nitrile gloves, and an apron to prevent melted ingredients from contacting the body. These precautions are essential for ensuring the safety of the practitioner and maintaining the quality of the final product. Continuous stirring of the material over specified heat is necessary to avoid sticking. Deviating from the classical method, A mud *Sharava* or glass beaker is utilized instead of metallic vessels to melt the ingredients, which prevents any potential reaction with the *Kshariya dravya*. if metallic vessels are employed, the drug might react with the vessel. Additionally, the molten drug mixture is usually poured onto a clean, smooth surface because there is a risk that the ghee-coated *Kadali Patra* may burn shortly after pouring the liquefied drug material[15]. G*omaya* is not required for pressing the molten material in this study because the molten material would directly contact *Gomaya* as *Kadali Patra* burns due to the *Kṣārīya* properties of the ingredients, leading to an unpleasant odour and a change in the colour of the final product. *Ashodhita* ingredients are used in this study based on previous references that suggest they produce a higher quality and quantity in the final product, resulting in a smoother and whiter *Parpati* compared to *Shodhita* and *Nirmalikruta* ingredients[16].

Analytical tests conducted on SP samples revealed significant variations in pH values, indicating differences in acidity across methods. For example, methods utilizing sulfuric acid (SP3) displayed lower pH values (1.32), whereas SP1 exhibited a higher pH value (7.97). These variations impact solubility and stability in formulations, influencing the therapeutic efficacy of the preparations. Notably, the pH values align with standards reported in previous studies[17], confirming the accuracy of the methods used. Analytical tests, including loss on drying, water-soluble extractive, total ash, and acid-insoluble ash, provided insights into the physicochemical properties of SP across different methods. The high ash values in SP2 and SP4 (above 70%) highlight the need for careful consideration during drug administration, Differences in loss on drying and total ash content reflect variations in moisture and mineral content, which influence therapeutic efficacy.

It is crucial to apply the appropriate *Yukti* based on *Doshadushya* involvement, *Kriyakala* of *Vyadhi*, *Samskara* and *Yukti* of the physician. Specific conditions such as *Mutrakrichra, Ashmari, Amlapitta, Udara Vikaara, Shwasa, Vaatarakta,* and *Raktagatavata*[18] should be treated according to these principles. These considerations should be confirmed through clinical studies.

CONCLUSION

By compiling and preparing *Shweta Parpati* based on classical references, this research establishes a foundation for further refinement and clinical exploration to enhance its therapeutic potential in modern Ayurvedic practice. Standardizing these methods is crucial for ensuring consistency and reliability in clinical applications. Future research should concentrate on fine-tuning these techniques and investigating their clinical benefits more thoroughly.

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