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COMPARATIVE PHARAMACEUTICO-ANALYTICAL STUDY OF MANDOOR BHASMA, SWARNAMAKSHIK BHASMA AND MANDOOR-MAKSHIK BHASMA

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ABSTRACT

Background: Rasashastra, a unique branch of Ayurveda, focuses on the use of metals, minerals, and gemstones in medicinal formulations. This approach has yielded valuable contributions, including Bhasmas – processed metallic or mineral powders with enhanced bioavailability and therapeutic efficacy. Mandura Bhasma (iron oxide) and Swarna Makshik Bhasma (a compound of copper, iron, and sulfur) are well-established Bhasmas in Ayurvedic medicine, each known for its hematinic (blood-purifying) properties and applications in managing anemia. Traditionally, these Bhasmas have been used both individually and in combination. The therapeutic benefits of both Mandura Bhasma and Swarna Makshik Bhasma as individual agents are documented. Combining these Bhasmas extemporaneously (mixing separately prepared powders) is a common practice in Ayurvedic medicine. Rasatantrasaar Siddhaprayog Sangraha" introduces a unique formulation – Mandurmakshik Bhasma (MMBCP) – where the processing (marana) involves combining pre-purified Mandura and Swarna Makshik Bhasma. No work was done on this combination so study was undertaken, **Aims of the Study:** To study the comparative pharamaceutico analytical study of mandoor bhasma (MB), swarnamakshik bhasma(SB) and mandoor-makshik bhasma"

Objectives.

1. Shodhana and marana of Mandoor as per classical reference mentioned in samhitas.

2. Shodhana and marana of Swarnamakshik as per classical reference mentioned in samhitas.
3. Marana of shuddha mandoormakshik as per classical reference mentioned in samhitas.
4. Analytical study of Mandoor Bhasma (MB), Swaramakshik Bhasma (SB), Combination of separately prepared Mandoor Bhasma and Swarnamaskshik Bhasma.(MMBSP), Combinely prepared Mandoor-Makshik Bhasma (MMBCP).

Methodology: Shodhana and Marana of Mandoor Bhasma, Swaramakshik Bhasma, and Combinely prepared Mandoor-Makshik Bhasma were done as per classics. **Results:** After 32 putas, 5 putas Mandoor bhasma and mandura makshika bhasama passed all the Bhasma pariksha is which ash value is more which shows its inorganic nature and mandurmakshik is highly rich in iron oxide. **Conclusion:** The study confirms that the combined processing method (MMBCP) for Mandoor- Makshik Bhasma is more efficient (5 putas vs 30 putas) and cost-effective while retaining the properties of both original Bhasmas. Analysis shows all four Bhasmas in all are rich in iron oxide (Fe_2O_3>50%).

KEYWORDS: The therapeutic benefits of both Mandura Bhasma and Swarna Makshik Bhasma as individual agents are documented.

INTRODUCTION

Ayurveda, the traditional Indian medical system, emphasizes the balance of three vital elements – Vata, Pitta, and Kapha (collectively known as Tridosha) – for optimal health.[1] Ayurvedic medicines are derived from natural sources like plants, animals, and minerals. Rasashastra, literally translating to "science of mercury" (rasa) and "literature" (shastra), is a unique branch of Ayurvedic medicine. It delves into the world of metals, minerals, and gemstones, offering a potent complement to the traditional focus on herbal remedies.[2]

While Ayurveda has long relied on the healing power of plants, Rasashastra emerged as a significant addition. It introduced a powerful arsenal of treatments for various ailments, utilizing metals and minerals in a sophisticated manner.

Bhasma, the quintessential product of Rasashastra, is a fine powder or ash obtained through the meticulous processing of metals and minerals at specific temperatures. This process, crucial for detoxification, unlocks the medicinal potential of these materials and allows for their efficient absorption by the body.

Mandura Bhasma[3] (iron oxide) and Swarna Makshik Bhasma[4] (a copper, iron, and sulfur compound) are well-established hematinic agents, traditionally used for managing anemia. While their individual therapeutic effects are documented, a gap exists in understanding potential benefits of combining them. Rasatantrasaar Siddhaprayog Sangraha described a unique formulation – Mandurmakshik Bhasma[5] (Combinely prepared Mandoor-Makshik Bhasma - MMBCP). So this study focuses on Comparative Pharamaceutico Analytical Study of Mandoor Bhasma, Swarnamakshik Bhasma and Mandoor-Makshik Bhasma.

AIMS OF THE STUDY: To study the comparative pharamaceutico analytical study of mandoor bhasma (MB), swarnamakshik bhasma(SB) and mandoor-makshik bhasma.

OBJECTIVES

1. Shodhana and marana of Mandoor as per classical reference mentioned in samhitas.
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METHODOLOGY

Methodology s includes pharmaceutical study along with Physico-chemical and analytical study. Mandura Bhasma and Swarna Makshik Bhasma possess inherent therapeutic properties; their raw forms are unsuitable for direct use. These materials require specialized processing to unlock their medicinal qualities and ensure safe absorption within the human body. Drug specific shodhana and Marana need to carry out to make the bhasma bio-available for the human use.

Raw mandura and Swarna makshika was procured from the pharmacy of the college.

Mandura Bhasma

Ashudhha Mandura, underwent shodhana with Gomutrayukta triphala kwath,[6] After Shodhana, 480 grams of Shodhit Mandoor, the refined form, remained from the initial 500 grams of Ashudhha Mandura. Shodhit Mandoor was divided into two equal portions of 240 grams each. One portion of Shodhit Mandoor underwent Marana to produce Mandoor

Bhasma, The other portion of Shodhit Mandoor combined with pre-purified Swarna Makshik Bhasma.

The purified Mandura was ground with triphala decoction for 8 hours,[7] then shaped into chakrika (patties) and dried. These patties were layered in sharava (crucibles), sealed, and puta was given on day three they were taken out. The resulting patties were powdered and tested for Bhasma. This process was repeated until the desired Bhasma characteristics were achieved, which took a total of 32 putas. From the initial 240 grams of Shodhit Mandoor, the processing resulted in a final yield of 160 grams of Mandoor Bhasma. This indicates a loss of 80 grams during the transformation process.

Swarnamakshik Bhasma

Swarna makshik powder was tightly enclosed in a pottali and suspended in a Dola yantra filled with matulunga swaras (citrus medica lime juice) for 6 hours over mild heat.[8] Afterwards, the preparation was washed, dried, and stored as purified Swarna makshik for future use in creating both Swarna makshik Bhasma and Mandurmakshik Bhasma.

For marana Kulattha seeds were thoroughly washed with tap water and boiled in a large stainless-steel vessel until the liquid reduced to one-eighth its original volume (around 4 liters). The strained liquid was then filtered using the cloth intended for processing Swarna makshik.

Swarna Makshik was mixed with Kulattha seed decoction in a grinding mortar until it formed a thick paste. This paste was then heated and stirred in an iron pan until it turned brownish-brown. After cooling, the resulting Bhasma was finely ground and stored in an airtight container. The starting weight of 240 grams yielded 210 grams of final product (a 30-gram loss). The finished Bhasma displayed a smooth texture, a blackish-brown color, and no distinct taste or smell, meeting bhasma pariksha.[9]

Marana of Mandoor Makshik[10]

Equal quantities (240 grams each) of Shudhha Mandoor and Swarna Makshik underwent a 12- hour bhavana with fresh Gomutra in a Khalva. This intensive grinding yielded a paste-like consistency. The paste was then shaped into Chakrikas and dried overnight. These dried chakrikas were carefully arranged in sharavas. After drying overnight, the sealed sharavas were placed in a Puta containing layers of Vanyopalas. The puta was ignited, and on day

three chakrikas were retrieved from the sharavas and ground again. Bhasma Pariksha was performed after each Puta to ensure the Bhasma met all the desired characteristics. This process of trituration, shaping, heating, and testing was repeated until the Mandurmakshik Bhasma passed all the quality checks, which in this case, took a total of five Puta cycles.

OBSERVATIONS ANS RESULTS

Table no-1: showing organoleptic test of raw mandoor and Swaranamakshik.

Sr. No.	Parameter	Result for Mandoor	Result for Swavarnamakshika
1.	Colour	Blackish brown	Grayish with golden tint
2.	Odour	Odourless	Odourless
3.	Taste	Metallic	Metallic
4.	Touch	Rough	Rough
5	Iron	63.3 mass%	50.3 mass%

Table no-2: showing Comparative physical properties of Raw Mandoor, Shuddha mandoor and Mandoor Bhasma.

Sr no	Parameter	Raw Mandoor	Shuddha Mandoor	Mandoor Bhasma
1	Sparsha	Hard	hard	Smooth & soft
2	Rupa	Blackish brown	black	Brick red
3	Rasa	Metallic	katu	Tasteless
4	Gandha	Odourless	Gomutragandhi	Odourless

Table no-3: showing Percentage of Metals in Mandura and Swarna makshika.

	Raw Mandoor	Shudhha Mandura	Mandura Bhasma	Raw swarnamakshik	Shuddha swarnamakshik	swarnamakshik
Fe%	63.3 mass%	66 mass%	57.8 mass%	50.3 mass%	62.1 mass%	79.3mass%
Cu%	-	-		0.1 Mass%	0.1 Mass%	0.2 mass%
S%	-	-		40.3 Mass%	27 Mass%	6.56 mass%

Table no. 4: showing organoleptic test of Bhasma.

Sr. No.	Parameter	Mandoor Bhasma	Swarnamakshik Bhasma	Mandoor-makshika Bhasma(SP)	Mandoor-makshika Bhasma (CP)
1.	Colour	Brown	Red Brown	Red Brown+	Brown+
2.	Odour	Odourless	Odourless	Odourless	Odourless
3.	Taste	Tasteless	Tasteless	Tasteless	Tasteless
4.	Touch	Smooth and fine powder	Smooth and fine powder	Smooth and fine powder	Smooth and fine powder

Table no- 5 showing Ayurvedic (Classical) Bhasma Pariksha.[11]

Sr. No.	Name of Bhasma Pariksha	Mandoor Bhasma	Swarnamakshik bhasma	Mandoor-makshika Bhasma(SP)	Mandoor-makshika Bhasma(CP)
1.	Rekhapurnatva	Passed	Passed	Passed	Passed

2.	Varitaratva	Passed	Passed	Passed	Passed
3.	Unam	Passed	Passed	Passed	Passed
4.	Nishchandratva	Passed	Passed	Passed	Passed
5.	Niswadu Pariksha	Passed	Passed	Passed	Passed

Table no-6: showing Physiochemical analysis of MB, SB, MMBSP & MMBCP.

Parameters	Mandoor Bhasma (MB)	Swarnamakshik Bhasma (SB)	Mandoor-makshika Bhasma(MMBSP)	Mandoor-makshika Bhasma (MMBCP)
Loss on drying @ 110°C	0.171%	0.205%	0.413%	0.109%
Total Ash Content	99.58%	97.34%	99.52%	99.73%
Acid insoluble Ash	55.77%	37.76%	43.01%	53.59%
Water Soluble extract	3.06%	15.50%	7.43%	7.73%
Alcohol soluble Extract	0.22	11.03%	4.37	3.36%

Mandor-Makshik (SP) Bhasma had a higher drying loss compared to the other three samples, suggesting all four Bhasmas possess low moisture content. The total ash content of Mandor- makshik (CP) Bhasma was highest, indicating a greater proportion of inorganic material compared to the other three samples. Ash Value in all four bhasmas was more which indicates it has more amount of inorganic content.

Table no-7: Shows Mandoor- XRF analysis.

	Raw Mandoor	Shuddha Mandoor	Mandoor bhasma
Fe%	63.3 mass%	66.0 mass%	57.8 mass%
Fe_2O_3%	51.3 mass%	49.4 mass%	42.5 mass%

Table no-8 Shows Swarnamakshik- XRF analysis.

	Raw Swarnamakshik	Shuddha Swarnamakshik	Swarnamakshik bhasma
Fe%	50.3 mass%	62.1 mass%	79.0 mass%
Fe_2O_3%	31.9 mass%	42.4 mass%	69.4 mass%
Cu%	0.015 mass%	0.01 mass%	0.02 mass%
CuO%	0.008 mass%	0.01 mass%	0.01 mass%
S%	40.3 mass%	27.0 mass%	6.56 mass%
SO_3%	56.9 mass%	44.1 mass%	11.8 mass%

Table no-9: Shows Mandoormakshika Bhasma (MMBSP) & Mandoormakshika Bhasma (MMBCP) - XRF analysis in oxide form.

Sr no	Component	Mandoor-makshika Bhasma(MMBSP)	Mandoor- makshika Bhasma (MMBCP)
1	Fe_2O_3	51.1%	45.1%
2	SiO_2	24.2%	24.0%
3	Al_2O_3	8.16%	8.30%
4	CaO	4.22%	5.19%
5	SO_3	5.12%	2.12%
6	K_2O	2.77%	9.05%
7	MgO	1.95%	2.92%

8	TiO_2	0.996%	1.11%
9	P_2O_5	0.786%	0.652%
10	Co_2O_3	0.152%	0.124%
11	MnO	0.127%	0.124%
12	CuO	0.017%	0.022%
13	ZnO	0.008%	_
14	BaO	_	0.022%
15	V_2O_5	_	0.058%
16	Cl	_	1.19%

Images

Raw Mandoor

Shodhit Mandoor

Mandura Marana

Chakrika

After 10 putas

After 20 putas

Mandoor After 30 putas

Swarnamakshik Shodhana

Raw Swarnamakshik.

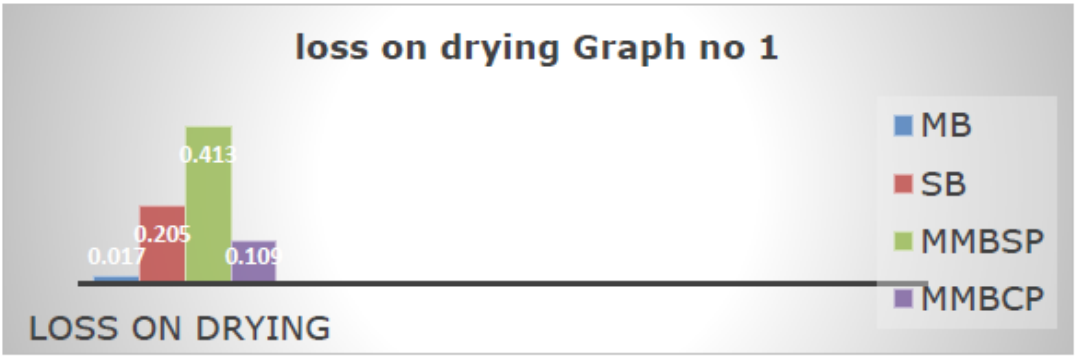
Shodhit Swarnamakshik

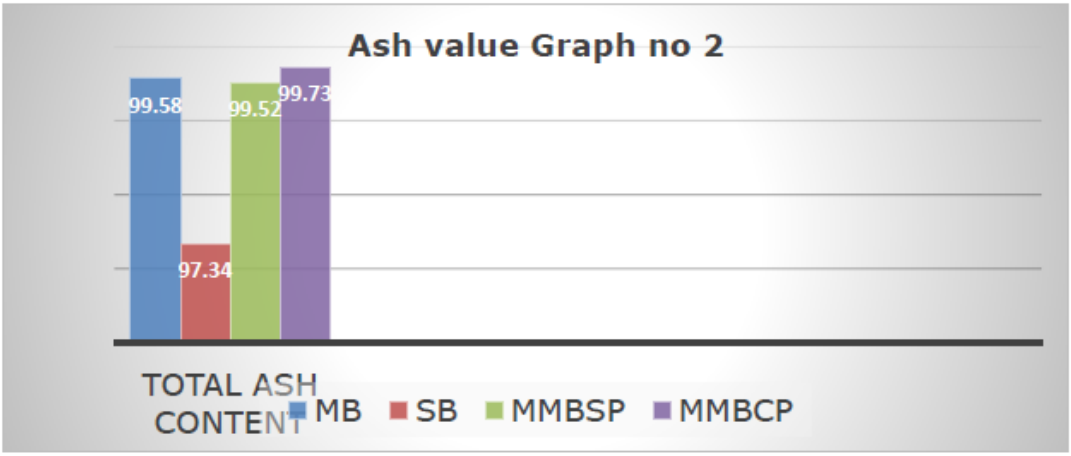
Swarna makshika Marana

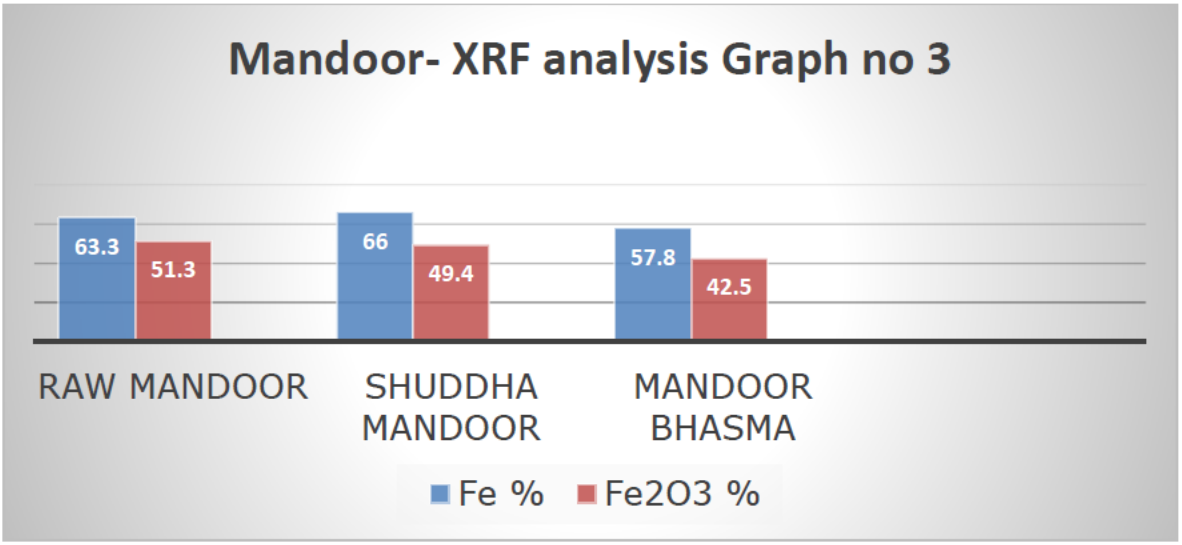
Shuddha Mandoor + Shuddha Swarnamakshik

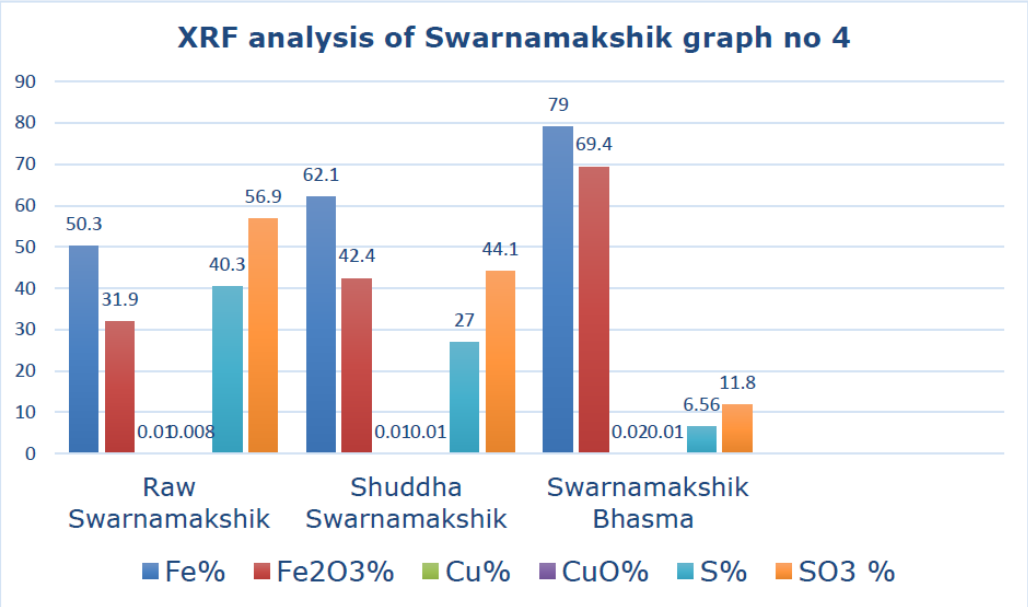
Bhavana of Gomutra to shu.Mandoor+ shu Swarnamakshik

After 3 putas Mandoor Makshik Bhasma.


loss on drying Graph no 1
0.017
0.205
0.413
0.109
LOSS ON DRYING
MB
SB
MMBSP
MMBCP


Ash value Graph no 2
99.58
97.34
99.52
99.73
TOTAL ASH CONTENT
MB
SB
MMBSP
MMBCP


Mandoor- XRF analysis Graph no 3
63.3
51.3
66
49.4
57.8
42.5
RAW MANDOOR
SHUDDHA MANDOOR
MANDOOR BHASMA
Fe %
Fe2O3 %



DISCUSSION

Discussion on therapeutic uses of Mandoor bhasma, Swarnamakshik bhasma and Mandoormakshik bhasma

Mandoor Bhasma excels in treating Pandu, Gulma, spleen Pleeha, Sangrahani, Kamala,[12,13] Swarnamakshik Bhasma beneficial Pandu, Kamala, Netradaha, Ashmari, Udara, Arsha, and excessive menstrual bleeding (Pradara).[14,15] Mandoormakshik Bhasma, inherits the therapeutic prowess of both, proving particularly effective in addressing severe Pitta-related conditions such as anemia in pregnant women Garbhini Pandu, Garbhini Kamala, Pittaj Grahani, and Parinam shoola.[5]

Discussion on Mandoor Bhasma

According to Rasaratnasamucchay 5/121, Mandoor underwent Shodhana using a Triphala decoction with gomutra, initial slight increase in weight likely due to absorbed gomutra, but then decreased after drying the Shodhita Mandoor. The color also shifted to blackish, possibly influenced by its iron content.

Marana was carried out based on Rasataringini 20/129-130. During this 32-puta process, the Mandoor achieved the desired characteristics of Nishchandratva after 8 Putas, Rekhapurnatva after 10 Putas, and Varitaratva after 28 Putas. The final Mandoor Bhasma exhibited a brick-red color, indicative of high ferric oxide content. Notably, the iron content initially rose to 66% in Shodhita Mandoor from 63.3% in raw Mandoor, but then decreased to 57.8% in the final Bhasma, possibly due to processing losses and compositional changes. The preparation

method employed was Antardhuma pachan paddhati.

Discussion on Swarnamakshik Bhasma

Swarnamakshik underwent Shodhana using Matulunga swarasa as per Rasaratnasamucchay 2/78, resulted in a color change to blackish-brown with a golden tint. Marana was performed based on Rasachandanshu, iron content increased significantly from 50.3% in raw Swarnamakshik to 62.1% in Shodhit Swarnamakshik and further to an impressive 79.0% in the final Swarnamakshik Bhasma, possibly due to various factors during processing and compositional changes. The preparation method employed was Bahirdhuma pachana paddhati.

Discussion on Mandoormakshik Bhasma Combinely prepared (MMBCP)

Shodhana of Mandoor and Swarnamakshik as per Rasaratnasamucchay (5/121 and 2/78, respectively), Marana of the combined mixture was carried out based on Rasatantrasaar and Siddhaprayog Sangraha Part 1. Gomutra served as the bhavna dravya. Remarkably, Mandoormakshik achieved the desired characteristics of Nishchandratva, Rekhapurnatva, and Varitaratva after just 2, 2, and 3 Putas, respectively. The iron content in the final Mandoormakshik Bhasma was 59.5%.

Discussion on Mandoormakshik bhasma separately prepared

Already prepared mandoor bhasma and swarnamakshik bhasma was taken in khalvayantra, after dry triturating analysis was done. Iron % in mandoor bhasma- 57.8 % Iron % in swarnamakshik bhasma- 79.0%.

Discussion on loss on drying of MB, SB, MMBSP and MMBCP: Graph 1

Analysed using loss on drying, the moisture content in all four Bhasma samples was minimal as shown in table no 6, MB (0.1%), SB (0.2%), MMBSP (0.4%), and MMBCP (0.1%). This suggests very low moisture content across all four samples.

Discussion on Ash value of MB, SB, MMBSP and MMBCP: Graph 2

The ash value, an indicator of inorganic content in Bhasma, was high for all four samples as shown in Table no 6, MB (99.58%), SB (97.34%), MMBSP (99.52%), and MMBCP (99.73%).

This suggests a significant presence of inorganic material in all four Bhasmas.

Discussion on Acid insoluble ash value of MB, SB, MMBSP and MMBCP

Analysis of acid insoluble ash content (55.77% for MB, 37.765% for SB, 43.01% for MMBSP, and 53.59% for MMBCP) suggests varying degrees of digestibility among the four Bhasma samples.

Discussion on XRF analysis of MB, SB, MMBSP and MMBCP. Graph 3, Graph 4

XRF analysis of all four Bhasma samples revealed varying iron content (MB: 57.8%, SB: 79%, MMBSP: 64%, MMBCP: 59.5%), with Swarnamakshik Bhasma (SB) having the highest iron percentage.

CONCLUSION

This study explored the impact of processing methods on Bhasma preparation. Traditionally, Mandoor Bhasma required 30 Putas for formation. However, combining purified Mandoor and Swarnamakshik Bhasma significantly reduced the Putas needed to just 5 for the formation of Mandoor-Makshik Bhasma (MMBCP). This combined Bhasma inherits the therapeutic properties of both parent Bhasmas and is potentially more cost-effective and time-saving. Analysis of all four Bhasma samples (MB, SB, MMBSP, and MMBCP) revealed a high iron content exceeding 50%, suggesting a high presence of Fe2O3.

Furthermore researches are need to find out use of combinely in prepared mandoor makshik bhasma and separately prepared mandoor and swarna makshika bhasma in randomized clinical trials.

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