Preparation and physicochemical analysis of Yashada Bhasma-*vanaspati* and *parada marita*

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Abstract:

Introduction:

This research aims to prepare *Yashada Bhasma*, a zinc-based herbometallic preparation used in *Ayurveda*, from bio-incompatible zinc metal and enhance its therapeutic properties by adding plant extracts and herbs to the calcination process. The study also aims to investigate the transformation of zinc metal into a bio-absorbable *bhasma* form using both ancient and modern logical principles, and to provide scientific evidence for its therapeutic potential.

Materials and methods

The process of purification involved two stages - *Samanya Shodhana* and *Vishesha Shodhana*. Samanya Shodhana is a general method of metal purification that involves melting and quenching the metal in various liquids such as sesame oil, buttermilk, cow urine, sour gruel, and decoction of seeds of Dolichos biflorus. The process is repeated seven times for each liquid, resulting in a total of 35 times. The weight and melting time of the purified *Yashada* were recorded after each process. The observations made during the *Shodhan* of *Yashada* have been meticulously recorded, both in *Yashada* and in the media.

Vishesha Shodhana is a method of metal purification specifically for zinc. The *Samanya Shodhita Yashada* obtained from the first stage was melted and quenched in *Nirgundi patra swarasa* and *Haridra churna*. The process was repeated three times, and the weight and melting time of the purified *Yashada* were recorded.

The final stage involved the incineration of purified Yashada by three methods to obtain Yashada Bhasma. In this method, purified Yashada was mixed with *Apamarga panchang churna* and heated in an iron pan for four hours. The resulting powder was *Yashada Bhasma.* in remaining two methods *putapak* method was used and *bhasma* was obtained.

Discussion:

Yashada, which is a mineral mentioned in traditional medical texts as one of the seven *dhatus* . *Yashada* is also associated with metals and minerals in traditional medicine and is mentioned in *Rasa Shastra* under *Loha Varga*, which highlights its significance in traditional medicine. However, impure *Yashada* can lead to adverse effects, emphasizing the importance of proper purification and processing. The purification process involves Five liquid media *in Samanya Shodhana*, and followed by *the Vishesha Shodhana* of Yashada is performed using a mixture of *Nirgundipatra swarasa* and *Haridra churna.* The process of *Jarana* involves roasting the *Puti lohas* and using *Rajavriksha Choorna*, which converts *yashada* into a more suitable form for further processing. After *Jarana*, the *Yashada* is further processed using *Bhavana* and *Marana* to convert it into its *bhasma* form. Each step in the process plays a crucial role in the transformation of the metal into its *bhasma* form and enhances its therapeutic benefits. The proper purification and calcinations of *Yashada* is essential to ensure its efficacy and safety in *Ayurvedic* medicine.

Conclusion:

This study aimed to prepare Yashada Bhasma from zinc metal and enhance its therapeutic properties by adding plant extracts and herbs to the calcinations process, which decreased its size to nanoscale. The *Ayurvedic* preparation steps of *Shodhana, Jarana,* and *Marana* were used to transform the metal into a bio-absorbable *bhasma* form using ancient and modern principles. This study sheds light on *Ayurvedic bhasma* preparation and provides scientific evidence for the therapeutic potential of *Yashada Bhasma.* However, further research is necessary to assess the safety and efficacy of *Yashada Bhasma* in treating various ailments, as mentioned in ancient texts.

Keywords: *Jarana,parada marita,* Physiochemical analysis,*yashada bhasma.*

Introduction:

Bhasmas, complex organometallic mixtures of metals or minerals produced by repeated ignition with various media, have been shown to be clinically effective in *Ayurveda*.[1] However, their acceptance in contemporary medicine is constrained by several factors, including the challenge of interpreting synthesis processes from ancient texts, the need for a thorough understanding of the Ayurvedic system, and

the safety of the preparation. The safety of Ayurvedic bhasma is dependent on how it is processed, and it is nontoxic because it undergoes several purification and incineration steps.[2] Among the different types of *bhasma*, *Yashada Bhasma* is a zinc-based herbometallic preparation made from zinc metal and a few herbal components. *Yashada Bhasma* is indicated for various disorders in ancient texts like *Prameha* (Diabetes), *Pandu* (anaemia), *Vatavyadhi* (neuro-muscular disorders) and *Netravikaras* (eye disorders), etc.[3] The goal of the current research is to prepare *Yashada Bhasma* from bio-incompatible zinc metal and enhance its therapeutic properties by adding plant extracts and herbs to the calcination process, which decreases its size to nanoscale. In this study, we aim to demonstrate how the fundamental metal was changed into a bio-absorbable *bhasma* form using both ancient and modern logical principles. The three steps used to prepare *Yashada Bhasma* are *Shodhana, Jarana,* and *Marana*. Through this research, we hope to contribute to the understanding of *Ayurvedic bhasma* preparation and provide scientific evidence for the therapeutic potential of *Yashada Bhasma*.

Aims and objectives:

The main aim of this research is to prepare *Yashada Bhasma* from bio-incompatible zinc metal and enhance its therapeutic properties by adding plant extracts and herbs to the calcination process, which decreases its size to nanoscale. Additionally, we aim to investigate the fundamental metal transformation into a bio-absorbable *bhasma* form using both ancient and modern logical principles.

Objectives:

1. Preparation *of Yashada Bhasma* from bio-incompatible zinc metal using the three *Ayurvedic* preparation steps of *Shodhana, Jarana, and Marana*.
2. To enhance the therapeutic properties of *Yashada Bhasma* by adding plant extracts and herbs to the calcination process and decreasing its size to nanoscale.
3. To investigate the transformation of zinc metal into a bio-absorbable *bhasma* form using both ancient and modern logical principles.
4. To contribute to the understanding of *Ayurvedic bhasma* preparation and provide scientific evidence for the therapeutic potential of Y*ashada Bhasma.*

MATERIALS AND METHODS:

Procurement of raw drugs: The raw Yashada metal was sourced from department of *Rasashastra*.Selection of raw material was done according to *grahya lakshanas* mentioned in texts. According to *Rasatarangini, Yashada* (Zinc) underwent *Samanya Shodhana* (a general method of metal purification), *Vishesha Shodhana* (a method of metal purification specifically for Zinc), and *Jarana* (roasting). According to *Rasachandramshu, Yashada Marana* (incineration) was carried out.

Samanya shodhana of *yashad*a- *Samanya Shodhan* of *Yashada* –

Principle :*Dhalana* (melting, followed by quenching) Material-Raw Yashda -500 gms.Media : 1. *Tila Taila* (sesame oil) 2. *Takra* (butter milk) 3. *Gomutra* (cow urine) 4. *Kanji* (sour gruel) 5. *Kulattha Kwatha* (decoction of seeds of Dolichos biflorus)-q.s. Duration: 6 days. Equipments : *Pithara Yantra*, Stainless steel vessels, *Loha Darvi*, measuring vessel, weighing scale, gas stove (kitchen type) etc. Duration-23 hours.

Procedure-A thin metal sheet of *yashada* is heated to a high temperature and submerged in *tila taila* .It is reheated and then again dipped in a new sample of *Taila* after quenching (sesame). Hence, the process is repeated seven times. The same metal sheet is then similarly processed by being heated and quenched in liquids while utilising Takra (buttermilk), Gomutra (cow urine), Kanji (sour gruel), and Kulattha decoction (Dolichos biflorus). So, dipping in five different liquids seven times total for a total of 35 times. A new, gravimetrically identical amount of media was taken each time to quench the *yashada.* Each time, the *shodhit yashada's* weight and melting time were recorded. Observations made during the *Shodhan* of *yashada* have been meticulously recorded, both in yashada and in the media.

Observations-After *Dhalana* in *Taila, Yashada*, which was in the shape of a mass, disintegrated into tiny globules. The time required for each melting process after *Dhalana in Tila Taila* was shorter than the preceding one. After quenching, *Tila Taila's* colour somewhat darkened. A greater amount of *Yashada* was transformed into Blackish Powder as the *Shodhana* process advanced. After first *Dhalana, Yashada's* colour changed to a silvery white. Sixth and seventh *Dhalana* were observed to have a blackish shade, while some *Yashada* powder had a shift in colour to a greyish tint. Except for the observation of blackish particles Yashada catching fire during the sixth and seventh Dhalana in Takra, there was no discernible alteration in the colour of the Kanji. Yashada's colour became muted during *Dhalana in Kulattha Kwatha* because of a layer of *kwatha* covering it. The sample also got more brittle during *Dhalana in Gomutra,* and there was an increase in shine. The final weight of *samanya shodhit* yashada was 463 grams.

Vishesha shodhana* of *yashada [4]

Principle : *Dhalana* Materials-*samanya shodhit Yashada*-463 gms ,Medias : *Nirgundi patra swarasa, Haridra churna*-q.s. Equipments : Gas burner, cylinder, lighter, iron ladle, iron rod,*Pithara Yantra,* spatula, measuring cylinder, weighing machine, etc

Procedure -The Samanya shodhita yashada was placed in an iron ladle (*Loha Darvi),* which was then heated on a gas stove to melt it. Metal was quenched in the liquid media that was stored in *Pitara Yantra*. The residue substance which was the metal which got settled in *Pitara Yantra* was then collected and the process was repeated for three times.

Observations - When melted *Yashada* was quenched in it, the distinctive scent of *Nirgundi patra* swarasa could be detected. After quenching, *haridra churna* was visible precipitating, and the liquid media's hue also changed from bright green to dark green. *Yashada's* melting time increased with each subsequent melting. After *Dhalana*, the silvery brilliance of *Samanya Shodhita Yashada* become dull, and particles of *Haridra* could be seen adhering to the surface .During the *Vishesha shodhana*, *Yashada* changed into a considerably more brittle state, resulting in the formation of a grey coloured powder.Final weight of vishesha shodhit Yashada was 450 gms. This was divided into three equal parts of 150 gms each and *Yashada bhasma* was prepared by 3 different methods.

Jarana of shodhita Yashada-Yashada bhasma – Method A-*Shuddha Yashada + Apamarga panchang churna)-Jaran* .[5]

Principle: *Avapa* .

Materials-vishesha shodhit Yashada-150 gms,*Apamarga panchanga churna*-10-15 gms

Duration: 4 hours.

Equipments: Iron pan (*Kadahi),* iron ladle with a long handle, weighing scale, *Sharava*, Stainless steel spatula, etc.

Procedure-A pan made of iron was filled with *Shuddha Yashada* and set on the stove top. yashada was set to melt. A 2g–3g weight of *Apamarga* was added to the molten *Yashada*, and the mixture was then stirred vigorously with an iron ladle. When all of the metal had been reduced to powder and no longer had any metallic components, the powder was gathered in the centre of the pan, covered with an earthen saucer, and the heat was adjusted to its highest setting. *Jarita Yashada* was picked up and weighed the following day.

Observations- As *Shuddha Yashada* began to melt; smoke and the burning smell of *Nirgundi* and *Haridra* were also noticeable. When *apamarga* was added to melted *yashada*, there was gray coloured smoke observed and eventually it stopped. As the process progressed, the intervals between *Apamarga* additions progressively grew longer. After adding the recommended amount of A*pamarga*, no free metal was detected. Final weight of *jarita Yashada* was 155 gms. Colour *of jarita Yashada* was greyish .

Yashada Marana-

The process of *Maran* was done by two methods as follows-

1. *Kumari swarasa bhavana* followed by *Gajaputa* (*Yashada bhasma* – Method B)[6]
2. By addition of *sodhit parada* and *shodhit gandhaka*,*bhawana* by *kumara swarasa* and nimbu swarasa followed by *Gajaputa* (*Yashada bhasma* – Method C)

Marana of Yashada- Yashada Bhasma –B

Principle: *Putapaka* (Incineration)

Equipments : Mortar and pestle (stone made), *gaja Puta*,[7]. Cow dung cakes, weighing scale, knife, spoon, *Sharava,* mud smeared cloth, etc

Ingredients: *ShodhitYashada* –150 gms,*Ashwattha twak churna*-1/4 part-35 gms.

Media for levigation :Kumari *Swarasa* –q.s.

Procedure: Weighed quantity of *Jarita Yashada* measured amount of *Kumari Swarasa* were put together in a *Khalwa* and triturated for 3 hours till it become paste like consistency ,*chakrika* were made and further dried .after it was fully dry *chakrika* were transferred to *sharava* and *sharava samputa* was made,which was later subjected to *gajaputa*, when it becomes *Swangasheeta,Yashada* bhasma was recovered carefully and *Bhasma pariksha* mentioned in texts were done. The same procedure of *Bhavana* with kumari swarasa was given and the *Puta* were given till *Varitara bhasma* was obtained. After 8 such puta *Varitara bhasma and bhasma siddhi lakshanas* were obtained which was 127 grams.colour of Yashada Bhasma –B was dull grayish white.

Observations- Following the first two puta, the colour of the *Chakrikas* was uniformly hard and greyish white. The colour and substance of the next putas shifted from greyish white to creamish white and from firm to soft, respectively.

Maran of Yashada (***Yashada Bhasma* C**)

Principle : *Putapaka* (Incineration)[8]

Equipments : Mortar and pestle (stone made), *gaja Puta*, Cow dung cakes, weighing scale, knife, spoon, *Sharava*, mud smeared cloth, etc.

Ingredients: *Shuddha Yashada*-1 part-150 gms, *Shuddha Parada*-1/4 par-37.5 gms, *Shuddha Gandhaka*-1/4part -37.5 gms,*Ashwattha twak* churna-1/4 part-35 gms.

Media for levigation : *kumari swarasa and Nimbu Swarasa* q.s.

Procedure-To create a consistent mixture (Kajjali), *Jarita Yashada* was triturated with 1/4 the amount of *Shuddha Parada* for 9 hours and with Shuddha Gandhaka for 24 hours. Next, *Bhavana* with *Kumari Swarasa and Nimbu Swarasa* were given separately for 9 and 6 hours respectively, and when the mixture reached the proper consistency, pellets were formed and dried in the shade. They were subsequently moved to *Sharava Samputa*, where *Gajaputa* was given. ,

when it becomes Swangasheeta,*Yashada bhasma* was recovered carefully and *Bhasma pariksha* mentioned in texts were done. The same procedure of *Bhavana* with *kumari swarasa* and *Nimbu swarasa* was given and the *Puta* were given till *Varitara bhasma* was obtained. After 5 such puta *Varitara bhasma* and *bhasma siddhi lakshanas* were obtained which was 111 gms.colour of Yashada Bhasma –C was dull grayish white.

Observations - The number of cow-dung cakes was gradually reduced in further *Putas.* The colour of the *Chakrikas* changed from yellowish to dark grayish. After 5 putas, bhasma was very fine and the color was dull grayish white.

The final samples (A, B and C) of all preparations was subjected to EDS (energy dispersible X ray diffraction) analysis .

Results-

The physiochemical analysis and assay of Zinc of *ashodhit* and *shodhit yashada* is as mentioned in Table 1

Table 1- physiochemical analysis and assay of Zinc of *ashodhit and shodhit yashada*

	Loss on drying@110 c	Ash value (%)	Acid insoluble ash	Assay of Zinc (Zn)
Ashodhit yashada	0.0 %	99.93 %	83.45 %	76.23 %
Shodhit yashada	0.64%	98.89 %	82.56 %	71.43 %

Table 2 indicates organoleptic characters and *bhasma pariksha* of different samples of *Yashada bhasma.*

Table 2- organoleptic characters and *bhasma pariksha* of *Yashada bhasma* A,B and C

parameter	*Yashada Bhasma A*	*Yashada Bhasma B*	*Yashada Bhasma C*
Shabda	absent	absent	absent
Sparsha	Rough, no course particles	soft	soft
Roopa	gray	Creamish white	Dull grayish white
Rasa	Tasteless	Tasteless	Tasteless
Gandha	Non specific	Not specific	Not specific
Snigdhatwa	Alpa snigdha	Alpa snigdha	Alpa snigdha
Nischandratwa	No metallic lustre	No metallic lustre	No metallic lustre
Rekhapurnatwa	present	present	present
Varitaratwa	Absent	present	present
Unama	Absent	present	present

Table 3 shows physiochemical analysis of different *Yashada bhasma* samples.

Table 3- Physio-chemical Analysis of *ashodhit,shodhit and Yashada bhasma –A,B and C*

Sr No	*Yashada*	Total Ash content (%)	Acid insoluble extractive (%)	Water soluble ash (%)	pH	LOD @110 C (%)
1	*ashodhit Yashada*	99.93 %	78.54 %	9.22		0.39
2	*Shodhit Yashada*	98.89 %	76.53 %	11.56		0.68
3	YB-A	98.93	46.48	1.54	8.38	0.96
4	YB- B	99.47	45.57	0.93	7.97	1.08
5	YB-C	99.05	46.23	1.04	6.29	1.07

Table 4 indicates EDS (Energy dispersive X ray spectroscopy) analysis of the samples.

Table 4- EDS (Energy-dispersive X-ray spectroscopy) analysis

Sr. No	*parameter*	*Yashada bhasma –A*	*Yashada bhasma –B*	*Yashada bhasma –C*
1	*Zn*	87.43 %	81.76 %	71.02 %
2	*O*	28.43 %	33.76 %	32.54 %
3	*C*	7.63 %	-	-
4	*Si*	1.22 %	-	-
5	*P*	1.87 %	2 .76 %	2 .13 %
6	*K*	0.72 %	0.64 %	0.68 %
7	*Ca*	0.38 %	0.47 %	0.40 %
8	*Fe*	0.43 %	0.38 %	0.46 %
9	*Al*	0.08 %	0.05 %	0.07 %
10	*Na*	0.09 %	0.06 %	0.03 %
11	*Hg*	-	-	0.76 %
12	*Mg*	-	0.53 %	0.37 %

Discussion:

Yashada or zinc is an important mineral mentioned in the ancient Indian medical texts as one of the seven *dhatus* or tissues of the body. The *Acharya Adhamalla* commentary on the *Sharangdhar Dipika* refers to *Yashada* as the seventh *dhatu*, indicating its importance in maintaining bodily functions.

In addition, *Yashada* is also mentioned under *Loha Varga* or the category of iron in *Rasa Shastra,* highlighting its association with metals and minerals in traditional medicine. However, it is important to note that the use of Ashudha Yashada Bhasma or impure zinc ash can lead to adverse effects such as *Prameha, Kushta, Gulma, and Kshaya*. This emphasizes the need for proper purification and processing of the mineral before its use in medicine.

The classical reference of *Yashada as Kharpar satwa in Rasaratna samuccaya* dates back to the 13th century. However, *Madanpal Nighantu*, which was written in the 17th century, mentions *Yashada* individually, along with its physical and pharmacological properties. This indicates that the knowledge and use of *Yashada* as a medicinal substance have been passed down through generations in India.

In the purification of *Yashada*, Five liquid media are used in *Samanya Shodhana*, three of which are acidic, one basic, and one neutral in nature. The alternating heating and quenching in these liquid media help eliminate acid and alkali soluble impurities from the metal. The pH changes in the various liquids used in the process indicate the removal of alkaline and acidic impurities.

Vishesha Shodhana of Yashada is performed using a mixture of *Nirgundipatra swarasa* and *Haridra churna.* The pharmacological effects of *Nirgundi swarasa,* such as *agni deepaka, lekhana, sroto vilayana,* etc., may explain why *shodhana* was performed in Katu Rasa dravya. This process aims to give the medicine therapeutic properties, as stated in the term itself.

The Griffith theory[9] or Stress corrosion theory, and Theory of thermal expansion explain how repeated melting and quenching in specific media in a specific order can disturb the compression tension equilibrium in the internal structure of *Yashada* and cause cracks on its surface. This happens in both *Samanya Shodhana* and *Vishesha Shodhana* of *Yashad*a. The liquid media used in the process also function as cooling agents and provide a suitable environment for specific chemical reactions and compound production.

In addition to removing impurities, the various processes (*Shodhana, Jarana, and Marana*) involved in *bhasma* preparation help transform the metal into a form that is safe for internal consumption and enhances its therapeutic properties. Therefore, proper purification of *Yashada* is essential to ensure its efficacy and safety in *Ayurvedic* medicine.

The process of *Jarana*, as mentioned in *Rasa Kaumudi,* involves roasting the *Puti lohas* and using *Rajavriksha Choorna*, which converts *Naga, Vanga, and Rasaka* into a more suitable form for further processing. During this step, the zinc metal is converted to zinc oxide by air oxidation, which is crucial for the transformation of the metal into its *bhasma f*orm. The rubbing process not only reduces the particle size but also helps change the shape of the metal to a finer powder form.

Although the ash of the *Jarana dravyas* is of alkaline nature and may act as a catalyst for chemical reactions, it is not sufficient to convert the metal into its *bhasma* form. The *bhasma* form is necessary for internal use of metallic medications as it enhances the therapeutic benefits and minimizes the side effects. Therefore, after *Jarana,* the *Yashada* is further processed *using Bhavana* and *Marana* to convert it into its *bhasma* form.

There are references that suggest that *Jartita Bhasma* has therapeutic benefits, which may seem contradictory as the metal is not entirely transformed into *bhasma* form after *Jarana*. However, it is important to note *that Jarana* is just one step in the process of *bhasma* preparation and that the final product is a result of several other steps, including *Bhavana and Marana*. Each step in the process plays a crucial role in the transformation of the metal into its *bhasma* form and enhances its therapeutic benefits.

Five liquid media were utilised in *samanya shodhana*, three of which were acidic, one basic, and one neutral in nature. The elimination of acid and alkali soluble impurities from the metal may result from the alternating heating and quenching in these acidic and basic liquid media. The removal of alkaline impurities is indicated by changes in the pH of the *Takra* from 4.07 (acidic) to 4.11, the *Gomutra* from 7.83 to 8.78, and the *Aranala* from 3.63 (acidic) to 5.75. The removal of acidic impurities is shown by changes in the pH of the *kulattha kwatha* from 7.03 to 6.58.

Yashda 's Visesha Shodana was performed using a mixture of *Nirgundipatra swarasa*, and *Haridra churna* . The pharmacological effects of *Katu rasa*, such as *agni deepaka, lekhana, sroto vilayana*, etc., may explain why shodana was performed in *Katu Rasa dravya, or Nirgundi swarasa*. Since Visesha Shodana is performed to give the medicine therapeutic properties, as stated in the term itself, it could potentially be beneficial.[10]All of these liquids function as cooling agents throughout the *Dhalana* process and may also provide the material with a suitable environment for the occurrence of specific chemical reactions and compound production. In addition to removing the metal's impurities, the various processes *(Shodhana, Jarana*, and *Marana*) of *bhasma* preparation

In *Rasa Kaumudi, Naga, Vanga and Rasaka* (Zinc carbonate) are said to be used *after Jarana (*roasting) with *Rajavriksha Choorna* (Cassia fistula)[11] .*Jarana* is a middle step of preparation for *Marana*. *Puti lohas* are converted into powder form, which makes them suited for burning. In this process, melted zinc is turned into zinc oxide by air oxidation. The act of rubbing reduces not only the particle size but also helps in change in the shape of metal to finer powder form. The ash of *Jarana dravyas* is of alkaline nature, which may act as catalyst for the chemical reactions. There are references indicating that the *Jartita Bhasma* has therapeutic benefits. Yet given that the metal is not entirely transformed into *bhasma* form after *Jarana*, this appears contradictory. For internal use, metallic medications should always be converted to Bhasma form so Jaritha Yashada was taken to Bhavana and subjected to Marana[12]

Marana was done by two different methods.in first method bhavana of *kumari swarasa* was given, followed by *gajaputa*. Kumari is having *Tikta Rasa, Katu Vipaka and Kapha Vatahara* properties. Wet trituration makes it easier to homogenize and reduce particle size, which changes the finished product's characteristics (*Gunantatradhana*). By breaking down the *Bhavya* dravyas into smaller pieces, incorporating trace elements into the *Bhasma,* and transforming the latter into smaller particles, *Bhavana* serves to increase the therapeutic efficacy. By creating new bonds between the two substancess, as the use *of kumari swarasa bhavana* in the *marana* process may increase the therapeutic effectiveness of *yashada* in treating some particular ailments.

The method employed in preparation of sample A did not pass all requsite ayurvedic and modern tests while methods employed in preparation of sample B and C passed all the tests.This implies the fact that ,method A can be considered non valid while method B and C can be considered as valid methods for *bhasma pariksha.*

According to classical *Agni* specified for Marana of *Yashada is Gaja puta. Gaja puta* has thus been used for the manufacture of *Yashada Bhasma* in the current study.continuous process of bhavana and puta helps in reduction of partical size and increasing in surface area of *bhasma* which helps in easy absorption in the body as well as it becomes non-toxic.colour of bhasma prepared was slight different by three methods,.colour of *bhasma* prepared by only jarana was gray and in marana bhasma colour was creamish white in *Yashada bhasma* –B and dull greyish white in *Yashda bhasma* –C. 8 and 5 *gajaputa* were required to obtain *rekhapurna bhasma*. Yashada Bhasma –B and C have passed all the *bhasma pariksha* mentioned in texts.

Zinc and oxygen are present in all of the samples, according to EDS analysis, but their concentrations vary. It is clear from the higher proportion of oxygen in *Yashada bhasma* sample that most of the zinc is transformed into zinc oxide. Zinc is primarily changed into zinc oxide in the *Yashada bhasma* sample, however in the raw metal, *Shodhita* sample, and *Jarita* sample, just the surface of the zinc metal may have converted into ZnO as seen by the low amount of oxygen. The presence of some trace elements like phosphorus, potassium, and calcium in the *bhasma* sample as compared to other samples may be linked to the usage of some herbal juices or plant extracts during its manufacture. Fe could have come from an iron pan used during the *Jarana.*

There are slight differences Regarding particle size, zinc, oxygen, and other trace metal levels, results from all samples. So, the method of *bhasma* preparation from the traditional book should be chosen while considering its medicinal efficacy in a given ailment.

Conclusion:

This study aimed to prepare *Yashada Bhasma* from bio-incompatible zinc metal and enhance its therapeutic properties by adding plant extracts and herbs to the calcination process, which decreased its size to nanoscale. The three *Ayurvedic* preparation steps of *Shodhana, Jarana,* and *Marana* were used to transform the fundamental metal into a bio-absorbable *bhasma* form using both ancient and modern logical principles.. This study contributes to the understanding of *Ayurvedic bhasma* preparation and provides scientific evidence for the therapeutic potential of *Yashada Bhasma*. Further research is needed to investigate the safety and efficacy of *Yashada Bhasma* in treating various disorders as indicated in ancient texts.

References:

1. Pal D, Sahu CK, Haldar A. Bhasma : The ancient Indian nanomedicine. J Adv Pharm Technol Res. 2014 ;5(1): 4-12
2. Chaudhary A. Ayurvedic bhasma: nanomedicine of ancient India--its global contemporary perspective. J Biomed Nanotechnol. 2011 ;7(1):68-9
3. Pareek A, Bhatnagar N. Physico-chemical characterization of traditionally prepared Yashada bhasma. J Ayurveda Integr Med. 2020;11(3):228-235.
4. Kulkarni DA .Editor. Rasa Ratna Samuccaya Vagbhata . Vidyotini Hindi comm, Meharcand Lacchamandas Publication , New Delhi, 1998
5. Upadhyay M.Editor. Ayurveda Prakasha, Sanskrit Hindi commentary, Chaukhambha Bharatiya Academy,1999 Varanasi, , chapter 3 verse 183.
6. Tryambak Nath Sharma . Editor. Rasa Mitra, , Chaukhambha Sanskrit Series office 2016
7. Shri Sadananda Sharma, Rasa Tarangini, Edited by Kashinath shastri, Hindi commentary by Dharmananda Shastri, 11th edition, New Delhi Mothilal Banarasidas Publication, 19th Taranga, shlok, 1979; 104-107, 476
8. Halasikara (1850) Rasachandamshu, Purvakhanda Sloka 587, Hubli: Atreya Sadana: 144.and . Dattaram Choube, Bhrita Rasaraja Sundara, edition 3rd, Choukhamba Orientalia, Varanasi2000.
9. A. A. Griffith. The Phenomena of Rupture and Flow in Solids. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences. 1921; 221(582-593):163-198.
10. Rahul Yashavanth et.al., Pharmaceutico-Analytical Study of Naga Bhasma (Incinerated Lead) International Journal of Ayurvedic Medicine, 2017, 8(3), 119-127
11. Sharma GC. Rasa Kaumadi. Mishra Bs editor. Varanasi, Chaukhamba Vidya Bhavan. 1966. p. 21-22.
12. Yadavji trikamji,Rasamrutham-by Dr. Devanath simha Goutham, Chowkamba surbarathi, Varanasi, 2018, 3/119.