World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

REVIEW OF MARANA WITH SPECIAL REFFERENCE TO YASHADA BHASMA

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Article Received on 21/05/2020 **Article Revised on 11/06/2020** **Article Accepted on 01/07/2020**

ABSTRACT

Rasashastra is a part of Indian traditional system called Ayurveda. It deals with pharmacology and pharmaceutics of Ayurveda. It involves processing and therapeutic uses of metals and minerals. There are different methods of preparation of herbomineral drugs. The process of converting inorganic metal into the organic one which can be easily bioassemble with human body with the help of different trituration and heating procedure is called as *Maran* or *Bhasmikaran. Yashada* (Zinc) is one of the widely using *rasa bhasma*. *Yashad bhasma* is an effective medicine for treatment of *Twacha vikar, Netra vikar*, night blindness, *Shwasa, Prameha* etc. There are different procedures of *Yashad bhasma* nirman mentioned in ancient texts. So it is important to be reviewed which one is better for the preparation of gold standard *Yashada bhasma* as per textual references as well as modern standardization parameters. This work is the small effort for reviewing different texual methods of the preparation of *Yashada Bhasma.*

KEYWORDS: *Yashada bhasma, Puti loha, Maran, Bhasmikaran, dhatu.*

AIM AND OBJECTIVES

Review of literature regarding *Yashada maran.*

INTRODUCTION

In *Rasashastra* three types of *dravyas* mentioned according to their resources *Khanij (*mineral origine), *Pranij* (Animal origine) and *Vannaspatij* (Plant origine). Among which *dhatus* (Metals) comes under *Khanij dravya.* Nine metals were described in Ayurvedic texts. According to their properties they were divided in subgroups.

Deffination of Dhatu : The substance which strengthen the body parts and inhances the immunity power as well as which avoids the wrinkles, graying of hairs, weakness, weight loss and aging is called as *Dhatu.*[1]

Table 1: *In Ayurvedic texts 7 metlas were described.*[2]

Table 1: Metlas described in *Ayurveprakash.*

1.	*Suvarna*
2.	*Rajat*
3.	*Tamra*
4.	*Loha*
5.	*Naga*
6.	*Vanga*
7.	*Yashad*

In Sharangdhar Dipika commentetary (by acharya Adhamalla*) Yashada is* mentioned the 7th *dhatu. Yashada* (Zinc) is one of the *Dhatu* mentioned under Loha varga in various Rasa shastra texts. After it was separately mentioned with name *Yashada* along with its physical and pharmaceutical properties in 17thcentury *by Madanpalnighantu*; although it carries a classical reference as *Kharpar satwa* in *Rasaratna samuccaya*; which belongs to 13thcentury.[4] All dhatus should undergos the process of purification i.e. *Shodhan* and after that process of incineration i.e. *Maran. Yashad dhatu maran* has two steps jaran as well as maran. In this review study the details regarding the same is described briefly.

Table 02: Classification of Metals.[3]

1.	*Shudha loha*	*Suvarna, Rajat, Tamra, Loha*
2.	*Puti loha*	*Nag, Vanga.*
3.	*Mishra Loha*	*Pittal, Kasya, Varta*

MATERIAL AND METHODS

Table 03: Introduction to *Yashad dhatu*.[16,17]

1.	Classification	*Dhatu varga* (after 14th century in Rasagrantha *Madanpal nighantu*)
2.	chemical composition	Zn (Zinc),
3.	Atomic number	30
4.	Other names	*Jashad, Jasad, Ritihetu, Kharparaj, yasad, Yashad, Jasta, Tamra-ranjak, Netra Rogari, Rangsankash, Ritikruta*.
5.	Sanskrit Name	*Yashad*
6.	Hindi	*Jasta*
7.	English name	Zinc
8.	Latin name	Zincum
9.	*Ras, virya, vipak*	*Katu, kashaya ras, shit virya , katu vipak*
10.	*Gunadharma*	*Kaphaghna, pittaghna, chakshushya, vatashamak*
11.	*Matra*	*½- 1 ratti*
12.	Uses	*Pandu, netravikar, prameha, kasa, shwas, rajyakshama, kampvata, ratrisweda, sravshoshak, antravikara nashak, vranaropak*
13.	*Vikar shanty upay*	*Bala+ Abhaya+ Mishri = 3 days sewan*

Table 04: Physical and chemical properties of *Yashada*.[2]

1.	Specific gravity	7.1
2.	Density	6.9.
3.	Melting point	410^{o}C
4.	Boiling point -	910^{o}C
5.	Colour	Shiny white
6.	Effect of acid and alkali	Very fast action
7.	Heat and electricity	Good conducter
8.	Maliability	Yes
9.	Ductility	Yes
10.	Weight	Heavy
11.	Touch	Hard
12.	If heated in open air	Burn with Blue flame and becomes white coloured zinc oxide.
13.	If Heated and pourded into water	Transformed into Granulated Zinc

Raw material collection, Authentification and standardization

It is the first step for the *Yashad bhasma nirman*. Raw *Yashad*, raw Hartal, raw *Gandhak*, *Apamarga churna*, etc material should be purchased from local market. And should be authetified by nearest analytical lab. It should be done as per texual *grahya agrahya laksan* as well as modern analytical parameters.[18]

Process standardization: It includes the process of shodhan and process of maran. It should be done as per best method available as per texual refference and previous research work done.

Shodhan* of *Yashad

Shodhan is the important process of purification of metals before the process of *Bhasmikaran*.[5] During the process of shodhan the metals are heated or melted and deeped or poured in the medicated liquid, & the same procedure is repeated for 7 times. *Shodhan is of two types Samanya shodhan and vishesh shodhan.*

1. *Samanya shodhan*: Metlas are heated and deeped into *Tail, Takra, Gomuta, Kanji and Kulattha kwatha* respectively in each liquid continuously for seven times, is called as *samanya shodhan* of dhatus. In the same way *Samnaya shodhan of Yashad* should be done.[6]
2. *Vishesh shodhan*: *Yashada* purified by the *Samanya* method was heated to melt and poured into *Churnodaka* (lime water) for seven times with fresh liquid each time. Molten Zinc when came in contact with liquid media produced loud blasting sound. The melting duration was extended on every *dhalana* procedure due to presence of carbonaceous material. This type of repeated liquefying and pouring in liquid media resulted in the formation of large amount of slag which floated on the surface of molten Zinc.[7]

Yashad Maran

After the process of *shodhan* (detoxification), the metals are triturated with specific plant juices and then the mixture is subjected to Aagni sanskara (heating) which yields very fine powder i.e. *Bhasma*, and the process is called as *Mararana. Marana* is the process where *Rasadi dhatus* processed with *Gandhakadi dravayas* through various systematic steps or through the process of oxidation so that they attain the state of *bhasma* which is having capacity to eliminate the diseases.

Various authors had mentioned number of maran procedures of *Yashada*. As per the reference of *Rasaratna samuccaya*, the *maran* of *Loha* with *Parada* is considered as *Shreshta* while *maran* with *Ariloha* is considered as *Durgunaprad*.[8]

Necessity of Marana

*Ratana (*Gems*), Dhatu (*metals*), Maharas, Uparasas, Sudhavarga dravyas* etc when undergoes the process of marana, they get converted in to fine powder and looses their hardness, crudeness (*Kathordadeha* property) and achieve the status equivalent to mercury.[8]

For the *marana* of *Puti lohas* there are two steps described

1. *Jarana* (an intermediate step)
2. *Marana* (Actual process of *Bhasmikaran*)

1) *Jarana*: In *Rasashatra*, the term *Jarana* is generally used in concerned with parad. It is one of the important *sanskara* of *Parad.* However, this term is also used for the intermediate step performed during the *marana* of *puti lohas* i.e. *Vanga, Naaga* and *Yashad*. In the classical text *"Rasamruta"* clear use of the term "*Jarana"* is found in the context of *Vanga Marana*. In the same manner the process is applied for *Yashada jaran. Shodhit yashad* is molten in iron pan and *Apamrag churna* is gradually added in small quantity to the molten *Yashada* and whole mixture is kept stirring with staineless still ladle or wooden spoon.

This process of process of adding powder, stirring the mixture along with heating is continued till whole molten *Yashada* gets converted to amorphous powder. Then the powder is collected in the center of the iron pan. A *sharava* is placed upside down covering the powder and strong heat is given for a day. After self cooling this powder can be called as "*Jarit Yashada*" and the process is termed as " *Jarana*".

2) *Marana*: It includes a series of systematic steps as follows –

Mardana: – Mardana enhances the gunas i.e. properties of the *drvaya.* Mardana is the process of drugs to a fine state of division with or without prescribed liquid.

Types of Marana

According to the marak dravya, there are 4 types of *maran* mentioned in litertuare.[8]

1. *Parad marit bhasma - Shreshta*
2. *Mulibhi – Madhyam*
3. *Gandhakadibhi – kanishtakam*
4. *Arilohen – Durgunapradam*

There are various reference found regarding *Yashada marana* in literature. But this study is focused on main two following important methods of *Yashad Maran.*

1. *Parad marit Yashad Bhasma*
2. *Haratal Marit Yashad bhasma*

Method I- Parad Marit Yashad Bhasma

1. Take the *shodhit Yashad* in iron pan subject it to tivragni till it gets melt.
2. After melting, it should be poured into *khalwa yantra* containing equal quantity of *Parad* and vigorously triturated.
3. The mixture formed should be washed with Nimbu swaras (Citrus lemon) and dried.
4. Then *shuddha Gandhak* is to be added to the mixture and triturated to obtain the uniform mixture of Kajjali.
5. This *kajjali* is to be subjected to *Gajaputa agni*. Gajaputa agni is given till the *siddhilakshan* is obtained.[09]

Method II- Hartal Marit Yashad Bhasma

1. Take the *shodhit Yashad* in iron pan subject it to *tivragni* till it gets melt.
2. After melting, it should be rubbed with freshly collected *Nimba kashta* (fresh stick of Azadiricta indica) by *jarna* method.
3. After *jarana* procedure, *shudhha Hartala churna* should be added and triturated till the uniform powder is obtained. (*1/4 th part of Jarit Yashada*).
4. Then *gajputa* should be given to obtained desired *siddhilakshan* of *Yashad bhasma*.[10]

Table 04: Different methods of *Yashada maran*.[11,16]

Sr. no.	Reference	*Jarana Dravya* with quantity	*Bhavana Dravya*	No. of *Puta*
1	**2**	**3**	**4**	**5**
1.	*Sharangdhar samhita* with *Adhamalla's* commentary (14 AD)	*Arkakshir + Gandhaka Pishti*	*Jambeer Rasa*	2 *puta*
2.	*Ayurveda Prakash* (18 th) pg. no 380	like *Vanga*		
3.	*Rasayansar* (20th AD) *Shloka* 212, 215,	*1) Nimbu swaras* 2) *Shudhha gandhaka* 250gm + castor oil		
4	*Rasa tarangini* (20th AD) 19/104-119)	1) *Parad + Yashad pishti – Nimbu swarasa mardan+ shuddha Gandhak* (equal quality) 2)Stirring with stump of *Nimba + ¼ th Hartal churna* 3)*Apamarga churna* in small quantity 4) only mardan with *loha dravi* in *loha pan*		*Gajputa* *Gajputa* 3hrs *tivragni* *Tivragni*
5	*Rasamitra* (20th AD) Pg no 129	Like naga		
6	*Rasachikitsa* (20 th AD) Pg. no 68,69	Like *suvarna*		
7	*Rasa dhatu prakash* (20th AD) pg no. 356	*Ahifena Jala*		1 *prahar tivragni*
8	*Ayurved Sarsangraha* (20th AD) pg no 103	*Neem leaves swaras / churna* in small quantity	*Kumari swaras*	10-11 puta
9	*Bhaishajya sar sangragha*	*Apamarga churna with Neem swars mardan 1 prahar tivragni by antardhoom vipachan*	*Kumari swaras*	7 puta
10	*Bhasma vidnyana* (20th AD) pg. no 9	Like *vanga*	*Kumari swaras*	3 *puta*
11	*Rasachandashu* (20th AD)	*¼ th Parad + ¼ Gandhaka*	*Nimbu swaras*	1 *Puta*

Finished product prepared *Yashad bhasma* standardization as per Ayurvedic as well as modern analytical parameters.

***Bhasma siddhi pariksha*[3,15]**

Rekhapurnatva: '*Rekha*' means line pattern of ridges on tips of fingers, '*Purnatva'* means filling. When the *bhasma* is rubbed in between the tips of the thumb and index fingers, it entered into the furrows of the thumb and index finger and the ridges on the fingertips can be clearly seen. This indicates that the *bhasma* prepared is fine.

***Varitaratva*:** '*Vari*' means water, '*Taratva*' means ability to float. When fine powdered *bhasmas* were carefully sprinkled over water it floats on it. It is obvious that for this test to be positive the *bhasma* must be so fine that after it is sprinkled over water, the combined force created due to its weight and gravitation is less than the surface tension of water.

***Sukshmatva*:** During trituration process repeated grinding and heating help in dividing the particles of substance into very fine state. This fine state of *bhasma* is very important for absorption and assimilation in body.

Nischandratva: There is no shining and luster observed in prepared *bhasma* even when these are rubbed with wet fingers and observed in bright sunlight through magnifying glass.

***Nirdhumatva*:** It means 'smokelessness'. If a small quantity of prepared *bhasma* is put over fire, it should not produce any smoke. It indicates that it should not contain any organic matter in free state.

Privious Research work done on Yashada Bhasma and its conclusion in brief.

1. Title: *Yashad bhasma*: Synthesis and characterization – The Pharma Innovation Journal 2018; 7(1): 119-122ISSN (E): 2277- 7695 ISSN (P): 2349-8242 NAAS Rating: 5.03 TPI 2018; 7(1): 119-122- by the author Babita Kale a) Department of Chemistry, Savitribai Phule Pune, Maharashtra. University, Pune, and Nilima Rajurkar Department of Chemistry, Savitribai Phule Pune University, Pune, Maharashtra.

CONCLUSION

XRD of *Yashad Bhasma* shows the presence of ZnO and Zn. EDAX analysis of *Yashad bhasma* shows that various important nutrient elements are incorporated in

the final product during preparation of *Bhasmas*. TEM of *Yashad Bhasma* shows the polycrystalline nature. *Bhasma* have passed the Ayurvedic Physical as well as physicochemical tests. These DLS studies reveal that *Yashad bhasma* prepared by electric muffle furnace heating has 70% nanoparticles in the range of 250-750nm, while that prepared by using traditional method of heating has 30% particles are in the range of 200-700nm range. The commercial sample shows 20% particles in the range of 500-800 nm and 60% particles in the range of 800-1.5µm. It is observed that incineration by muffle furnace gives better results as compared to the traditional method of heating.

2. Research article - Nanometals in *Bhasma*: Ayurvedic Medicine- first online chapter on 15 nov 2017, author - Dilipkumar Pal and Vinod Kumar Gurjar)

***Conclusion*:** The *Bhasmas* are biologically produced nanoparticles and are taken along with milk, butter, honey, or ghee thus; this makes these elements easily assimilable, eliminating their harmful effects and enhancing their biocompatibility. Particle size (1–2 µm) is reduced significantly, which may assist absorption and assimilation of the drug into the body system. Standardization of *Bhasma* is utmost necessary to confirm its identity and to determine its quality, purity safety, effectiveness, and suitability of the product. But the most important challenges faced by these formulations are the lack of complete standardization by physiochemical parameters.

3. International Journal of Pharmaceutical & Biological Archives 2014; 5(3): 74 – 78 Title: XRD and XRF Screening of *Yashad Bhasma*- Author Laxmi Narayan Gupta, Neeraj Kumar, Kapil Deo Yadav, Assistant Professor, Department of *Rasa Shastra*, Faculty of Ayurveda, Institute of Medical Sciences, Banaras.[11,12,13]

Conclusion: *Bhasma* are complex compound forms of metals or minerals obtained by repeated incineration with herbal juices. The reactive components of Achyranthes aspera helped in further disintegration of Zinc particles into Zinc compounds in open atmosphere. Potassium being main constituent of Achyranthes aspera will give rise to potassium oxide (alkali) at high temperature. Formation of Zinc compounds depends upon the concentration of potassium oxide which reacts with Zinc during Jarana process. A number of modern technology are used to know material characterization of *Yashad* and its *bhasma*. Among them XRD and XRF analytical technique by which compound of materials can be detected. In XRD analysis, *Yashad* sample was crystalline in nature and highest peak was correspond to elemental Zinc and in its *bhasma* crystalline structure was destroyed and highest peak correspond to Zinc Oxide. XRF analysis, *Yashad* sample have 98.20% zinc metal along with other trace elements like Pb-0.63%, Sn-0.11%, Fe-0.56%, Ca0.07%, Al-0.09%, Cr-0.06% and in *Yashad bhasma* 98.20% zinc oxide was present along with trace element like Fe2O3-2.6%, K2O-0.8%, Al2O3-0.32%, PbO-0.2% etc.

4. Dr Rajesh K. Ingole - Preparation of parad marit yashad bhasma and hartal marit yashad bhasma with their comparative analytical study *in International Journal of Research in Ayurveda and Pharmacy 4(4):507-509 · August 2013)*

Conclusion: Colour of *Parad marit Yashad bhasma* is bright yellowish white than that of *Hartal marit Yashad bhasma* was deep yellow. X-ray diffraction of *Parad marit Yashad* shows major phase of zinc sulphide and minor phase of zinc oxide. While *Hartal marit Yashad bhasma* shows major phase of zinc oxide and minor phase of zinc sulphide. AFM of *Parad marit Yashad bhasma* showed even particle size and were found to be smaller than *Hartal marit Yashad bhasma.* On Pharmaceutical ground and on the basis of final product *Parad marit Yashad bhasma* was found to be better as compaired with *Hartal marit Yashad bhasma*.

RESULTS

Raw Material satardization

Authentification of Raw *Yashad* should be done as per classical *Grahya –Agrahya Lakshanas* as per Ayurvedic parameters and melting point as well as purity of zinc as per modern parameters i.e. 419^{o}c and 99.96% respectively.

Process standardization

After reviewing the literature available and the previous research work done the most accepted process of *Yashad maran* is *Parad marit Yashad bhasma. After physicochemical tests, it shows the standardize values of Yashad Bhasma as per Ayurvedic Formulary of India.*

Finished product standerdization

Subjective parameters.

Table 05: Prepared *Yashad bhasma* should posses following characters.

Sr. no	Organoleptic Chracters of *Yashad bhasma*	Results
1.	Colour	Yellowish
2.	Odour	Not specific
3.	Taste	Tasteless
4.	Touch	Smooth
5.	Luster	No

Table 06: Prepared *Yashad bhasma* should passes following Ayurvedic parameters of *Bhasma pariksha.*

Sr. no	Bhasma Pariksha	Results
1.	Rekhapurnatwa	100%
2.	Varitaratwa	100%
3.	Unam	Passed
4.	Apunarbhava	Passed

5.	Niruthha	Passed

Table 07: Objective parameters to be tested for prepared Yashad Bhasma.[20]

1.	Colur
2.	Odour.
3.	Partical size
4.	Loss on drying at 105$^{o\,C}$
5.	Total ash
6.	Water soluble ash
7.	Acid insoluble ash
8.	XRD (X- ray Diffraction)
9.	SEM (Scan electron Microscopy)
10.	AAS (Atomic absorption spectrophotometry)
11.	EDAX (Energy Dispersive X-ray Analysis)

DISCUSSION

In this review study the details regarding *Yashad maran* is describes briefly. In Ayurvedic pharmaceutics, metals were being used from ancient time to prevent aging problems and other disease by protecting the body of living organisms hence called as *dhatu dadhati deham iti*. Metallic preparations are mainly used as *bhasma* and obtained by repeated incineration of metal with herbal extract. There are four methods of *marana* mentioned in ancient literature *Parad marit, Gandhak marit, Vanaspati marit and Arilauha marit*, among these *Parad marit* method is said to be best method. The processing techniques of '*Bhasma'* were set to remove toxic effects of the source material in therapeutic doses. Physical and chemical tests were also developed to decide the safety of these drugs. The ancient texts are full of such information about testing procedure like *Varitaratva, Rekhapurnatva, Apunarbhav, Niruthha,* color etc. These tests are more or less related to the particle size, density and chemical and physical stability of *'Bhasma'* under high temperature conditions.

In Sharangdhar Dipika commentetary (by acharya Adhamalla*) Yashada is* mentioned the 7th *dhatu. Yashada* (Zinc) is one of the *Dhatu* mentioned under Loha varga in various Rasa shastra texts. After it was separately mentioned with name *Yashada* along with its physical and pharmaceutical properties in 17thcentury *by Madanpalnighantu*; although it carries a classical reference as *Kharpar satwa* in *Rasaratna samuccaya*; which belongs to 13thcentury.[4] All dhatus should undergos the process of purification i.e. *Shodhan* and after that process of incineration i.e. *Maran. Yashad dhatu maran* has two steps jaran as well as maran. *Yashad bhasma* is an effective medicine for treatment of *Twacha vikar, Netra vikar*, night blindness, *Shwasa, Prameha* etc. During the Yashad maran first step is Raw material collection, authentification and standerdization as per texual reference as well as modern analytical parameters should be done. While performoing process standardization shodhan and maran is the important processes to do carefully. First is the shodhan of Yashad by dhalan method using churnodak should be done with pithar yantra for 7 times as per reference of Rasatrangini text. Maran of Yashad consist of two steps first jaran and second maran. If both steps are followed respectively then the prepared bhasma shows the proper desired siddhilakshanas as per texts. While reviewing the literature of Yashad maran, there are more than 10 defferent refferences was found, but mostly it was divided as per marit and jarit method. It showed that Tivragni of 3 to 10 Gajputa (700$^{o\,C}$) was required for the maran of yashad bhasma as per selected reference. Dhatu Maran is done basically by 4 methods. One by using parad, second by using herbal drugs, third by using Gandhakadi dravya and fouth by using ariloha etc. As per the previous research studies, amongs four methos of Dhatu maran Parad marit yashad bhasma nirman is the best method as compare to Hartal marit yashad bhasma nirman method as the bhasma prepared by this method shows the best qualities of bhasma as per Indian pharmacopies standerd values. As per the previous studies, only *Jarit Yashada* shows particle size bigger than *Marit Yashad Bhasma*, so for better quality *bhasma* both the steps of jaran and maran should be performed. After the process of both Jaran and Maran crude Yashad get transformed in to small particle of Zinc oxide. The yield of finally Prepared zinc oxide is greater after *Maran* than only Jaran process. Final product prepared Yashad bhasma should be standardized with Ayurvedic as well as modern analytical techniques. As per previous study, it is stated that XRD and XRF analytical technique by which compound of materials can be detected. In XRD analysis, *Yashad* sample was crystalline in nature and highest peak was correspond to elemental Zinc and in its *bhasma* crystalline structure was destroyed and highest peak correspond to Zinc Oxide.

So this review article is the small effort of collection and summarization of the basic and essential data regarding *Yashad maran*. For adavance methods of *dhatu maran* and analytical methods, future detail research studies should be done with the view of practical approach toward the Ayurvdic pharmaceutics.

CONCLUSION

This review article can conclude following important points

- Yashad is the metal firstly described by Acharya Adhamalla in 14 the century and named as *Kharpar satwa* then after named as *Yashad* in 17 th century by Madanpal Nighntu.
- Preparation of Yashad bhasma needs two important steps, first is Jaran and next is Maran.
- There are more than 10 defferent refferences was found about the yashad maran. But mostly it was divided as per marit and jarit method.
- Tivragni (700$^{o\,C}$) of 3 to 10 Gajputa was required for the maran of yashad bhasma as per selected reference.
- As per the previous studies, only *Jarit Yashada* shows particle size bigger than *Marit Yashad*

Bhasma, so for better quality *bhasma* both the steps of jaran and maran should be performed.

- After the process of both Jaran and Maran crude Yashad get transformed in to small particle of Zinc oxide.
- The yield of finally Prepared zinc oxide is greater after *Maran* than only Jaran process.
- Standardization of *Bhasma* is utmost necessary to confirm its identity and to determine its quality, purity safety, effectiveness, and suitability of the product.
- *Parad Marit Yashad bhasma method* shows the best quality of *Yashad bhasma* as compaire to *Hartal marit Yashad bhasma* as per norms of Ayurvedic pharmacopeia standards.

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