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REVIEW ARTICLE

A Review through Therapeutic Attributes of *Yashada bhasma*

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ABSTRACT

In Ayurveda, metal-based preparations are familiarly known as bhasmas. Yashada bhasma is one such bhasma. Textbooks of Ayurveda recommends Yashada bhasma (incinerated Zinc) as the treatment of choice in many diseases. Though bhasmas are being safely practiced in therapeutics in Indian scenario; concerns are being raised on safety issues in the recent past. So there is a necessity to assess and develop safety profile and to generate evidence. As a part of it, many research works are being carried out in various institutes of India. Five Postgraduate studies dealing with classical guidelines developing safety profile and therapeutic utilities of Yashada bhasma, carried out in Institute of postgraduate teaching and research in Ayurveda, Gujarat are selected for the present paper. Experimental Studies revealed that Yashada bhasma doesn't have serious deleterious effect on body function as a whole. Clinical trials revealed its usefulness in Prameha (Diabetis mellitus), Swetapradara (Leucorrhoea) and Vicharchika (Eczema). No adverse effects were reported during the treatment period. Though certain limitations were observed, the results can be considered as a lead for further well stratified studies covering larger population.

Key words: Bhasma; Prameha;sweta pradara; Vicharchika; Yashada

INTRODUCTION

Metallic preparations has became an integral part of Ayurvedic therapeutics due to their additional advantages like smaller doses, quick action etc.[1] *Yashada* (Zinc) is one such metal, which is being advocated in different forms in the management of various diseases.[2] Zinc is the second most abundant transition metal in organisms after iron and it is the only metal that appears in all enzyme classics. In human Zinc plays ubiquitous biological role and its deficiency leads to many diseases.[3]

Yashada was included for the first time in 14th century in *Madanpala Nighantu* and then in 16 thcentury it was dealt independently in two Ayurvedic texts '*Ayurveda Prakash* and '*Bhavaprakash*'.[4]But no description of *Yashada* is found in literatures prior to 14thcentury.[5] Textbooks of *Ayurveda* recommend *Yashada bhasma* (~Incinerated Zinc) as the treatment of choice in many diseases. To make it fit for therapeutic use, *Yashada* has to pass through a set of pharmaceutical processes known as *Shodhana (~purification)* , *Jarana (~frying)* and *Marana(~incineration).* It is indicated in all types of Prameha (DM), Pandu (~anaemia), KasaSwasa (~respiratory disorders), Nisha sweda (~Night sweating), Rajasrava (~menorrhagia), vrana (~wounds) and Kampavata (~Parkinsonism).[6]

Though bhasmas are being safely practiced in therapeutics in Indian scenario, concerns are being raised on safety issues in the recent past. So there is a necessity to assess and develop safety profile and also to revalidate the classical guidelines and therapeutic efficacies, to generate evidences. As a part of it, many researches on metallic compounds are being conducted in various institutes of India. The aim of the present study is to compile all such available research works on *Yashada* at IPGT &RA, Jamnagar, and provide brief information about pharmaceutical, analytical, pharmacological and clinical contributions.

MATERIALS AND METHODS

Five works were carried out in Institute of Post Graduate Teaching and Research in Ayurveda (IPGT&RA), Jamnagar at postgraduate (PG) levels during 1987- 2001 and they were reviewed for the

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present work. All of these studies were conducted in department of Rasasastra and Bhaishajya Kalpana. Till date PhD works on Yashada were not carried out in this institute.

Table 1: Studies conducted on *Yashada Bhasma* in IPGT & RA

S. No	Study Title	Author	Year
1.	Role of media in the preparation of *Yashadabhasma* w.s.r. to *Swetapradara*	Dr.V.M. Saly	1987
2.	Use of *yoni varti* in *swetapradara* – A pharmaceutical study of *Vit khadira* alone and along with *Yashada pushpa*	Dr. Purohit Chetna. P	1993
3.	A comparative pharmaco-clinical study of *Shilajith* compound and *Yashada* compound on *Madhumeha (w.s.r to DM)*	Dr. kailash Chandra sahoo	1998
4.	*Rasamanikaya evam Yashadamrt ka nirmanatmaka tatha Vicharchika vyadhi par prabhava utpataka adhyayana*	Dr. Misra. D.A	1999
5.	Pharmaceutical standardization of *Yashada bhasma*	Dr. Renuka Diwakar Joshi	2001

OBSERVATION AND ANALYSIS

A study conducted by Saly et al., in 1987 evaluated the role of media in the preparation of *Yashada bhasma* (incinerated Zinc) with special ref to *Swetha pradara (Leucorrhoea).* [7]*Yashada bhasma* was prepared by three methods in the presence of *parada* (mercury), *mulika* (herbs) and *gandhaka* (sulphur) as media, sample A,B and C, respectively. *Bhasmas* prepared by above three methods were compared physico-chemically. The colour of *bhasma* obtained out of 1st and 3rd method was light and dark grey respectively and that of 2nd method was of brick red. 99.96% free zinc and 82.52% Zinc oxide were detected in *ashodhita* (unpurified) and shoditha *(purified)* sample, respectively. In *Parada media yashada bhasma (A)* 86.14% ZnO were detected. No trace of mercury was found in it.

Table 2: Analytical Study

Analytical study findings	Maximum (%)	Minimum (%)
Ash value	Sample A (99.9%)	Sample C (74.38%)
Presence of Sulphate	Sample B (2.02%)	Sample A (1.46%)
Presence of Iron	Sample C (13%)	Sample A (10%)

Clinical study was conducted in 38 patients, who were divided in to three groups A,B and C respectively. 500 mg sized *Yashada bhasma* capsules were given twice daily with milk. As far as the symptoms of *Swetha pradara* were concerned, maximum relief was observed in patients who were given sample B *Yashada bhasma*. Increase in Hb in group C was remarkable. There was a tendency of increase in total leukocyte count in all groups mainly in group B. Indiscriminative of the media, it gave 70.69 % symptomatic relief in *Swetha pradara.* Maximum result was observed in *shira shoola (Headache)* ie., 87.5% and minimum in cervical erosion (27.59%).[8]

A clinical study on *Swetapradara* was done by Purohit chetna et al., in 1993.[9] A combination of d*rug Vit khadira* (Acacia leucophloea(Roxb.) with Yashada *pushpa (processed zinc)* and Vit khadira alone was administered as *yonivarti* (Vaginal Suppository) in 33 patients as two groups, group A and B respectively.[10] One gm of varti was used once a day and continued for three weeks. Though both the preparations were found effective in *Swetha pradara*, better result was observed in group A. On chemical analysis, ZnO (94.34% w/w) and Fe203 (4% w/w) were detected in *yonivarthi* containing *Yashada pushpa*. *Yashada pushpa* had shown antifungal activity in pharmacological study.

A comparative pharmaco-clinical study of *Shilajatu(Asphaltum Punjabianum)* compound and *Yashada* compound in *Madhumeha* (Diabetes Mellitus) was carried out by kailash Chandra sahoo et al., in 1998.[11] Extract of *Vijayasaradi gana was mixed with* equal quantity of *Shilajatu and yashada bhasma (Jaritha maritha)* respectively and capsulated. Both the test drugs were administered in Charles foster strain albino rats, at a dose of 2 ml/ kg. Hypoglycemic, anti hyperglycemic and anti diabetic properties of test drugs were evaluated. *Yashada* compound group showed a statistically significant decrease in blood sugar level in the 1st hour after drug administration whereas no significant result was observed at the 5th hr of post drug period. In *Shilajatu* compound group, blood sugar lowering was observed at 1st and 5th hour after drug administration, however it was not statistically significant. On administration of alloxan, an elevation of 62.65%, 88.05% and 140.37% of blood sugar was observed in *Yashada* compound group, shilajatu compound group and control group respectively. In histopathological study both *Yashada* compound and *Shilajatu* compound showed lesser fatty degenerative changes in comparison to alloxan diabetic rats. There was no significant change in pancreas. Clinical study was carried out in 20 patients as two groups. 2gms each of *shilajatu* compound and *yashada* compound capsules were administered in these groups, orally for 30 days. Capsules were administered twice daily with plain water as *anupana*. Significant decrease in cardinal signs such as Polyurea, Turbid urine, Excessive thirst, Polyphagia etc were observed in the patients of both the groups. Similarly there was a significant decrease in sugar level in blood and urine and

serum cholesterol level in both the groups. In this study *Shilajatu* compound showed significant result than *Yashada* compound both experimentally and clinically. In this study UV spectra pattern of Yashada *bhasma* doesn't showed noticeable absorption where as *Shilajatu* showed three absorption peak.

Misra. D.A *et al*., in 1999 evaluated the safety profile of *Rasamanikya* and *Yashadamrta malahara (ointment made of processed Zinc)* and analysed its clinical efficacy in *Vicharchika (Eczema).*[12] *Yashadamrtha malahara* was prepared as per Rasatarangini.[1] Pharmaceutical study were also carried out along with it. In the toxicity study *Yashadamrta malahara* seems to be safe on external application. Also it showed significant size reduction in cotton pellet granuloma model. On physicochemical analysis, *Yashada pushpa* seems to be ZnO and possess 99.42% Zinc in it. Clinical study in *Vicharchika* was carried out using three groups, *Rasamanikya* was given internally in one group, *Yashadamrta malahara,* externally in 2nd group and both the drugs were administered (internal and external use) in the 3rd group. There was significant improvement in symptoms like *itching, eruption and burning sensation i*n all the 3 groups. Significant improvement in *shotha (*oedema*) was found in group treated with Yashadamrta malahara only*. Improvement in *srava (*discharge*)* and *vaivarnya* (discolouration) was significant in combined drug group and *rasamanikya* group (Group treated with Arsenic compound). Significant improvement in dryness, pain and discolouration was observed only in combined drug group. Three of the groups didn't show any changes in biochemical parameters.

A study done in 2001 attempts to develop process standardization in the manufacture of *Yashada bhasma*.[14] The study also provided evidences about safety of *Yashada bhasma* and its antidiabetic activity on the basis of pharmacological grounds. In the present work 3 types of Yashada bhasma were prepared and assessed, *vanaspathi/ herb(Apamarga- Achyranthes aspera) jaritha (YJ), Vanaspathi jaritha maritha(YJM)* and *Parada maritha* (YPM).[15] Classical parameters such as *Varna, Varitaratva, Rekhapurnatva*, and contemporary parameters such as chemical analysis, XRD (X-ray diffraction), ICPAES (Inductively Coupled Plasma Atomic Emission Spectroscopy), Brunauer-Emmett-Teiler (BET) method were used for evaluation of *bhasmas.*

There was a gradual rise in the melting point till the *vishesha shodana process (488^{0}c).* It was found that *Jaritha yashada* seems to possess the highest M.P (1895) than *vanaspathi maritha* (1858) and *parada maritha* (1435). The colour of *Parada marita bhasma* was bright yellow, where as *vanaspati marita* was light yellow. The assay for Zinc by the tritrimetry method gives the results as YJ 86.94%, YJM 77.09% and YPM 56.54%. XRD phase identification showed presence of free Zn in YJ sample only. In YJM and YPM samples, Zinc was present as Zinc Oxide. The YPM sample showed least particle size Particle Size followed by YJM and YJ samples. The maximum number (90%) of particles was below 63.66 microns.

Surface area was assessed using BET method. On an average the YJ sample showed the maximum surface area of 9.56 m^2/g, followed by YJM (5.36 m^2/g) and YPM (5.01 m^2/g). ICP-ES method detected Al, Fe, Ti, Ca, Mg, P, Na, K, and S in its oxide form as major elements. Trace elements detected were Cr, Mn, Co, Ni, Cu, As, Cd, Pb, Hg etc. The proportion of S, Ni and Cu derivatives were more in *parada maritha* (YPM) variety, but YPM samples on an average showed lowered profile of trace element than YJ and YJM samples.
In this study YPM and YJM *Yashada bhasma* samples were subjected to toxicity evaluation. The YPM sample was studied at two dose level- at TED and 5TED and YJM sample at higher dose only ie. at 5TED, for 30 days and evaluated its impact on four different parameters. In albino rat models, Ponderal, Haematological, Biochemical and Histopathological parameters indicate the absence of serious deleterious effect on body functions as a whole. Histopathological study had shown a decrease in the cellularity of mild to moderate extent in organs, which indicates mild cytolytic effect. In biochemical analysis, YPM treated group showed moderate reversal of diabetes induced elevation of serum urea, VLDL-cholesterol, serum triglyceride, SGPT etc. In YJM administered group reversal was observed in elevated serum cholesterol, Serum triglyceride and GPT activity. In the case of YJ treated group a decrease in elevated serum urea and cholesterol level was observed. Anti-diabetic activity evaluation was carried out in all the three samples of *Yashada bhasma*. Only YJ preparation was found to be effective in hyperglycemia compared to YJM and YPM**.**

DISCUSSION

Pharmaceutical Findings

Shodhana has imparted increased brittleness and reduced hardness of *yashada*. The gradual rise in melting point after *shodana, jarana* and *marana* indicates some structural change in the alignment of molecules of *Yashada*. The change in melting point can be attributed to the conversion of metallic bonding to ionic bonding in the metal.[16]

Analytical Findings

Particle size of *bhasma*, which got considerably reduced after every *puta*, indicates that the *marana* helps in the reduction of the particle size. The size of nano particle plays an important role in changing the entire properties of material.[17] The least particle size of YPM samples may be rendering it, more available for the manifestation of the moderate cyto protective activity.The absence of free Zinc in the samples subjected to *putas* can be interpreted as total conversion of Zinc into its compound form and its presence in *Jaritha* sample indicates incomplete conversion. The use of *Gandhaka* in the *parada marita yashada bhasma* samples might have resulted in a few sulfide phase formations.[18] When compared with *shoditha* (purified) samples the *sulphate* percentage increased and the phosphate percentage got reduced in *Yashada bhasma*.[19] The presence of Fe_30_4 detected in *Yashada pushpa* may be, due to frying in iron pan.[20]Variety of major and trace elements detected in Spectroscopy may be due to the natural and manipulated blemishes associated with it, the media and vessels used for its processing etc.[21]

Pharmacological Findings

With increasing knowledge of risk of nanomaterials, it becomes imperative to assess the safety of Nano particulate Ayurvedic medicines using toxicity models. Drug yashada *pushpa* which showed significant size reduction in cotton pellet granuloma model, indicates its anti-inflammatory and anti proliferative effect.[22] In the pharmaco clinical study on *Madhumeha*, *Yashada* compound was observed to have a marginally better effect than *Shilajatu* compound in experimental animals and viceversa clinically.[23] In toxicity study, serum urea level was elevated in all the three YJM and YPM treated groups of albino rats. At the same time the drug showed reversal of elevated serum urea in diabetic albino rats. Since the changes are of moderate intensity they are likely to be reversible. However caution should be exercised while administering these preparations in persons with renal insufficiency**.** It is better to avoid their long term administration. On the basis of analysis of ponderal and bio-chemical parameters it can be suggested that YPM seems to have moderate cytoprotective activity, YJM weak cytoprotective activity and YJ moderate anti-diabetic, anti-hyperglycemic and weak cytoprotective activity.[24]

Clinical findings

Therapeutic efficacy of *Yashada bhasma* has been proved in diseases like *Swethapradara*, *Vicharchika* and *Prameha*. In these studies, the *bhasmas* were administered by mixing with suitable herbal powders and adjuvants. The therapeutic dose was ranging in between 300 mg – 1 gm. Different preparations of *Yashada bhasma*, used internally and externally, had shown remarkable relief in *swethapradara.* Antibacterial, antifungal and immunomodulatory activity of *yashada* might have prevented the recurrence of such immunosuppressive diseases.[25] Similar properties of *Yashadamrita malahara* might have contributed in reducing the symptoms of *Vicharchika* on external application. *Shilajatu* showed significant result than *Yashada in Madumeha* clinically. This may be because of the better action of *Shilajatu* at *rakthadathu* and *medo dhatu* level than *Yashada*. In D.M, oxidative stress contribute to insulin resistance and many complications.[26] Later studies have proved Immunomodulatory and free radial scavenging activity of *Yashadabhasma*, may help to prevent the systemic level damage, by reducing the oxidative stress.[27] Though some studies suggest that the antidiabetic activity of *yashadabhasma* is due to its insulin sensitizing effect, further studies to identify it's target of action have to be carried out.[28]

Many studies regarding the standardization, toxicity profile and clinical efficacy of *Yashadabhasma* in various diseases were conducted and is being continued in various institutes of India. This will help in improving the validity of the trial and the scope of the drug in various ailments.

CONCLUSION

In the above studies, characteristics *of Yashada bhasma* were analysed using modern physicochemical techniques. In vitro toxicity study revealed no major cytotoxicity at all the dose levels tested. In clinical trial no adverse effects or mortalities were observed. From the above studies, *Yashada bhasma* appears safe and effective for human use if properly processed and administered. All these studies, reveal that *bhasmas* prepared in different medias have different chemical compositions, and biological activities. This may be the reason for the specific clinical efficacy of a particular *bhasma* incinerated in specific media.

Above studies which have proved the safety and clinical efficacy of *Yashada bhasma*, supports the long standing classical use of zinc preparation in Indian traditional medicine.

Nano analysis of particles and further systemic evaluation through in vitro studies can be conducted to obtain advanced research outcomes. we should be able to convince the scientific world and public about the safety and efficacy of the metallic drugs like *Yashada* to make it's use credible and this can be achieved by systematic and scientific researches.

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