



**A REVIEW ARTICLE ON THE ROLE OF SOME METALLIC AND MINERAL DRUGS
IN AYURVEDA IN THE MANAGEMENT OF DIABETES**

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Article Received on 25/12/2017

Article Revised on 15/01/2018

Article Accepted on 04/02/2018

ABSTRACT

Diabetes is a lifestyle disease that is caused by unhealthy behaviour, habits and practises. Obstinate urinary disorders with increased urinary flow are grouped together as prameha in Ayurveda. Common symptom for all pramehas is that urine is increased in quantity and is altered in consistency. The need to develop more efficient drugs with minimum side effects and cost for the treatment of prameha is very necessary. Prameha is a disease which requires lifelong medication. In its chronic state, it may manifest many complications and sometimes compromise the quality of life of the patient. So along with controlling the disease, prevention of complication and improvement in the quality of life of the patient is equally important. Classical Ayurvedic treatment of prameha includes ahara, achara, vyayama, samana chikitsa (internal medication), sodhana chikitsa (purification processes) and rasayana (rejuvenation) therapy. Rasashastra (Ayurvedic Chemistry) has been successful from very early times in using various formulations in preventing or treating prameha. Some of the important formulations that can be used for treating prameha in Rasashastra are Yashada bhasma, Swarna makshika bhasma, Shilajatu prayoga, Vanga bhasma etc. In the present work we are discussing about the role of these formulations in the management of prameha. The aim of this work is to provide a general outline about diabetes and its management by following the principles of Ayurveda.

KEYWORDS: Diabetes is a lifestyle Yashada bhasma, Swarna makshika bhasma, Ayurveda.

INTRODUCTION

Diabetes is a disease which is characterised by frequent urination, intense thirst and hunger, weight gain, unusual weight loss, fatigue, cuts and bruises that do not heal, male sexual dysfunction, numbness, tingling in hands and feet etc. For the treatment of such a disease several researches has been conducted but no fruitful result came. Eventhough several antidiabetic drugs are available for its treatment, we do not have a single ideal drug without any side effects. Thus the emphasis is made over the natural products. Maintaining a good diet is also a vital part of keeping tight control of blood sugar levels, itself important for minimizing the risk of diabetes complications.^[1] Classical medicine that has existed for thousands of years from the time of vedas has described many formulations which not only useful for the treatment but also promote good health and longevity without any side effects to mankind.

I. Yashada bhasma (Zinc calyx)

Yashada (Zinc) is an essential mineral of exceptional biologic and public health importance. Zinc is necessary for the formation of insulin in the pancreas's beta cells.^[2] It also plays an essential role in growth, neuro development, immunity, reproduction, and a wide range of physiological processes including metabolism of nucleic acids, proteins and lipids, synthesis of hormones, and apoptosis. Symptoms of zinc deficiency include stunted growth (in children), hair loss, diarrhea, decreased appetite, eye and skin lesions, delayed wound healing, and weight loss. Yashada bhasma is a compound preparation of Yashada which can be prepared by the incineration of purified Yashada. According to Ayurvedic classical texts, it possess kashaya and katu rasa and sita guna. Its judicial use cures kapha pittaja roga. It improves physical strength, virility and intellect. It can be used in pandu (anaemia), prameha diabetes),

swasa, kasa (cough) etc. It prevents the excessive secretions from the wounds and heal them. Its use also relieves tiredness.^[3]

General purification of Yashada

Yashada is heated in an iron laddle till they melt completely and then poured into kanji(a fermented preparation), takra (butter milk), kulattha kwatha (decoction of horse gram), gomutra (cow's urine)and tila taila(sesame oil), three times each, through pithara yantra (special instrument used for purification of metals).^[4]

Specific purification of Yashada

Like general purification of Yashada, it is heated in an iron ladle and poured into churnodaka, for seven times through pithara yantra.^[5]



Figure 1: Yashada.



Figure 2: Yashada bhasma.

Research works on Antidiabetic efficacy of Yashada bhasma

First experiment^[7]

Fifteen albino rats(110-180g each) of both sexes were taken, kept overnight fast and diabetes was induced in them by injecting 65mg/kg body weight of streptozotocin I.P in sodium citrate buffer. The total animals that became diabetic were divided into three groups ie control, drug treated and rastinon treated group. Control group was given distilled water. The drug Yashada bhasma was given for one month in aqueous suspension through oral route in the dose of 0.5g/kg body weight and at weekly intervals the blood sugar levels were recorded. The effect of Yashada bhasma was evaluated against streptozotocin and compared with that of known short acting drug Rastinon (Tolbutamide). In control group the blood sugar levels remained elevated through out the study, where as the levels returned to near normal by the end of the treatment in treated levels. In Rastinon treated group also the blood sugar levels returned to near normal levels. In the control group two animals died (40%). No mortality was observed in both treated and Rastinon treated groups.^[7]

Second experiment^[8]

In another study, thirty adult albino rats (200 ± 20gm each) were used. The rats were divided in three groups – group I, group II and group III. The rats in group I were used as control. Each rat of group II was administered with shuddh shilajatu (250 mg/Kg bw, orally) once daily

Incineration of Yashada

Molten Yashada is triturated with suddha parada (purified mercury) to obtain a drug mixture in the form of amalgam which is again triturated with nimbu swarasa (lemon juice) and later washed with water. It is added with suddha Gandhaka (purified sulphur) and triturated thoroughly to obtain the drug mixture in blackish powder form. The powder is enclosed in sarava sampta (two mud vessels closely packed) and subjected for incineration.^[6]

Dosage – ½ to 1ratti (62-125mg).

for 15 days. Yashada bhasma (100 mg/Kg. b.w.p.o) was given to group III rats once daily for 15 days. At the end of 15 days, blood from the retro orbital venous plexus of each rat was collected following overnight fasting. These blood samples were used for the determination of blood sugar levels using oxidase peroxidase methods. The administration of Yashada Bhasma for 15 Days significantly decreased the fasting blood sugar levels (P<0.01). Similarly, the fasting blood sugar levels were also observed to be lower in Yashada bhasma pretreated alloxanized rats as compared to control alloxanized rats (P<0.05).^[8]

II. Swarna makshika bhasma

Swarna makshika or copper pyrite or chalcopyrite contains copper, iron and sulphur as major contents. It is a chief ore of pure copper and presence of copper makes it look golden yellow in colour. Swarna makshika which is smooth and heavy and have bluish and blackish shade on the body and which possess golden colour is selected for pharmaceutical purposes.^[9] Swarna makshika bhasma is prepared by the incineration of purified chalcopyrite. Properly prepared swarna makshika bhasma possess madhura rasa(sweet taste), rasayana guna (rejuvenative), and partial tikta rasa(bitter). It cures prameha roga, kshaya roga, arsa roga(piles), pandu, swayathu, kushta(skin disease) etc. It is good to throat and voice.^[10]

Purification of swarna makshika

The filtered fine powder form of swarnamakshika is taken in an iron vessel along with enough quantity of nimbu swarasa. This vessel is placed over intense fire with frequent stirring. When the contents attain reddish colour, required quantity of nimbu swarasa is again added and heating is continued for 2-3 days. When cool on its own, the fine powder in the vessel is triturated and can be used as suddha swarna makshika.^[11]



Figure 3: Swarna makshika.

Research works on Antidiabetic efficacy of Swarna makshika bhasma

First experiment^[13]

Present study was conducted to see the effect of Swarna Makshika bhasma on serum sugar level, total cholesterol and triglyceride level. Healthy Charles foster albino rats having weight of 180- 200gm bred in the Central Animal Facility were used for the present study. Streptozotocin solution was prepared freshly and injected intraperitoneally to induce Diabetes. Experiment was carried out in 7 groups. It had a total duration of 27 days. The effect of graded dose of Swarna makshika bhasma solution (5.85mg/kg, 11.25mg/kg and 22.5mg/kg), standard drug glibenclamide and a combination of standard drug and medium dose of Swarna makshika bhasma was observed on blood sugar level, total cholesterol and triglyceride level. Swarna makshika bhasma showed marked decrease in blood sugar level from 7th day onwards of treatment.^[13]

Second experiment^[14]

The biochemical role for copper is primarily catalytic, with many copper metalloenzymes acting as oxidases to achieve the reduction of molecular oxygen. Many copper metalloenzymes have been identified in humans. Copper/zinc superoxide dismutase (Cu/Zn SOD) uses two copper atoms for conversion of the superoxide anion (O₂⁻) to H₂O₂ and O₂. The results of the studies conducted by Shiva *et al.* also confirmed same pattern and showed significant enhancement in lipid peroxidation level (malondialdehyde release) in diabetic conditions. A concomitant decline in antioxidant status (FRAP assay) was also observed.^[14] Iron plays a pathogenic role in diabetes and its complications such as microangiopathy and atherosclerosis.^[15]

Incineration of swarna makshika

The suddha swarna makshika is again triturated with enough quantity of nimbu swarasa and prepare chakrikas (pellets) of even size and shape. The pellets are dried under sun, enclosed in sarava samputa (mud vessels placed one over the other and sealed) and subjected to varaha puta (one puta/one incineration).^[12]

Dosage – ½ to 2 ratti (62- 250mg).



Figure 4: Swarna makshika bhasma.

III. Shilajatu Prayoga (Blach bitumen; Asphaltum Punjabinum)

Shilajatu is a mineral drug in maharasa group (mineral group). Essence of Himalayan rocks that is secreted out collects in between the rock cleavages is called as shilajatu. Gomutragandhi shilajatu is the variety used for therapeutic purposes. The main active component of Asphaltum Punjabinum is fulvic acid which is considered as the strongest natural electrolyte. Fulvic acid is an unusual collection of hormones, nutrients, anti oxidants, enzymes, amino acids, free radical scavengers, anti viral, anti fungal, bactericidal substances, biochemical and phytochemicals.^[16] Suddha Shilajatu possess tikta rasa and katu vipaka. It possess Yogavahi (synergistic) and rasayana (rejuvenative) properties.

Purification of Shilajatu

Thorough washing of asuddha (impure) shilajatu in godugdha (cow's milk) or thriphala kwatha or bhringaraja swarasa or gomutra (cow's urine) or any alkaline liquids or any sour liquids will purify the drug. Here the shilajatu is added with enough quantity of above specified liquids in a stainless steel vessel. It should be stirred well, filtered into larger trays and dried under sun to obtain suddha shilajatu.^[18]

Therapeutic utility of Shilajatu

Suddha Shilajatu when used judiciously for internal administration, it improves the physical strength. It is indicated in prameha, pandu, kshaya, sotha, mutrakricca, swasa, udara, mutrasmaris etc.^[18]

Shilajatu prayoga in prameha

One tula of shilajatu is soaked and macerated well in the decoction of saara (drugs of asanadi gana). Prameha rogi should consume this with the same decoction and eats boiled rice and soup of meat of desert animals. He will be cured of all varieties of prameha, along with its upadrava vyadhis.^[19]



Figure 5: Impure Shilajatu.



Figure 6: Purified Shilajatu.

Research works on Antidiabetic efficacy of Shilajatu First experiment^[20]

250g of Shuddha Shilajatu was given for selected 22 patients twice a day for 28 days by oral route with plain water. Shilajatu was effective in lowering the mean fasting blood glucose levels with $p < 0.001$ which was highly significant statistically. There was also significant reduction in the mean post prandial blood glucose levels with $p < 0.001$. Shilajatu was effective in lowering the mean urine sugar level also with $p < 0.001$ which was statistically highly significant. The mean score of Glycosylated Hemoglobin (HbA_{1c}) was also reduced significantly with $p < 0.01$ statistically.^[20]

Second experiment^[21]

Select randomly 46 patient of type-2 diabetes mellitus and Shilajatu capsules of 500mg B.D was given to them with normal potable water for 3 months. Final assessment was done after completion of three months. For the diagnosis of Diabetes mellitus Fasting Blood Sugar and Postprandial Blood Sugar at two different days have been done. Glycosylated hemoglobin (HbA_{1c}) and Fasting Lipid Profile (to find out the lipid status of patients) before and after completion of treatment was estimated. After evaluating the observation of the present series of investigation it is concluded that Shilajatu has a beneficial role in reducing the severity of all the symptoms and controlling fasting blood sugar, postprandial blood sugar, glycosylated hemoglobin and lipid profile.^[21]

IV. Vanga bhasma (Tin calyx)

Vanga bhasma is an Ayurvedic medicine prepared by the incineration of Tin metal. Before incineration, it should

be properly purified. Vanga bhasma possesses laghu, sita, ruksha guna. It has tikta, kashaya and alpa lavana rasa. Its judicious use for internal administration promotes medha (intellect). It eradicates meda (excessive fat) and is a good appetizer. It is a good rejuvenator and cures kaphaja roga. It is effective against all types of prameha.^[22]

General purification of vanga

Vanga is heated in an iron laddle till they melt completely and then poured into kanji, takra, kulattha kwatha, gomutra and tila taila, three times each, through pithara yantra (special instrument used for the shodhana of putilohas).^[23]

Specific purification of vanga

Asuddha Vanga is taken in a big iron table spoon and it is heated over fire. The molten metal is poured through pidhanaka yantra to a vessel containing arkadugdha. Repeat the process for 7 times.^[24]

Incineration of vanga

In a wide mouthed iron vessel suddha Vanga (purified Tin) is added with suddha Parada (purified Mercury) and placed over intense fire. When Tin starts melting suddha haritala is added little by little by stirring with stick of Vana karpasa. This process is continued till it attains bhasma form. This bhasma is heaped up in the middle of the vessel and subject to intense heat by closing it with an inverted mud lid. When cool on its own, the Tin calyx can be collected.^[25]

Dosage – 1 to 2 ratti (125-250).



Figure 7: Vanga.



Figure 8: Vanga bhasma.

Research works on Antidiabetic efficacy of Vanga bhasma

First experiment^[26]

Hyperglycaemia was induced in albino rats of wistar strain (200-250g) by single dose of alloxan monohydrate. The rats were divided into four different groups. Vehicle treated group received 4% gum acacia in normal saline. Test group received 25 and 20mg/kg of Vanga bhasma and standard group received metformin (500mg/kg). Statistical tests indicated that Vanga bhasma has significant influence on blood glucose levels in alloxan induced hyperglycaemic rats. Standard drug metformin also showed significant reduction in the blood glucose levels.^[26]

Second experiment^[27]

Total 62 patients were selected for the study. They were divided into two groups – group A and group B. Group A (32patients) received 250mg of Vanga bhasma + 250mg of guduchi Ghana + 3ml of old honey for 28 days. Group B (32patients) received 250mg of guduchi Ghana + 3ml of old honey for 28 days. In group A, marked improvement for 14%, moderate improvement for 28% and mild improvement for 10% was noted and in group B, marked improvement for 2%, moderate improvement for 10% and mild improvement for 24% was noted. So we can conclude that Vanga bhasma with guduchi Ghana as sahapana had anti hyperglycaemic effect.^[27]

CONCLUSION

Prameha in its chronic course might manifest many complications and reduce the quality of life of the patient. Apart from controlling the blood sugar levels, prevention of complications and improvement in the quality of life Rasasastra, one of the pharmaceutico therapeutic branches of Ayurveda, incorporates many of the metallic and mineral preparations. They have better therapeutic qualities like effective in small dosage, tastelessness, quick effectiveness and long shelf life. Rasoushadhis has rasayana effect and thus they help to boost the metabolism, and enhances the regeneration of the body cells and tissues. Also the immuno modulatory effect of rasoushadhis help to strengthen the cells and boost the immunity. If it is practiced in full earnest can help alleviate dreadful diseases and help in longevity.

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