

A Literary Study of Rasa Tantra Sar Va Siddha Prayog Samgraha with Special Reference to Pramehahara Yogas

Abstract

Objective: To critically review all formulations indicated for different types of *Prameha* with the objective of understanding the drug action and focusing on new drugs which could be more beneficial against diabetes. **Data Source:** Two volumes of preprinted versions of RTSVSPS, internet sources, and catalogs of various pharmaceutical companies were scrutinized. **Review Methods:** All the formulations of *Pramehahara Yogas* were compiled and classified as herbal, herbo-mineral-, and mineral-based medicine. Related published works on DM were noted and all formulations were analyzed in various aspects such as type of ingredients used, research works, market available formulations, and commonly used *Rasa dravya*. **Results:** RTSVSPS treatise contains 1307 formulations out of which 104 medicines were indicated for diabetes. Fifteen compound drugs have published research work and only 62% are available in the market. *Lauha bhasma* is the most extensively used *Rasa dravya*. **Conclusion:** This article throws light on various unfathomed formulations and highlights appropriate usage of compounds with different *anupanas* (vehicles) according to different conditions.

Keywords: Diabetes, Madhumeha, Prameha, Pramehahara yogas, Rasoushadhis

Introduction

Ayurveda is one of the oldest of the traditional systems of medicines accepted globally. It has a better approach to treat chronic illnesses and lifestyle-related disorders as it focuses on personalized treatment, diet plan, and lifestyle modifications.

Different formulations and *Chikitsa sootra* (approach to cure or manage the disorder) have been mentioned in Vedic books which are very difficult to interpret. With this practical obstacle hindering the treatment of human beings, many *Acharyas* such as Atreya, Bharadwaja, Parashara, and Sushruta wrote treatises in a more simplified way for easy understanding. Eventually, scholars such as Vagbhata, Vrinda, Vangasena, Chakrapani, and Sharangadhara realized the need to conventionalize these treatises further and wrote their own books or commentaries for the *Samhitas*. It was at this time that along with *Dhanwantara sampradaya*, Lord Shiva/*Rasa sampradaya* treatises up-surged. These *rasa sampradaya* literatures emphasized the usage of processed metals and minerals for

therapeutic purposes. Henceforth, books combining *Dhanwantareya* and *Rasa sampradaya* came into existence based on the author's knowledge and experience to serve mankind and also to preserve and flourish Ayurvedic science for future generations.

One such treatise is *Rasa Tantra Sar Va Siddha Prayog Samgraha* (RTSVSPS) which consists of two volumes. It is archived or composed by Swami Shri Krisnaananda Ji Maharaj (03/07/1889-30/12/1974). It is published by Krishna Gopal Ayurved Bhawan, Ajmer.

Prameha is a disease known to the medical world since time immemorial.^[1] The description available in Atharvaveda is considered the first ever on this topic and is mentioned in Kaushikasutra. Sayana and Kesavabhata, the well-known commentators of the Sacred Vedas interpret *ASRAVA* as "*Mutratisara*."^[2] *Prameha* of this era is perilous with more number of populations affected by this, especially India and China. India alone has 69 million diabetic people and is expected to double by the year 2040.

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The WHO has predicted that there will be a 50% increase in deaths due to diabetes in the next 10 years and by 2030, it predicts that diabetes will be the 7th leading cause of death worldwide. The treatment strategies available now are neither able to halt the progress of diabetes nor are preventing the development of chronic complications. The scenario will presumably worsen in the following years.^[3]

Most of the anti-diabetic formulations mentioned in RTSVSPS treatises are undetermined. A small percentage is available in the market and limited research works have been conducted. Hence, this paper is intended to do a critical analysis of all *Pramehahara Yogas* mentioned in RTSVSPS which will sanguinely help researchers, manufacturing companies, and academicians to scrutinize different compounds which might exhibit better anti-diabetic property.

A brief about the book

The author has written the book in a very simple, easily understandable way. He has explained the mode of action on grounds of both *Samprapti* and modern pharmacology. The formulations mentioned in this book are based on other texts and the explanations given are from the author's clinical experience.

Author's main objective

नात्सार्थं नापि कामार्थमथ भूतदयां प्रति

This book was written not for myself, neither for money but for serving mankind.

The author himself has made few amendments in formulations till the 10th edition. Vaidya Bhadrinarayan Shastri's new techniques/machinery for the preparation of formulations has been added. The admin of the publication (Krishnagopal Ayurveda Bhawan) of RTSVSPS has stated in the "forward" part of the book that references of Marathi book "Ayurvediya Oushadhi Gunadharna Shastra" by Gangadhar Shastri is present. And also few formulations have been selected from Gujarati book "Ayurveda Nibandha Maala," Marathi book "Vaidyaka Saara Sangraha," ancient Ayurveda/Unani books, monthly magazines, and also from few known experienced *Vaidyas*.

Kaviraj Pratap Sinha Ji has made few amendments in the 7th edition of this book. Few experiences of Acharya Pandit Sukharamdas Ji T Ojha and few new thoughts by Vaidya Bapala Ji Shah have been added in the 24th edition of volume 1. Modern Metric conversion of Ayurveda units has also been mentioned.

This book (Part 1) is also considered an authentic book in Schedule I of Drugs and cosmetics Act, 1940 and Part 2 was amended in the year 2010.

Methods

Source of information

Both the volumes of RTSVSPS were scrutinized for all

anti-diabetic formulations. Out of 1307 formulations, 104 medicines were indicated for different types of diabetes. A master chart was prepared specifying their ingredients (Mineral/herbo-mineral/herbal compound). Another column of any special indication and other details were consolidated. Research articles of each formulation were investigated in different search engines such as Google Scholar, PubMed, AYUSH Research Portal, and Research Gate. The search words used were "respective formulation name-research work." One 69 articles were retracted on 15 formulations out of 104 compounds mentioned in the text. However, only 23 articles are considered in this paper based on their anti-diabetic effect and associated complications. Other search words such as Iron, Zinc, calcium, and diabetes were also used to describe link to the metabolic disorder.

Inclusion criteria

The formulations which had *Phalashruti* and *Rogadhikara* of *Prameha* and *Madhumeha* or its subtypes were compiled from the two volumes of RTSVSPS.

Exclusion criteria

The present study excludes compounds for other disorders such as *mootrakrichra*, *mootraghata*, *medoroga*, *bahumootra*, and *pooyameha*.

Data analysis

Available data in the master chart were analyzed from various aspects and related research works were investigated profoundly.

Results

There are 68 formulations mentioned for all types of *Prameha*, 29 on *Madhumeha*, 12 on *Pittaja Prameha*, nine on *Kaphaja prameha*. Volume 1 contains 5 *Bhasmas*, 4 *Kupipakwa rasayana*, 3 *parpati*, 30 *Kharaliya rasayana*, 2 *Guggulu*, 2 *Gutika*, 5 *Churna*, 6 *Asava*, 2 *Arka* and 2 *Ghrita-taila* dosage forms summing up to 61 *Pramehahara Yogas*. Volume 2 contains 43 formulations. They are indexed in Sanskrit *Varnamala* order but the book contents are categorized as per disease. Under the disease heading of *Prameha*, we can find 18 formulations and 2 formulations under *Prameha pidaka*, remaining 23 compounds are chiefly indicated in other diseases but have anti-diabetic references.

There are two compounds in RTSVSPS with the name *Sariva*: *Sarivadi vati* and *Sarivadi lauha*. The former contains both *Abhraka bhasma* and *Lauha bhasma* and is primarily indicated for disorders of the ear, the latter contains *Shudha Bhallataka* and *Lauha bhasma* is indicated for *Prameha pidaka* (Diabetic carbuncles). The primordial feature of this book is about the indication of formulation in specific conditions. The author emphasizes different *anupana* to be used. For example, *anupana* of *Chandraprabha vati* in all types of *Prameha* is

Guduchi swarasa (*Tinospora cordifolia* [Thunb.] Miers), honey or triphala (*Terminalia chebula* Retz., *Terminalia bellirica* [Gaertn.] Roxb., *Embolica officinalis* Gaertn.) / daruharidra (*Berberis aristata* DC.) / Devadaru (*Cedrus deodara* [Roxb.] G. Don), Musta kwatha (*Cyperus rotundus* L.); in *Madhumeha-nimba patra* (*Azadirachta inidica* A. Juss) and *bilwa patra swarasa* (*Aegle marmelos* L), *jambu rasa* (*Syzygium cumini* [L.] Skeels) *agnimantha kwatha* (*Premna seratifolia* L.); in *Lala meha – triphala* (*Terminalia chebula* Retz., *Terminalia bellirica* [Gaertn.] Roxb., *Embolica officinalis* Gaertn) and *amlavetasa kwatha* (*Garcinia inidica* Choisy); in *Manjishta meha-nimba twak* (*Azadirachta inidica* A. Juss), *arjuna twak hima hima* (*Terminalia arjuna* [Roxb.] Wight and Arn.) may be used (Gutika prakarana Page no-311). If the patient is suffering from chronic constipation and he is lean, Chandraprabha vati will be the drug of choice (Gutika prakarana Page no-313). He has also mentioned medicines based on characteristics of urine such as specific gravity, Ph, and presence of glucose in urine. The author has mentioned about the action of particular medicines on different organs such as *Mehantaka rasa* should be given in condition with hepatic impairment (Kharaliya rasayana prakarana Page no-297); *Prameha Gajakesari rasa* does hypoglycemic action by improving *agneya rasa srava* (Kharaliya rasayana prakarana, page no-296). If a sedentary lifestyle, excess intake of *guda* (jaggery), and its products such as sugarcane juice and sweet products is the causative factor for *Prameha*, then *Navayasa churna* should be the drug of choice (Kharaliya rasayana prakarana page no-210) [Table 1 outlines the details of different formulations].

Out of the 104 formulations mentioned in the book for diabetes condition, only 15 formulations have been validated in research papers and the remaining 89 medicines are either in use by practitioners or confined to only texts. From the available papers, *Rasa sindoora*,^[4] *Saptavimshati guggulu*,^[5] *Mehamudgara rasa*,^[6] *Pramehamihira taila*,^[7,8] *Naga bhasma*,^[9] and *Trivanga bhasma*^[10] have undergone clinical study. Among these, *Saptavimshati guggulu* was found to be more beneficial in *Sthula Pramehi* than *Krishna Pramehi* and *Mehamudgara rasa* showed significant improvement in fasting and postprandial serum insulin level. Experimental studies have been conducted on *Chandrakala rasa*,^[11] *Vasanta kusumakara rasa*,^[12,13] *Chaturmukha rasa*,^[14] *Chandraprabha vati*,^[15] *Lodhrasava*,^[16] *Bahumootrantaka rasa*,^[17] *Abhraka bhasma*,^[18,19] *Jashada bhasma*,^[20] *Naga bhasma*^[21] and *Trivanga bhasma*.^[22] *Vasanta kusumakara rasa* was found to enhance oxidative stress in eye tissue which in turn decreased lipid peroxidation and increased endogenous antioxidant levels. It also decreased levels of aldose reductase and vascular endothelial growth factor in eye tissue and restored the normal structure of retinal tissue in Wistar rats. *Chandraprabha vati* normalized the impaired glucose tolerance in Oral Glucose Tolerance Test

(OGTT) at 60 and 120 min on glucose-loaded normal rats. In a sub-acute toxicity study of *Abhraka bhasma*, the histopathological report has exhibited prominent hyperplasia and regeneration of islet cells.

However, 62% of these formulations with the same ingredients are available in the market and we are naïve to 38% of the drug wisdom. Among these formulations, 39, 36, and 29 are purely composition of the processed mineral, herbo-mineral and herbal medicines, respectively. *Lauha bhasma* has been used to the maximum in 36 formulations. Processed Gandhaka being the next highest has been used in 30 formulations. Vanga bhasma and Naga bhasma is found in 26 and 7 formulations, respectively [Figure 1].

Discussion

The treatise RTSVSPS can be called the encyclopedia of Ayurveda Pharmaceutics as it encompasses the entire manufacturing procedure. It can also be considered an atlas for clinicians of this era as we find terminologies of Ayurveda classics along with terminologies of diabetes pathology and its complications such as hepatic involvement in diabetes, diabetic carbuncle, and acetonuria. This appraises the in-depth knowledge of the author in terms of modern and Ayurveda *Samprapti*. The author has also thrown light on the characteristic of urine such as Ph, specific gravity, color, and presence of entities such as glucose and albumin in his explanation of *Karma* of few compound drugs. Of 104 medicines found in this book, only 15 formulations have been validated and very few are being practiced by Ayurveda doctors. Few formulations though available in market are not being used for diabetic condition. The probable hypothesis of such drug action is explained below.

Lauha bhasma

It is the utmost used nano-particle among only mineral and herbo-mineral compounds in this book. It is mainly

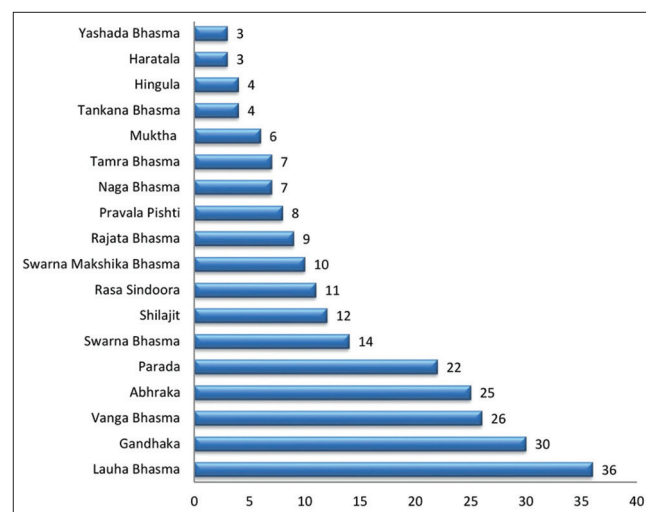


Figure 1: Different Rasoushadhi used in number of anti-diabetic compounds

Table 1: Details of compounds in specific condition

Formulations	Key ingredients	Speciality
<i>Gandhaka Rasayana</i>	<i>Shudha Gandhaka</i>	<i>Krishna pramehi</i>
<i>Trayoshanadi Lauha</i>	<i>Trikatu, Triphala, Tri lavana, Chavya, Chitraka, Bakuchi, Lauha bhasma</i>	<i>Sthoola pramehi</i>
ABR	<i>Hingula, Triaktu, Tankana, Vatsanabha, Gandhaka</i>	In a <i>kaphaja prameha</i> person with <i>agnimandya</i> but no glycosuria, polyuria, polydipsia, burning sensation etc.
<i>Navayasa churna</i>	<i>Trikatu, Triphala, Trimada, Lauha bhasma</i>	If causative factor is sedentary lifestyle, excess intake of <i>guda vikriti</i> , and sweets and if specific gravity and pH of urine is less
<i>Vasanta Kusumakara Rasa</i> <i>Anupana-Haridra, Sharkara and Madhu</i>	<i>Pravala pishti, Rasa sindoor, Mukta pishti, Abhraka bhasma, Swarna bhasma, Rajata bhasma, Lauha bhasma, Naga bhasma, Vanga bhasma</i>	Chronic diabetes associated with CVS, <i>kasa shwasa</i> , impairment of sense organs, <i>prameha pidaka</i> , diabetic syncope etc.
<i>Maha Vataraja Rasa</i>	<i>Parada, Gandhaka, Lauha bhasma, Abhraka bhasma, Rasa sindoor, Ahiphena, Dhatura Bija</i>	<i>Madhumeha</i> with complications of CVS, neuropathy and carbuncles
<i>Prameha Gaja Kesari Rasa</i>	<i>Lauha bhasma, Naga bhasma, Vanga hasma, Abhraka bhasma, Sjlajit, Ahiphena kesari</i>	Reduces blood sugar level by improving <i>agnaya rasa srava</i> especially in <i>Ikshumeha</i> where pancreatic impairment is present
<i>Mehantaka rasa</i> Anupana - milk which has been cooled after boiling for 2–3 times	<i>Abhraka bhasma, Lauha bhasma, Naga bhasma, Vanga bhasma</i>	If associated with hepatic impairment along with diabetes
<i>Vridha Danda churna</i>	<i>Shweta Mushali, Shalmali, Guduchi satva, Amalaki, Kapikachchu, Mishri, Gokshura</i>	<i>Vataja meha</i> occurring in old age (mild age related diabetes)
<i>Madhumeha Darpahari</i>	<i>Ahiphena, Shilajit</i>	Especially useful in polyuria and addictive medicine. Hence, if this is to be given for a longer time, should always be prescribed along with <i>Jaatiphaladi vati/ Mahavataraja rasa</i> or <i>Poorna Chandrodaya</i>
<i>Pramehantaka churna</i>	<i>Kokilaksha, Guduchi satva, Jatiphala</i>	Is excellent on kidneys. This powder should be mixed with <i>Pravala pishti</i> and milk and consumed immediately
<i>Madhumeha Dhamana churna</i>	<i>Madhunashini, Karpasa, Jambu, Bilwa and Nimba patra</i>	Acts as synergist with <i>Vasanta Kusumakara Rasa</i>
<i>Sarivadi lauha</i>	<i>Sariva, Rasna, Neelini, Guduchi, Ela, Chitraka moola, Hareetaki, Bilwa etc.</i>	Indicated in <i>prameha pidaka</i>
<i>Shilajit vati</i>	<i>Shilajit, Guggulu, Lauha bhasma, Vanga bhasma, Swarna makshika bhasma</i>	<i>Vataja prameha, Sharkara meha, Ikshu meha, Madhumeha</i>
<i>Chandanasava</i>	<i>Swetha chandana, Musta, Gambhari, Kamala, Lodhra, Mocha rasa etc.</i>	<i>Shukrameha</i>
<i>Sarivasava</i>	<i>Sariva, Musta, Lodhra, 2 types of Chandan, Katuki etc.</i>	Diabetic complications like carbuncles
<i>Devadarvyarishta</i>	<i>Devadaru, Vasa, Manjishta, Daruharidra, Arjuna etc.</i>	<i>Vataja meha, pooya meha</i>
<i>Trivanga bhasma</i>	<i>Naga, Vanga, Yashada</i>	<i>Ikshumeha, Haridrameha, Lalameha</i> . If <i>Madhumeha</i> is associated with <i>Sandhivata</i> . Only <i>Madhumeha – Naga bhasma</i> should be given; with associated joint pain/ gut disturbance - <i>Trivanga bhasma</i> ; associated with complications of carbuncle, <i>Shilajit</i> instead of <i>Naga</i> and <i>Trivanga bhasma</i>
<i>Prameha pidikahara yoga</i>	<i>Corallocarpus epigeous rhizome</i>	Rubbed in water and apply <i>lepa</i> on <i>prameha pidaka</i> or given internally to induce <i>Vamana</i> or <i>Virechana</i>
<i>Pramehahara yoga (1)</i>	<i>Vanga bhasma, Guduchi Satva, Haridra</i> with honey twice a day followed by <i>Guduchi swarasa</i> with honey for 1 month	

Contd...

Table 1: Contd...

Formulations	Key ingredients	Speciality
Pramehahara yoga (2)	<i>Suryaputi Pravala bhasma, Shukti bhasma, Varatika bhasma, Guduchi satva, Gairika</i> along with ghee and honey twice or thrice a day and at night <i>Triphala, Haridra, Mishri</i> along with water or honey for 1–2 months	
Pramehahara yoga (3)	<i>Vanga bhasma, Pravala pishti, Swarna Makshika bhasma, Jaharmohar pishti</i> along with <i>Mishri yukta ksheera/Chywanprash/Musambi</i> juice with <i>Mishri</i> twice a day	
Pramehahara yoga (4)	<i>Triphala, Haridra</i> with honey for 2–4 months every morning	
Pramehahara yoga (5)	<i>Amalaki</i> and <i>Haridra</i> soaked overnight. Morning <i>Guduchi satva</i> with honey followed by soaked water for 21 days	
Pramehahara yoga (6)	<i>Somala, Ahiphena, Hingula (Kaphaja/vataja prameha)</i> for 15 days. Stop for 7 days and then start again	

ABR: Ananda Bhairava Rasa, CVS: Cardiovascular system

indicated in hepatomegaly and splenomegaly. These organs play an important role in Iron metabolism; it is widely used in anemia. Furthermore, it has been indicated in *Pittaja* and *Kaphaja Prameha*. It has *lekhana* and *rakta mamsa poshana* property. The *Rasayana* property of *Lauha bhasma* has shown to act on insulin resistance and beta cell dysfunction by reducing the oxidative stress signaling pathway. The *medohara* property acts on adipose tissue and corrects lipid metabolism. *Triphala* is used in large amount during the preparation of *Lauha bhasma* which aids in reducing blood glucose level. *Triphala* is also proven to decrease the effect of inflammatory cytokine released in diabetics and increase superoxide dismutase, glutathione, and catalase, thereby improving insulin resistance.^[23] There are other hypotheses that Iron and diabetes are interlinked. Decreased iron stores are responsible for increased glycation of hemoglobin A1c (HbA1c). During the process of glycation, the glucose in the red cells reacts with N-terminal valine of both beta chains and forms aldimine linkage. This undergoes rearrangement and forms a more stable ketoamine link. Few studies have demonstrated the effects of Iron therapy on glycated hemoglobin and have found a significant reduction of HbA1c levels in nondiabetic population after iron therapy.^[24-26] In other studies on diabetes associated with Iron deficiency anemia patients, the elevated HbA1c levels significantly decreased after the treatment with iron. This signifies that iron condition must be checked during the interpretation of HbA1c in both diabetic and nondiabetic individuals.^[27]

Pravala panchamruta rasa and kukkutanda twak bhasma

These mainly contain calcium components. There is inadequate evidence in the trials conducted to establish the effect of calcium supplementation (calcium alone or as a component of dairy products) on diabetes parameters.

However, Insulin production is mediated by calcium. Therefore, alterations in the calcium pool can lead to detrimental effect on beta cell secretary function, normal insulin release, especially the response to a glucose load.

Few prospective studies have established that low calcium Intake is inversely proportional to the incidence of Type 2

Diabetes mellitus (DM)^[28-31] or the metabolic syndrome.^[32] A cohort prospective study of approximately 59,000 women aged between 21 and 69 showed a similar inverse association as per the Black Women's Health study.^[33] In another study, supplementation of calcium versus placebo was conducted for 8 weeks. It did not influence fasting glycemia but improved insulin sensitivity as measured by euglycemic hyperinsulinemic clamp. Thus, the results of such studies emphasize the importance of calcium in diabetes.^[34]

Lodhrasava

It has exhibited alpha-amylase inhibition activity. The drugs that inhibit carbohydrate hydrolyzing enzymes have been proven to decrease postprandial blood glucose levels and improve impaired glucose metabolism without aiding insulin secretion in noninsulin-dependent DM patients. Digestion of dietary starch amylase plays a significant role in elevated blood glucose. Hence, the inhibition of the amylase enzyme is an effective means of the management of hyperglycemia.^[6,7]

Jashada bhasma

As per Ayurveda, *Prameha* is caused by *dosha-dushya vaishamyas*. *Yahsada* rectifies this *vaishamyas* and thereby helps to control diabetes. As early as 1930s, zinc was known to be important for the stability of the crystalline structure of insulin.^[35]

Insulin monomers assemble to a dimeric form for storage and secretion as the zinc crystal in the presence of zinc within the beta cell. Dimeric insulin assembles further into a hexamer which is a more stable form of insulin.^[36] Zinc prevents the degradation of insulin hexamers and also improves the binding of insulin to its receptors. It inhibits degradation by liver plasma membranes.^[37] These reported mechanisms might work together to improve insulin action.

Zinc also has beneficial effects on glucose metabolism. It inhibits intestinal glucose absorption.^[38] It inhibits fructose 1,6-biphosphatase and does glycolysis as opposed to gluconeogenesis in the cell. In adipocytes, zinc induces

the translocation of glucose transporters to the plasma membrane, thus increasing glucose uptake and reducing blood glucose levels.^[39,40]

Zinc also protects beta cells from death. This ensures higher plasma insulin levels.^[41] In a study with streptozotocin (STZ) and alloxan-induced diabetic models, it was reported that zinc protected beta cells from oxidative damage and death.^[42] Thus, zinc plays a pleiotropic role in the maintenance of glucose homeostasis.^[21] It is a known fact that zinc deficiency co-exists with diabetes.^[36] They have suboptimal levels of zinc. Patients with diabetes are more likely to have suboptimal zinc status and a negative correlation has been observed between zinc intake and prevalence of diabetes.^[43] Whether zinc deficiency is the cause or effect of hyperglycemia is still debatable. Diabetes itself affects zinc homeostasis in many ways resulting in decrease in total body zinc.^[36] Zinc deficiency is associated with an impairment in glucose tolerance.^[44] Zinc deficiency may also affect the progress of Type 2 diabetes. Reduced zinc may also exacerbate the oxidative stress-mediated complications of diabetes.^[21]

Abhakra bhasma

It is said to possess *Yogavahi guna* and hence this becomes a boon if given along with any Pramehagna drug. Its *Rasayana* property corrects the *Dhatu poshana krama* which is majorly altered in diabetic patients. The author has indicated to give this along with Shilajit and Jambu beej.

Abhakra bhasma contains Si, Mg, Ca, Fe, K, and Al. Magnesium is an essential component in glucose metabolism where it aides the movement of glucose into the cell. It is also responsible for the cellular activities of insulin. Calcium plays an important role in insulin resistance and secretion. A significant association between Iron metabolism and glucose homeostasis being acknowledge nowadays.^[44] An observational study has found a link between serum potassium and diabetes risk.^[45] Thus, altered levels of these essential trace elements are linked to the causation, prevention, and treatment of DM. In an experimental study on STZ-induced rats, abhakra bhasma showed a dose-dependent reduction in blood glucose levels which was comparable to metformin. It was also effective in controlling the altered lipid profile by reducing total cholesterol and triglycerides (TGL) in the animals and reduced the weight of the rats. As per the histopathology report, it improved the number and size of islets of Langerhans in diabetes-induced rats.^[18]

Shilajit

Experimental studies have shown pancreatotropic action which results in increased secretion of insulin in response to hyperglycemia^[46] it also reduced total cholesterol and TGL. In another study, it was seen to prevent maturity-onset diabetes.^[47] The fulvic acid present in shilajit reduces

cytokines and pro-inflammatory markers which are elevated Type 2 DM. Diabetes patients have altered gut microbial composition and fulvic acid influences the gut microbiome also.^[47]

Conclusion

With the alarming rise in the incidence and prevalence of diabetes, the present treatment modality and quality of life of diabetics is unsatisfactory, nevertheless, the mortality rate of diabetes has reduced. This intrigues the application of *Rasoushadhis* which are not only quick in action but also possess *Rasayana* property which is essential for a diabetic patient. RTSVSPS is an umbrella for various *Rasoushadhis* which must be exploited to its best to find a better, satisfactory treatment for DM.

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Conflicts of interest

There are no conflicts of interest.

References

1. Patil S, Sowmya MN, Nanjammanni N. Dietary intervention in Prameha (diabetes mellitus) J Ayurveda Integr Med Sci 2021;6:268-70.
2. Roy CK, Ojha JK, Bajpai HS. A review of the history of Prameha and diabetes mellitus. Anc Sci Life 1993;12:394-8.
3. Rastogi S, Pandey N, Sachdev K. Linking Prameha etiology with diabetes mellitus: Inferences from a matched case-control study. Ayu 2018;39:139-45.
4. Biswajyoti P, Gokarn R. Research works done on Rasasindura (sublimated mercurial preparation) – A critical review. Ayurpharm Int J Ayurveda Allied Sci 2014;3:41-7.
5. Nirmal A, Pandya D, Baghel M. Clinical evaluation of Saptavimshatika Guggulu and Haridra Churna in the management of type-2 diabetes mellitus. J Ayurvedic Herb Med 2017;3:5-10.
6. Tanna I, Chandola HM, Joshi JR. Clinical efficacy of Mehamudgara vati in type 2 diabetes mellitus. Ayu 2011;32:30-9.
7. Mahalakshmi KM. Effect of Pramehamihira Taila in the management of Madhumehaja Paadadaaha W.S.R to diabetic sensory neuropathy. International Journal of Ayurvedic Medicine, 2015;6(4).
8. Kolpakwar S, Gade P, Ashok B Jangid A. Clinical study of Kaminimadvidhunan Ras and Pramehamihir Tail Matra Basti in the management of Madhumehajanya Klaibya W.S.R. To diabetic impotency. Joinsysmed 2016;4:134-7.
9. Rajput D, Patgiri B, Ruknuddin G, Prajapati P. Anti-diabetic formulations of Nāga bhasma (lead calx): A brief review. Anc Sci Life 2014;33:52-9.
10. The Dissertation of Pune University in 1996-97 for the

- P.G.degree M.D. (Chikitsa) & Guide was Prof. Dr. P. H.Kulkarni & Research Center was Tilak Ayurved Mahavidyalaya, Pune (M.S.) India, Comparative study of Tab 'Asanad' of Ayurved Rasashala & Trivanga Bhasma in the Treatment of Madhumeha. Available from: https://pdeayurvedcollege.org/ARDB_FIRST_PHASE_2010-11/./CH%201-com.doc. [Last accessed on 2022 Jul 18].
11. Alok S, Santosh M, Damiki L, Narendra S, Ankit S. Antidiabetic activity of polyherbomineral formulation: Chandrakala rasa. *International Journal of Green Pharmacy*. 2016;10: 33-41.
 12. Tamoli SM, Kohli KR, Kaikini AA, Muke SA, Shaikh AA, Sathaye S. Vasant Kusmakar Ras, an ayurvedic herbo-mineral formulation prevents the development of diabetic retinopathy in rats. *J Ayurveda Integr Med* 2020;11:270-6.
 13. Jawaid T, Nishu K, Kamal M, Alsanad S. Evaluation of antidiabetic activity of polyherbal formulation 'Vasant Kusumakar Ras' on alloxan-induced and dexamethasone-induced diabetic rats. *J Pharm Res Int* 2021;33:13-22.
 14. Sharma A, Tiwari RK, Sharma V, Pandey RK, Shukla SS. Antidiabetic activity of an Ayurvedic formulation Chaturmukha Rasa: A mechanism based study. *J Pharmacopuncture* 2019;22:115-21.
 15. Wanjari MM, Mishra S, Dey YN, Sharma D, Gaidhani SN, Jadhav AD. Antidiabetic activity of Chandraprabha Vati – A classical Ayurvedic formulation. *J Ayurveda Integr Med* 2016;7:144-50.
 16. Butala MA, Kukkupuni SK, Vishnuprasad CN. Ayurvedic anti-diabetic formulation Lodhrasavam inhibits alpha-amylase, alpha-glucosidase and suppresses adipogenic activity *in vitro*. *J Ayurveda Integr Med* 2017;8:145-51.
 17. Islam MT, Bhuiyan MA, Shajjad MM, Sharif M, Sultan M, Rahman A, *et al.* A study of prophylactic effect against diabetes of two Ayurvedic drugs 'Jambadyarista' and 'Bohumutratak Ras' in normal as well as Alloxan-induced diabetic rats. *JPRI* 2014;4:1945-5.
 18. Gopinath H, Shivashankar M. A study on toxicity and anti-hyperglycemic effects of Abhrak Bhasma in rats. *J Ayurveda Integr Med* 2021;12:443-51.
 19. Phanindra B, Mounika Ch, Parthiban P, Kiran GU. Evaluation of antidiabetic and antioxidant properties of Abhraka Bhasma, Nisa Amalaki and Zinc Chelate on streptozotocin induced type II diabetic rats. *Nternational Journal of Pharmacy and Pharmaceutical Analysis* 2018;01(03):21-43.
 20. Umrani RD, Paknikar KM. Jasada Bhasma, a zinc-based Ayurvedic preparation: Contemporary evidence of antidiabetic activity inspires development of a nanomedicine. *Evid Based Complement Alternat Med* 2015;2015:193156.
 21. Dhirajsingh R, *et al.* Experimental study on anti-hyperglycemic effect of Naga Bhasma (incinerated lead) *Joinsysmed* 2015;3:180-3.
 22. Rasheed A, Naik M, Mohammed-Haneefa KP, Arun-Kumar RP, Azeem AK. Formulation, characterization and comparative evaluation of Trivanga Bhasma: A herbo-mineral Indian traditional medicine. *Pak J Pharm Sci* 2014;27:793-800.
 23. Singh TR, Gupta LN, Kumar N, Kumar V. Anti-diabetic activity of Shilajativadi Lauha, an Ayurvedic traditional herbo-mineral formulation. *Int J Health Allied Sci* 2016;5:9-14.
 24. Brooks AP, Metcalfe J, Day JL, Edwards MS. Iron deficiency and glycosylated haemoglobin A. *Lancet* 1980;2(8186):141. doi: 10.1016/s0140-6736(80)90019-7. PMID: 6105305.
 25. Gram-Hansen P, Eriksen J, Mourits-Andersen T, Olesen L. Glycosylated haemoglobin (HbA1c) in iron- and vitamin B12 deficiency. *J Intern Med* 1990;227:133-6.
 26. Coban E, Ozdogan M, Timuragaoglu A. Effect of iron deficiency anemia on the levels of hemoglobin A1c in nondiabetic patients. *Acta Haematol* 2004;112:126-8.
 27. Soliman AT, De Sanctis V, Yassin M, Soliman N. Iron deficiency anemia and glucose metabolism. *Acta Biomed* 2017;88:112-8.
 28. Klec C, Ziomek G, Pichler M, Malli R, Graier WF. Calcium signaling in β -cell physiology and pathology: A revisit. *Int J Mol Sci* 2019;20:6110.
 29. Pittas AG, Dawson-Hughes B, Li T, Van Dam RM, Willett WC, Manson JE, *et al.* Vitamin D and calcium intake in relation to type 2 diabetes in women. *Diabetes Care* 2006;29:650-6.
 30. Colditz GA, Manson JE, Stampfer MJ, Rosner B, Willett WC, Speizer FE. Diet and risk of clinical diabetes in women. *Am J Clin Nutr* 1992;55:1018-23.
 31. Pereira MA, Jacobs DR Jr., Van Horn L, Slattery ML, Kartashov AI, Ludwig DS. Dairy consumption, obesity, and the insulin resistance syndrome in young adults: The CARDIA study. *JAMA* 2002;287:2081-9.
 32. Liu S, Song Y, Ford ES, Manson JE, Buring JE, Ridker PM. Dietary calcium, vitamin D, and the prevalence of metabolic syndrome in middle-aged and older U.S. Women. *Diabetes Care* 2005;28:2926-32.
 33. van Dam RM, Hu FB, Rosenberg L, Krishnan S, Palmer JR. Dietary calcium and magnesium, major food sources, and risk of type 2 diabetes in U.S. Black women. *Diabetes Care* 2006;29:2238-43.
 34. Sánchez M, de la Sierra A, Coca A, Poch E, Giner V, Urbano-Márquez A. Oral calcium supplementation reduces intraplatelet free calcium concentration and insulin resistance in essential hypertensive patients. *Hypertension* 1997;29:531-6.
 35. Taylor CG. Zinc, the pancreas, and diabetes: Insights from rodent studies and future directions. *Biometals* 2005;18:305-12.
 36. Chausmer AB. Zinc, insulin and diabetes. *J Am Coll Nutr* 1998;17:109-15.
 37. Salgueiro MJ, Krebs N, Zubillaga MB, Weill R, Postaire E, Lysionek AE, *et al.* Zinc and diabetes mellitus: Is there a need of zinc supplementation in diabetes mellitus patients? *Biol Trace Elem Res* 2001;81:215-28.
 38. Ueda E, Yoshikawa Y, Sakurai H, Kojima Y, Kajiwara NM. *In vitro* alpha-glucosidase inhibitory effect of Zn (II) complex with 6-methyl-2-picolinylmethylamide. *Chem Pharm Bull (Tokyo)* 2005;53:451-2.
 39. Ezaki O. IIB group metal ions (Zn²⁺, Cd²⁺, Hg²⁺) stimulate glucose transport activity by post-insulin receptor kinase mechanism in rat adipocytes. *J Biol Chem* 1989;264:16118-22.
 40. Tang X, Shay NF. Zinc has an insulin-like effect on glucose transport mediated by phosphoinositol-3-kinase and Akt in 3T3-L1 fibroblasts and adipocytes. *J Nutr* 2001;131:1414-20.
 41. Jansen J, Karges W, Rink L. Zinc and diabetes – Clinical links and molecular mechanisms. *J Nutr Biochem* 2009;20:399-417.
 42. Ho E, Courtemanche C, Ames BN. Zinc deficiency induces oxidative DNA damage and increases p53 expression in human lung fibroblasts. *J Nutr* 2003;133:2543-8.
 43. Ukperero JU, Offiah N, Idris T, Awogoke D. Antioxidant effect of zinc, selenium and their combination on the liver and kidney of alloxan-induced diabetes in rats. *Mediterr J Nutr Metab* 2010;3:25-30.
 44. Dubey P, Thakur V, Chattopadhyay M. Role of minerals and trace elements in diabetes and insulin resistance. *Nutrients* 2020;12:1864.
 45. Chatterjee R, Yeh HC, Edelman D, Brancati F. Potassium

- and risk of type 2 diabetes. Expert Rev Endocrinol Metab 2011;6:665-72.
46. Gupta SS. Effect of Shilajit, *Ficus Bengalensis* & ant. Pituitary extract on glucose tolerance in rats. Indian J Med Res 1966;54:354-66.
47. Winkler J, Ghosh S. Therapeutic potential of fulvic acid in chronic inflammatory diseases and diabetes. J Diabetes Res 2018;2018:5391014:1-7.

सारांश

रसौषधियों पर उपलब्ध ढेरों ग्रंथों में से रस तंत्र सार वा सिद्ध प्रयोग संग्रह (र.टी.स.वि.स.पि.स) प्रामाणिक पुस्तकों में से एक है। प्रमेह को मूत्रगत रोग का एक हिस्सा माना जाता है। यह रोग का निदान और लक्षण डायबिटीज मेलिटस (डी.एम) के समान है, जबकि मधुमेह: (प्रमेह का एक प्रकार) व्युत्पत्ति, निदान, संप्राप्ति का कुछ पहलू डी.एम के साथ अधिक समानताएं साझा करता है। **उद्देश्य:** र.टी.स.वि.स.पि.स के पुस्तक से प्रमेह के लिए संकेतित सभी योगों की गंभीर समीक्षा करना, दवा की कार्रवाई को समझना और नई दवाओं पर ध्यान केंद्रित करके मधुमेह के खिलाफ फायदेमंद होने का उद्देश्य से ये अनुच्छेद लिखा गया है। **डाटा स्रोत:** र.टी.स.वि.स.पि.स के पूर्व मुद्रित संस्करण के दो खंड, इंटरनेट स्रोत, विभिन्न दवा कंपनियों के कैटलॉग की जांच की गई। **समीक्षा विधि:** प्रमेहहर योगों के सभी योगों को हर्बल, हर्बल-खनिज मिश्रित और खनिज आधारित औषधि के रूप में संकलित और वर्गीकृत किया गया था। डी.एम पर संबंधित प्रकाशित कार्यों को विभिन्न पहलुओं पर टिप्पणी लिखा गया। जैसे कि प्रयुक्त सामग्री के प्रकार, शोध कार्य के प्रकार, बाजार में उपलब्ध योग और ज्यादा इस्तेमाल हुआ रस द्रव्य को विश्लेषण किया गया। परिणाम र.टी.स.वि.स.पि.स ग्रंथ में १३०७ सूत्र शामिल हैं जिनमें से १०४ दवाओं को मधुमेह के लिए संकेत दिया गया है। १५ यौगिक दवाओं पर शोध कार्य प्रकाशित हुआ है और केवल ६२% ही बाजार में उपलब्ध हैं। लौह भस्म सबसे व्यापक रूप से इस्तेमाल किया जाने वाला रस द्रव्य है। **निष्कर्ष:** यह लेख विभिन्न योगों पर प्रकाश डालता है और रोग स्थिति के अनुसार दवा का अनुपानों के उचित उपयोग पर प्रकाश डालता है।