praboothaavilamootratha. The alteration of metals ellitus and vice versa can disrupt homeostasis of trace elements badhaavastha of doshyas can originate either first kapha, then progress to topaikta and finally vatika stage or separately in the beginning itself kapha presentation or pitha presentation or vattha presentation. All the three types of morbidity have same swabhava of medodhathu. Frequent and profuse micturition with turbidity (Praboothaavilamootratha) is mentioned as the samanyalakshana (general symptom).
Though Prameha is a tridoshaja Vyadhi according to Brihat-trayee, detailed classification of disease has been given by all of them. The body constitution and symptoms related to Sahaja / krishhapramehi (hereditary Diabetes/Thin Diabetic patients) and Apathyani mittajja/stroola (Stout Diabetic Patients), Pramehi (Occurred due to unwholesome diet and habits) have been described by susruthacharya.7 Acharya Charaka has mentioned, Santaranjanya and Apataranjanya Prameha9 that can be correlated with Avaranajanya and Dhatu-apakarshana janya Prameha respectively. Another classification is based on the color and other characteristics of urine.9

The term Madumeha refers to all types of Prameha in general and also to a particular type of Prameha. All types of Prameha on chronicity becomes Madumeha. It can be affected with boils, acquire the technical term “Madumeha” because of the similarity of the aroma and taste of honey.11 In Madumeha kupita vata extracts madurya and snidhatha from ojas.12 Brings it to rasa rakttha circulating complex, leading to Madura abhishayandhi and kledagunavrdhi. Vitiyact rakttha unable to nourish the utarotharadhathu will cause abhadhata of meda. Vitiyact vata carries ojas and shithiladhathu towards vasti and excreted as Prabuttaavila ojyuktamoora.

In DM, the imbalances of specific metals have a vital role in upsetting normal glucose and insulin metabolism, and the alteration of metals status can also increase oxidative stress that may contribute to the insulin resistance and development of diabetic complications.13 In this paper an attempt is being made to critically analyze the logic behind the selection of two Moharas, Shilajatu and Swarna Makshika in Madumehacikitsa by Susruthacharya, with classical and modern concepts.

MATERIALS AND METHODS
Susruthasamhitha, other Ayurveda classics and internet publications and journals were referred to compile the relevant information.

OBSERVATIONS
In view of its great importance, the treatment of Madumeha deserves separate discussion. Considering the anushangiya and darunathwa of this roga, Acharya Susruta has described Pramehacikitsa in three different chapters, gave separate chapters for Prameha, Prameha pittaka and Madumehacikitsa.

As the bala of a Madumeharogi is concerned, shamana therapies (pacifying therapy) are given more importance than shodana (elimination therapy). Krishhapramehi, who are durbala, should be given brmhanacikitsa (nourishing therapy) and sthoolapramehi, who are strong and have more doshas in the body should be administered shodanacikitsa.13 After shodana, patient should be administered santharanacikitsa, because in Prameha excessive apatharpana may lead to serious medical upadrava. In addition, due to agniupapghata, there will be kleda and medoaddhikya in Prameha. So treatment should be kledamedoprashamana through tejodathu vardhana.14 All the oushadaaarahar administered should be amoottara, balajanana and srothoshadaka. Ultimately treatment should be a compacted form of dhatutharpana.

Susruthacharya has mentioned around five Pramehamaraganas in dravyasangrahaneeya chapter of srothasthana. He has mentioned only 3 rasayana in Madumehacikitsa. They are Shilajatu, Makshika and Tuvaraka. Salasaradiganabhavitha Shilajatu and Makshika are advised in the beginning.

Shilajatu (Asphaltumpunjabianum) is a lac like substance which exudates from rocks. Susruthacharya has mentioned 6 types of Shilajatu. Among them oyoobhota Shilajatu (originated from stone rich in iron) is considered sreshtha. Another classification is gamutra gandhi and karpoora Shilajatu.15 Shilajatu is Tiktahakatuka with kashayaanurasra, ushnaveerya, katupaka, sara, medohara, shoshana and chedana with yogavahi property. It is tridoshahara, predominantly kaphavahataraha. Dosage of Shilajatu is 2 gunja as per bala and kalo.16 In Rasayana prakaranaa of Ashatangahhrdaya, it is advised to give 1 karsha for 1 week, ½ pala for 3 week and 1 pala for 7 weeks.17 The source and origin of drug is still a controversy.

Makshika dhathu is of two types, Swarna Makshika and Rajata Makshika. Among this Swarna Makshika (chalcopyrite) is superior to Rajatha Makshika (iron pyrite), which is a compound of Copper, Iron and Sulphur with the chemical formulae CuS, FeS2/ CuFeS2 while Rajatha Makshika is FeS2 having wide range of therapeutic efficaciy. Swarna Makshika has Madhuratikta rasa, Snidhaguna, sheeta Virya and catu Vipaka. It is agnideepana, swarya, chakshushya, vrsaya, grahi, rakthrasavahara and rakthapaksha with yogavahi property. It is tridoshahara, predominantly kaphapithahara.18 Swarna Makshika can replace the role of loha and swarna. Also it is laghu compared to those drugs. It is frequently used in the form of bhasma with or without other herbomineral drugs.

Dosage of Swarna Makshika bhasma is ½ gunja to 2 gunja as per bala and kalo.21 We should be cautious, while using the market available samples of swarna Makshika, as adulteration of this drug is very common.

Administration of rasayana in Prameha
Bhavana of the drugs should be done in salasaaradigana, for 10, 20 or 30 days. It should be administered in the early morning along with saradaka, after dehasudhi.22 Salasaaradigana is indicated in kushta, meha and panduroga. It is kaphamedo vishoshana.23 After digestion of medicine, he/she is advised to take jangala rasa (Soup of animals residing in dry land) to avoid vatakopa which further leads to shoshana and chedana. A person who take 1 tulam (100 pala) Shilajatu in his life time will acquire good health, varna, bala and will become Madumeha varjitha.24 Shilajatu subjected to bhavana in Pramehakna oushadaniryooha and intake of it will cure sarvameha and all pitaka.25 Ashatangahhrdaya mentioned it as agryaoushada in vastigata roga.26 In Yogaratnakara, Shudha Shilajatu is advised to take with milk and sitha in the early morning for 37 days.

After explaining Shilajatu rasayanavidhidi, Acharya susrutha advised the use of Makshikadhatuprayara in the similar way. It is mentioned to avoid kulaath and kapotha during intake of these 2 rasayana. All pariraviddhidi should be followed, twice that of the oushada sevanakala.26

Finally he explained tuvaraka rasayana. Tuvaraka rasayana, is agrya in Prameha and kushha.27 Moreover Madumeharogi is a durvirecya, 28 it may be the reason for advising particularly this yoga in this context.

DISCUSSION
Shilajatu is Well known for its naimittika rasayana effect, ojovardhaka and Pramehagana property. Swarna Makshika is agrya among all rasayanas which is famous for dehavada and lohavad property.29 Being a rasayana, they act primarily at the level of rasadhut (improves nutritional status), Improves the quality of dhatu production by improving agni and removing srothoradha. Ultimately it may decrease dhatushrithillya and strengthens the ojas.

After critically analysing some formulations, it was observed that 25% of formulations containing Swarna Makshikabhasma are indicated in Prameha. Some Prameha hara drugs like Chandraprabhavatika, Mehanajja rasa, Meghanata rasa, Sarveshwara rasa etc possess both Makshika and Shilajatu. Swarna Makshika is an ingredient of many Prameha hara yogas like...
According to vyadiavastha, we have to do the improperly treated soumyabhava mala and then go for santhrapana treatment. The best way for eliminating this soumyabhavaadhiphika mala is shoshana or rookshana karma. Both these rasayanas are of tridoshashamana, agnideepana, medohara, balya, cakshushya, srothoshodana and vrishya with yogavahi property. Rookshaguna of thiktha rasa helps in eliminating the increased and loosely compacted body elements through it soshana karma and there by removes the mandatha of dhatwagni and by its laghuguna it activates the dhatwagni. As the drugs cause shoshana in the body, usage of mamsa rasa is advised. Above said drugs with different virya and dosha hara property can be wisely selected based on the vyadyavastha of the patient. Kushtha hara property helps to cure the Madumehapitaka. Above all the synergetic action (yogavahithwa) of these drugs, will help to increase the potency of adjuvant many times. These all factors makes it therapeutically superior.

Body consists of more than 70 elements and the deficiency of these essential elements causes various disorders. Diabetes mellitus can disrupt homeostasis of trace elements. On the other hand, disturbance in trace element status in diabetes mellitus may contribute to the insulin resistance and development of diabetic complications. Tight glycemic control is the most effective way of preventing or decreasing these complications. This can be easily achieved with the help of some minerals and vitamins which are also able to exert antioxidant activity, thereby reducing diabetic complications.

Mineral drugs always remain superior to herbal and animal products in Ayurvedic therapeutics. Due to certain better qualities like prompt action, palatability, effectiveness with minimal doses, and long shelf life, mineral preparations are preferred over herbal formulations. Swarna Makshika and Shilajatu are such minerals rich in micronutrients which after proper processing, become highly potent and utilised for diseases like Prameha etc.

Shilajitsu consists of humic substances like DBP, Fulvic acid, Humic acid etc. It is also rich in micronutrients like Fe, Zn, Mn, Mg,V, k, Zn, Ni and many organic matters like benzoic acid, amino acids etc. Shilajatu has been reported to reduce macrophage and lymphocyte activation and migration, as a part of its immunomodulatory activity. Moreover, being an antioxidant it will prevent damage to the pancreatic islet cell induced by the cytotoxic oxygen radicals. Gupta et al suggested that long-term treatment with shilajit increases the number of β-cells of pancreas, i.e. pancreatic trophic action, which may result in better sensitivity of pancreatic β-cells with prompt secretion of a large quantity of insulin in response to hyperglycemia. The hypoglycemic effect of Shilajatu (100 mg/kg) is significantly higher than that of metformin (500 mg/kg).

The main three elements in Swarna Makshika ie Copper, iron and sulphur are essential and play a role in the formation of Haemoglobin. XRD of different samples of Swarna Makshika Bhasma revealed that raw Swarna Makshika contains CuFeS2, which was converted into sulfides of copper and iron and, oxide and sulfate of iron after Shodhana. Major compounds identified in Bhasma of different samples were FeO, Fe2O3, FeS2, FeSO4, and CuS. Trace elements like Mg, K, Si, and Al were also found.

The relationship between type 1 diabetes and type 2 diabetes and metal (Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, and Zn) blood concentration was evaluated in an Italian population. Results indicated that both type 1 and type 2 diabetes are associated with low levels of Cr, Mn, Ni, Pba nd Zn. Cr appears to act by enhancing insulin’s actions, with increases the number of insulin receptors. Mn helps to increase the Mn-SOD activity and normalize insulin synthesis and secretion. Similarly, a supplementation with Zn would be helpful for the glycemic control, insulinomimetic effect and prevention of oxidative damages. Cu supplementation in mice can prevent STZ-induced type 1 diabetes through the suppression of oxidative stress. The non-toxic levels of Ni and Pb found in diabetics can be interpreted in protective effects against the diabetes onset, in particular against diabetes complications and glucose deregulation. In animal models vanadium has been shown to facilitate glucose uptake and metabolism, lipid and amino acid metabolism, improve thyroid function and enhance insulin sensitivity. Age-Related macular degeneration Study–based micronutrients inhibit the development of diabetic retinopathy in rodents by inhibiting oxidative and nitrative stress. The use of minerals like vanadium, chromium, magnesium, zinc, selenium, copper and vitamins or cofactors (tocopherol [vitamin E], ascorbic acid [vitamin C], ubiquinone [ubiquinone, coenzyme Q], nicotinamide, riboflavin, thiotic acid [lipic acid], flavonoids) are advised in diabetes, with a particular focus on the prevention of diabetic complications. Insipde of all the merits excessive accumulation of metals may adversely affects the situation.

CONCLUSION

Susrutaharya has mentioned 2 maharosas, Shilajatu and Makshikadathu in Madhumehacikitsa. As the bala of a Madumeharoghi is concerned, shodana is not an apt choice always, also excessive santhrapana (nourishing) or apatrapana (Non nourishing and one causing depletion of medodhatu respectively) may make the condition worse. These drugs will provide the effect of shodhana (purification), without hampering the bala (strength) of the patient. They are having properties, like Tridoshaharatwa, Medoharotwa, Agnideepana, Srothoshodana, Yogavahiya (augments the action of medicine) etc. which helps to rectify the utharotharahadhu dushti occurring in Madumeha and provides datuprasananna. Moreover the rasayana property of these drugs helps to maintain the roga in its yopaga stage, preventing further complications. In DM, the imbalances of specific metals will upset normal glucose and insulin metabolism, and the alteration of metals status can increase oxidative stress contributing to diabetic complications. These minerals are rich in many micronutrients, which makes it more favourable. The goal for treatment of diabetes is to prevent its acute manifestations and long-term microvascular and macrovascular complications. These rasayanas can produce a better glycemic control along with improvement in the lipid profile. They are potent for the curative and preventive purpose and also provide strong and healthy body and delays ageing. So we may conclude that Shilajatu and Makshikarasyana are one of the best available treatment option in Madumeha, which offer a promising approach in the long-term management of diabetes mellitus, because of its multifaceted action.

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