AN INTEGRATED APPROACH TO CURRENT MANAGEMENT OF DIABETES MELLITUS TYPE II: A CONCEPTUAL STUDY

Agrawal Satish*, Mehra Bhawana, Haldar Pronab, Agrawal DS
Shubhdeep Ayurveda Medical College & Hospital, Khandwa Road, Indore

*Corresponding Author:
Satish Agrawal, Shubhdeep Ayurveda Medical College & Hospital, Khandwa Road, Indore (M.P.) INDIA
E Mail: dragrawalsatish@gmail.com
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ABSTRACT
Diabetes mellitus is one of the burning problem of modern society which has taken the humanity all over the world in its grip. In Indian scenario it is spreading at an exponential speed which has rocked the nation in recent years. Although a lot has been explored and established about the nature and treatment of this metabolic disease but somewhere our whole knowledge still seems incomplete as number of cases are continuously on hike and dose of oral hypo-glycaemic is also increasing with time in plenty of patients inspite of following proper dietary restrictions and daily regimen necessary to keep the disease in control. To supplement the modern knowledge, an Ayurvedic approach has been tried to develop so that combination of modern and ancient wisdom may prove beneficial for sufferers and open new vistas in near future. The drug approach has been devised on the basis of pathological cascade mentioned for Madhumeha in classical texts of Ayurveda. At the end of study, it is highly recommended to add drugs which ignite Medagni, Mansagni and have Kleda (unwanted unassimilated pathological fluid) shoshaka property from Ayurvedic point of view along with oral hypoglycemics.

Keywords: Madhumeha, Kledashoshaka, Diabetes mellitus, Medagni, Mansagni, Ayurveda

INTRODUCTION
India tops the world with largest number of diabetic subjects in order to achieve the bitter title of “Diabetes capital of the world”. The reason being is presence of certain unique clinical and biochemical abnormalities in Indians which include increased Insulin resistance and greater abdominal adiposity despite lower body mass index. It need not to be mentioned that sedentary life style, devoid of physical activity and excess intake of calorie rich food forms the predisposing factors for the diabetes to precipitate in genetically determined individuals. The present review article aims at understanding the pathological components of diabetes mellitus with respect to Madhumeha as mentioned in classical texts of Ayurveda. An effort has been made to prevent and curb the pathogenesis of diabetes taking into account the Ayurvedic principles and also to provide a way to design a treatment plan having desired quality and potential to cure Diabetes in light of modern knowledge. The article also aims at bridging the missing links in our current knowledge about diabetes and enriching the preventive and curative aspects of disease via eternal theory of Ayurveda so as to serve the humanity in a better way.

AIMS AND OBJECTIVES
1. To review the Pathophysiology of Diabetes mellitus and its correlation with Ayurvedic system of medicine.
2. To enrich and compliment modern diabetic therapy with Ayurvedic approach and drugs.

MATERIALS AND METHODS
Review of various classical texts of Ayurveda including CharakaSamhita, SushrutaSamhita, Ashtanga Hridaya and Bhavaparakash Samhita. Review of modern literature including Association of physicians of India (API) text book of medicine, Harrison’s Principles of internal medicine, Harsh Mohan’s text book of Pathology and KD Tripathi’s Essential principles of medical pharmacology. Review of Various journals including Journal of NIMA, AYU and AyurvedaVikas (Dabur India Ltd.) along with various subject related websites on internet.

Conceptual study:
Diabetes is an endocrinal disorder of carbohydrate, fat and protein metabolism characterized by constant hyperglycaemia
with negative nitrogen balance due to absolute or relative deficiency of Insulin with varying degree of Insulin resistance whereas Madhumeha is a type of Vatik Prameha in which a patient passes kashaya, madhur, pandu-varna and ruksha character urine. Cause for type I Diabetes mellitus includes absolute deficiency of Insulin due to destruction of pancreatic β cells whereas cause for type 2 diabetes includes either of the following phenomena:

- Activation of gluco-receptors present in β cells at higher glucose concentration.
- Reduced number of Insulin receptors at peripheral tissues mainly adipose and muscle tissues.
- Excess of hyperglycemic hormones such as glucagon or cortisol in blood.
- Causes for Madhumeha as mentioned in Charak Samhita includes
  - Excessive intake of new grains, heavy, unctuous, sour and salty diet.
  - Excessive sleepiness and sitting habits with no physical and mental work which causes aggravation and increased quantity of Kapha, Pitta, Mansa and Meda leading to obstruction and Vimarga-gamana (diversion) in passage of Vata which ultimately takes Ojas (vital-essence) in urinary bladder.
- Result is excessive urination resembling characters of madhu.
- Similarly BhavaPrakash has pointed out the cause of Madhumeha due to aggravation of Vata, either by emaciation of body tissues or obstruction by Kapha and Pitta. By going through causes mentioned by Charaka, it can be inferred that the vitiated Kapha, Pitta, Mansa and Meda blocks all the micro channels of body leading to diminution of seven Dhatvagnis. This eventually leads to more production of Kitta-Bhaga (waste part) as compared to Sara-Bhaga (nutrient part) by respective Dhatvagnis. Kitta-bhaga remains in the form of Kleda (unwanted unassimilated pathological fluid) by virtue of disease. It eventually covers all the target tissues of Insulin, chiefly muscles and fatty tissue due to its similarity with them and thus hinders the action of Insulin over its target organs. This pathological phenomenon can be viewed as Insulin resistance from modern aspect. Thus Madhumeha which is well described in sutra sthana of Charaka samhita can be correlated with diabetes type II. Also Madhumeha and Diabetes mellitus both have polyuria as one of the significant symptom which further strengthens above correlation. Acharyas have also used the term “Ojomeha” as a synonym for Madhumeha. The reason can be understood in following manner. As the sara-bhaga (nutrient part) that is supposed to be assimilated on the other hand get converted into Kleda. This Kleda ultimately is passed out of body via urine through “Vimargagaman of Vata”. Had this Kleda been properly assimilated and utilized, it could have worked as nutrient for body tissues. Hence the synonym “Ojomeha” matches very well against Madhumeha which shows the farsightedness and keen observation of Acharyas.
- Similarly the aggravation of Vata due to emaciation of body tissue can be linked to type 1 diabetes as Kshaya literally means atrophy and it is well known that type 1 diabetes occurs due to significant destruction (Kshaya) of pancreatic β cells.

**Rational drug approach: a hypothesis:**

The drug individually or collectively should possess following properties:

1. Kleda-shoshaka
2. Mutra-sangr ahaniya
3. Mansa and Medadhatu-karshak
4. Stimulate sapta-dhatvagni
5. Health restorative
6. Pacify Kaphaand Pitta

Kleda-shoshaka, Mansa and Meda-karshaka property of drug can be viewed to act by reducing Insulin resistance either by reducing hepatic gluco-neogenesis or enhancing the action of Insulin in target tissues. Their action can be correlated with Biguainides and Thiazolidinediones group of oral hypoglycaemic agents as their primary mode of action is to reduce Insulin resistance.

Stimulation of sapta-dhatvagni can be viewed to act by stimulating Insulin secretion.

The reason being that proper functioning of all the Dhatvagnis is required for optimum production of sara-bhaga necessary for maintaining the normal health of body. Similarly normal secretion of Insulin is necessary for proper utilization of glucose and storage of fatty acids and amino acids in form of adipose tissue and proteins. In absence of proper functioning of Dhatvagni or Insulin, it will lead to more production of metabolic wastes and thus catabolism will be on upper hand. Hence, the action of Dhatvagnis can be correlated with that of Insulin. From modern point of view the stimulation of Dhatvagnis can be correlated to action of Sulfonylureas and Meglitinide group of oral hypoglycaemic agents as their primary mode of action is to facilitate increase in Insulin level.

Balya property helps to check patient bala and pacify Vata along with emaciation. Their action can be correlated to intake of various micronutrients including selenium and chromium given to patients for health restorative purpose.

By virtue of Mutrasangr ahaniya property drug reduces excretion of Oja via urine. It is to be noted that in Rajyakshma Rogadhipak, Chakradatta has given prime emphasis on protection of Purisha and Shukra because the life of patient is dependent on strength imparted by them only as all Dhatus have reached to depletion. On similar grounds, excess loss of urine should be taken care of. Sushruta has also recommended intake of Tikta and Kashaya rasa prominent foodstuffs which also have property to reduce total quantity of urine.
• Kapha-Pitta pacifying property further checks vitiation of Vata due to obstruction.

• Looking at the causes of Madhumeha as mentioned in Ayurveda, diabetic patient with normal blood pressure should also be advised for salt restriction other than restriction for sweets as salt has property to aggravate Kapha, Pitta and Kleda which forms the major pathological components for development of Diabetes as per Ayurveda.

• Based on the above rational drug approach following drug/group of drugs should be incorporated in the current management of Diabetes Mellitus:-

  • Shilajatu (Asphaltumpunjabinum) - By virtue of its Tikta, Katu and Kashaya Rasa with Ushna Virya and shoshana property it acts as kledashoshak, meda-mansakarshak, mutrasan grahahaniya, along with Kapha-Pitta Shamaka¹⁴ Rasayana property seems to add Saptadhatvahni Vardhaka property that is accountable for its Bālyā action. Animal study showed that Shilajatu, in 100mg/kg dose produced hypoglycaemic effect in alloxan induced diabetic rats¹⁵. Gupta et al suggested that long-term treatment with shilajatu impart pancreatotrophic action i.e. increases the number of β-cells of pancreas that may result in better sensitivity of pancreatic β-cells with prompt secretion of a large quantity of Insulin in response to hyperglycemia¹⁶. Naga bhasma–Naga bhasma has significant anti-diabetic potential¹⁷ and can be viewed as rejuvenating tonic diabetic weakness and diabetic coma as well.¹⁸ It shows Rasayana effect chiefly by enhancement of immunity i.e. Oja. By virtue of its Kaphashamaka, Mansa – meda-Karshka and lekhana property it can be used a novel anti-diabetic drug¹⁹.

  • Vijayasara (Pterospermum marsupiumWilld.)- Water extract of Vijayasar (Pterocarpus marsupium) of Asanisigana described by Vagbhata also exhibit protective and restorative effect of β-cells²⁰. The regeneration of β-cells, normal function was evidenced by blood sugar values in animals. Jahromi et al identified some more flavonoids from Vijayasaras liquoritigenin and pterosupine, and reported hypo-lipidemic properties of these phytochemicals in experimental animal²¹. This validates the Medohara and anti-diabetic property of Vijayasara²².

  • Haridra(Curcuma longa Linn)-Curcumin, active component of turmeric (Curcuma longa Linn) exhibits cholesterol lowering action and phospholipids that were elevated under diabetic condition in streptozotocin induced diabetic rats²³. It also showed significant countering of renal as well as liver cholesterol²⁴ that can be corroborated with the Ayurvedic concept of Meda-Mansa karshaka and Kleda-shoshaka property of this herb²⁴.

  • Jambu(Syzgium cumini Skeels)-By virtue of being kashayarasa”it exhibits sthambhaka karma that is accountable for its mutrasagrahniya action²⁶. Aqueous extract of Syzygium cumini resulted in significant increase in level of superoxide dismutase, catalase, glutathione peroxidise and glutathione - S-transferase resulting in reduced free radical formation in diabetic rats along with significant reduction in blood glucose level²⁷. It proves the antioxidant property resulting in decreased production of toxic secretion that may helps to check the catabolic process going in diabetic patient.

• Swarna makshika- By virtue of being Tridoshshamaka and Rasayan property Swarna makshika is indicated for treatment of Madhumeha.

Table 1: List of few other Anti diabetic drugs with their probable mode of action

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Drugs</th>
<th>Probable mode of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Puga</td>
<td>By virtue of Kashaya rasa it can be viewed to act as mutrasangrghaniya and Kledashoshaka.</td>
</tr>
<tr>
<td>2.</td>
<td>Khadir</td>
<td>By virtue of Kashaya rasa it can be viewed to act as mutrasangrghaniya and Kledashoshaka.</td>
</tr>
<tr>
<td>3.</td>
<td>Amalaki</td>
<td>By virtue of Ruksha, Kashaya it is Kledshoshaka. Its Rasayana property is also accountable for its role in diabetes mellitus II.</td>
</tr>
<tr>
<td>4.</td>
<td>Bhumyamalaki</td>
<td>By virtue of Kashaya and Tikta rasa it act as Kledashoshaka,</td>
</tr>
<tr>
<td>5.</td>
<td>Guduchi</td>
<td>By virtue of Kashaya and Tiktarasa it is Kledashoshaka, Its Rasayana property makes it a good drug for Diabetes Mellitus II.</td>
</tr>
<tr>
<td>6.</td>
<td>Atasi</td>
<td>Its Tikta Rasa and Kaphavatas hsmaka property may be responsible for its pramehaginha action.</td>
</tr>
<tr>
<td>7.</td>
<td>Kashumbha</td>
<td>By virtue of its Rukshagauna it is Kledashoshaka.</td>
</tr>
<tr>
<td>8.</td>
<td>Daruharidra</td>
<td>By virtue of Tikta and rukshagauna it is Kaphamedanashaka and Kledashoshaka. Its Rasayana property shows its role in Diabetes mellitus II.</td>
</tr>
</tbody>
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RESULTS AND DISCUSSION

It is need of hour to work out a comprehensive approach for number of diseases. Diabetes mellitus is one such disease where a lot still needs to be done for complete cure. In a search to meet the above aim, a sincere effort has been done in present review article to devise an integrated approach for better control and cure of above disease. After a thorough review of both the literatures, it can be said that modern science though effective in its approach to stimulate Insulin secretion and control Insulin resistance finds it hard to control the pathology in number of cases which is evident from continuous rising toll of diabetic patients. Measures to reduce Kleda, Kindling of Sapta- Dhatwagni, institution of Mutra-sangrahaniya and Kapha-Pitta reducing drugs and foods which forms the cornerstone of treatment for Madhumeha in Ayurveda could further enhance the effectiveness of modern drug therapy. Restriction of salt and sour intake should also be emphasized as they play a prime role in initiation of drug therapy. Restriction of salt and sour intake should also be emphasized as they play a prime role in initiation of diabetes mellitus. Hence their treatment principles can also be combined for better care and control of disease. It is highly recommended to add few of the drugs according to their necessity as highlighted in above table.

CONCLUSION

At the end of study one can very well establish patho-physiological analogy between Madhumeha and Diabetes mellitus. Hence their treatment principles can also be combined for better care and control of disease. It is highly recommended to add few of the drugs according to their necessity as highlighted in above table.

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