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Research Article

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

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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"[1]. The reason being is presence of certain unique clinical and biochemical abnormalities in Indians which include increased Insulin resistance[2] and greater abdominal adiposity despite lower body mass index[3]. 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[4].

Cause for type I Diabetes mellitus includes absolute deficiency of Insulin due to destruction of pancreatic β cells[5] whereas cause for type 2 diabetes includes either of the following phenomena[6].

- 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*[7] 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*[8].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 s*utra sthana of Charaka samhit*a can be correlated with diabetes type II. Also *Madhumeha* and Diabetes mellitus both have polyuria[9,10] as one of the significant symptom which further strengthens above correlation.*Acharyas* have also used the term "*Ojomeha*"[11] as a synonym for *Madhmeha*.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 I diabetes as *Kshaya* literally means atrophy and it is well known that type I 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-sangrahaniya*
3. *Mansa and Medadhatu-karshak*
4. Stimulate *sapta-dhatvagni*
5. Health restorative
6. Pacify *Kapha*and *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 Biguanides 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 *Mutrasangrahaniya* property drug reduces excretion of Oja via urine. It is to be noted that in *Rajyakshma Rogadhikar, 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[12]. 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[13].

- *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 grahaniya*, along with *Kapha-Pitta Shamaka*[14].*Rasayana* property seems to add *Saptadhatvahni Vardhaka* property that is accountable for its *Balya* action. Animal study showed that *Shilajatu*, in 100mg/kg dose produced hypoglycaemic effect in alloxan induced diabetic rats[15]. Gupta et al suggested that long-term treatment with *shilajatu* impart pancreatotrophicaction 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 hyperglycemia[16].
- ***Naga bhasma***–*Naga bhasma* has significant anti-diabetic potential[17] 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 – medoKarshka and lekhana* property it can be used a novel anti-diabetic drug[19].
- ***Vijayasara (Pterospermum marsupiumWilld.)***- Water extract of *Vijayasar* (*Pterocarpus marsupium*) of *Asanasigana* described by *Vagbhata* also exhibit protective and restorative effect of β- cells[20].The regeneration of β- cells, normal function was evidenced by blood sugar values in animals. Jahromi et al identified some more flavonoides from *Vijayasara*as liquiritigenin and pterosupine, and reported hypo-lipidemic properties of these phytochemicals in experimental animal[21]. This validates the *Medohara* and anti-diabetic property of *Vijayasara*[22].
- ***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 rats[23]. It also showed significant countering of renal as well as liver cholesterol[24] that can be corroborated with the *Ayurvedic* concept of *Meda-Mansa karshaka and Kleda-shoshaka* property of this herb[24].
- ***Jambu(Syzygium cumini Skeels*)**-By virtue of being *kashayarasa*[25]it exhibits *sthambhaka* karma that is accountable for its *mutrasagrahniya* action[26]. 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 level[27]. 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

Sl. No	Drugs	Probable mode of action
1.	*Puga* (*Areca catechu Linn.*)[28]	By virtue of *Kashaya rasa* it can be viewed to act as *mutrasangrahaniya* and *Kledashoshaka*.
2.	*Khadir* (*Acacia catechu Willd*)[28]	By virtue of *Kashaya rasa* it can be viewed to act as *mutrasangrahaniya* and *Kledashoshaka*.
3.	*Amalaki* (*Emblica officinalis Gaertn.*)[29,30]	By virtue of *Ruksha, Kashaya* it is *Kledshoshaka.* Its *Rasayan*a property is also accountable for its role in diabetes mellitus II.
4.	*Bhumyamalaki* (*Phyllanthusniruri Linn.*)[31]	By virtue of *Kashaya* and *Tikta rasa* it act as *Kledashoshaka*,
5.	*Guduchi* (*Tinospora cordifolia Willd.)*[31]	By virtue of *Kashaya* and *Tikta*rasa it is *Kledashoshaka*, Its *Rasayan*a property makes it a good drug for Diabetes Mellitus II.
6.	*Atasi* (*Limumusitaissimum Linn.*)[32]	Its *Tikta Rasa* and *Kaphavatas hsmaka* property may be responsible for its *pramehaghna* action.
7.	*Kushumbha* (*Carthamustinctorius Linn.)*[32]	By virtue of its *Rukshaguna* it is *Kledashoshaka*.
8.	*Daruharidra* (*Berberis aristata DC*)[33,34]	By virtue of *Tikta* and *rukshaguna* it is *Kapha-medanashaka* and *Kledashoshaka*. Its *Rasayana* property shows its role in Diabetes mellitus II.

RESULTS AND DISCUSSION

It is need of hour to work out a compressive 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 *Madhumeha*.

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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