



Review Article

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PREDIABETES: AYURVEDIC REVIEW

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ABSTRACT

Prediabetes means a 'pre diagnosis of diabetes'. In real sense this is an intermediate state of hyperglycemia that gives you a chance to wake up and combat the dreadful menace untowardly knocking the door of your life. Modern sedentary life style may be one of the basic reasons of this pathological entity. Diabetes is one of the current burning health issues taking almost whole world in its grip. So, understanding its pace with which it is growing all over the world WHO also have declared its moto for this year as 'Stop Diabetes' mission. Near about 471 million peoples across the globe are suffering from this 'Prediabetes' and unfortunately, India stands at second position in the world. Prediabetes is an intermediate state of hyperglycemia where the glycemic level is above normal but below the Diabetic glycemic threshold level. Thus, Prediabetes is a state of high risk for developing Diabetes with 5 to 10% cases converting to Diabetes per annum. The appropriate changes in the life style can definitely reduce the severity of the risk factors and help to overcome the debacle. Along with this pharmacotherapy can also be a good tool to tackle the menace. Thus, the present review article aims at understanding Diabetes at its initial level termed as, 'Prediabetes' but with Ayurvedic sense & fundamentals with an intention to search out different treatment schedules or remedies for prediabetes in order to stop its consequential conversion to Diabetes.

Keywords: Prediabetes, glycemic, pharmacotherapy

INTRODUCTION

Ayurveda has the foremost objective of maintaining the health of a healthy person followed by its second objective of curing the diseased one. As prediabetes is also an intermediate state of hyperglycemia and not an irreversible pathological entity, therefore Ayurveda has a little bit advantage with its first objective of maintaining the glucose level in the normal limits. Diabetes poses a major health problem globally and is one of the five leading causes of death in most of the developing countries. Unfortunately, India will soon reach the pinnacle of it.¹

Therefore, understanding the seriousness of the problem & to stop its growth in India, our Govt. has already 'Stop Diabetes Movement' at its level. So, to join this mission of Govt. of India hand-in-hand & being an Ayurvedic Scholar, it is our first duty to help the society to get rid of the growing health problem of Diabetes. Therefore, the crux of the matter is early or pre diagnosis of Diabetes i.e. Prediabetes.²

Hence the present article focuses the attention towards understanding all the pathological components of Diabetes (*Prameha*) according to Ayurvedic Classical texts like Charaka Samhita, Sushruta Samhita, Ashtanga Hridayam, etc. Therefore in order to understand the gradual development of the diabetes its keen observation on ayurvedic fundamentals of etiopathogenesis (*Dosha-Dushya Sammurchhana*) of a disease, appearance of its primary signs & symptoms (*Poorvarupa*), along with the types of Prameha should be detailed out.

Among all Ayurvedic classical texts Charaka Samhita is the oldest & first to explore various facets of Diabetes coating it under *Ashtau Mahaagada* i.e. eight dreadful diseases and explaining its etiology & treatment in a separate chapter of His *Nidana sthana* & *Chikitsa sthana* respectively. Apart from this

his contribution in reference of understanding Diabetes & Obesity in his 17th and 21st chapter of Sutrasthana is unparalleled. The 21st chapter of Sutrasthana is '*Ashtau Ninditeeya Adhyaya*' which mainly deals with all the endocrinal metabolic disorders, one of them is *Atisthaulya* i.e. obesity which may further lead to Type II Diabetes.³

Therefore, it is customary to understand 'Atisthaulya' (Obesity) & Prediabetes with an intention to stop their conversion to Diabetes. An effort in the form of this article is being presented to prevent the pathogenesis of Diabetes taking into account the Ayurvedic principles of management and to provide a well-designed treatment plan having desired quality & potential.

Literature Review

1. Ayurvedic literary review from various ayurvedic classical texts such as – Charak Samhita, Sushruta Samhita, Ashtang Hridayam, Ashtang Sangraha, Bhavaprakash, etc.
2. Modern medicine literary review from – Kumar & Clarke's Clinical Medicine, API Textbook of Medicine, Harper's Medical Biochemistry, etc.
3. Review of various journals like – Asian Journal of Ayurvedic & Modern Medical Science, Unique Journal of Ayurvedic & Herbal Medicine, World Journal of Diabetes, etc.

DISCUSSION

Conceptual study (Modern & Ayurvedic Review)

Diabetes is an endocrinal disorder of carbohydrate, fat & protein metabolism characterized by constant hyperglycemia due to relative insulin deficiency or resistance or both, whereas '*Madhumeha*' is a '*vatika Prameha*' in which a patient passes *kashaya, madhura, pandu varna, & ruksha* character of urine.

Cause for Type I Diabetes Mellitus includes absolute deficiency of insulin due to destruction of pancreatic *Beta cells* whereas cause for Type II DM includes either of the following phenomena –⁴

1. Reduced number of insulin receptors at peripheral tissues, mainly adipose & muscle tissues.
2. Excess of hyperglycemic hormones such as glucagon or cortisol in blood.⁵

Equally it is important to go through the causes of Madhumeha as explained in ayurvedic classical texts

- 1.Excess intake of new grains heavy, unctuous, salty & sour diet.
- 2.Excessive sleepiness & sitting habits with no physical & mental work which aggravation & increased quantity of kapha, pitta, mamsa & meda leading to obstruction & vimarga-gaman (diversion) in passage of vata which ultimately takes ojas in the urinary bladder.⁶

Diagnosis of Prediabetes

WHO has defined prediabetes as a state of intermediate hyperglycemia using two specific parameters i.e., Impaired Fasting Glucose (IFG) defined as Fasting Plasma Glucose (FPG) of 6.1 – 6.9 mmol/L (110-125 mg/dL) and Impaired Glucose Tolerance (IGT) defined as 2 hour plasma glucose of 7.8 – 11.0 mmol/L (140-200 mg/dL) after ingestion of 75 g of oral glucose load or a combination of the two based on a 2 h Oral Glucose Tolerance Test (OGTT).

The American Diabetes Association (ADA), on the other hand, has the same cut of value for IGT (140-200 mg/dL) but has a lower cut of value for IFG (100-125 mg/dL) and has additional Haemoglobin A1c (HbA1c) based criteria of a level of 5.7 – 6.4% for the definition of prediabetes.

The disease process and the signs & symptoms can be shown schematically as given below

Table 1: Gradual development of obesity into Prediabetes & Diabetes

S.No.	Obesity (Atisthaulya)	Prediabetes	Diabetes
1	Decrease in Life span	Yes	Yes
2	Atherosclerosis	Yes	Yes
3	Loss of libido	Yes	Yes
4	Weakness	Yes	Yes
5	Foul smell of body	Yes	Yes
6	Sweating	Yes	Yes
7	Polyphagia (Over eating)	Yes	Yes
8	Polydipsia	Yes	Yes
9	--	Polyuria	Yes
10	--	Ants get collected at the site of urine	Yes
11	--	--	FBS, PPBS raised
12	--	--	May lead to Nephropathy
13	--	--	Retinopathy
14	--	--	neuropathy

The above table indicates that the obesity, if untreated, may lead to prediabetes and later it may be converted into Diabetes. Therefore to stop diabetes it is necessary to control it at its primary level i.e. obesity and give up the causative or

aggravating factors responsible for conversion of prediabetes to diabetes.⁶

This article is also intended to stop the growth of diabetes by ruling out it at its basic level of obesity & prediabetes and not to treat the known cases of Diabetes Mellitus. Thus a well designed treatment plan including the ways to stop the conversion of prediabetes to diabetes and to control & keep the glucose level within normal limits of the diabetic patients to avoid further complications is the need of the hour.

A treatment plan – a rationale drug approach

Here it is not needed to mention that the sedentary life style, devoid of the physical exercise and excess intake of calorie rich food forms the predisposing factors for the diabetes. Therefore, it is important to set the daily required physical exercise & work out it, make appropriate changes in the diet and take the selective drugs advocated for obesity & Prameha. Hence it won't be an exaggeration to follow the line of treatment explained for Atisthaulya in the 21st chapter of Charaka Sutrasthana.

By & large the drug individually or collectively should possess following properties

- 1.Kledashoshak & rukshan type of treatment & drugs
- 2.Dhatvagni vardhaka
- 3.Mamsa & Medo dhatu karshaka
- 4.Kapha & Vata shaamaka
- 5.Health restorative

Each of the above property of a drug certainly helps to restore the balance of vitiated Vata & Kapha doshas and also reduces the abnormal growth of Mamsa & Medo dhatu.

Dhatvagnis, in some way, can be co-related with various hormones & enzymes seen throughout different chemical processes & pathways during metabolism and liver in this reference is the important prime location of these metabolic processes hence deserves to be termed as the '*microbiological lab of the human body*'. The proper functioning of Dhatvagnis is needed for optimum production of '*saarabhaga*' (essential nutrient part obtained through metabolic processes) necessary for maintaining normal health. In the same way normal secretion of Insulin is also necessary for proper utilization of glucose & storage of fatty acids & amino acids in the form of adipose tissue & proteins.

In the absence of proper functioning of Dhatvagni or Insulin, it will lead to more production of metabolic wastes (*Kitta bhaaga*).

Hence it would be a wise & foresighted step to follow the treatment advocated for Atisthaulya in Charak Sutrasthana & Prameha in Charak Chikitsa sthana. Therefore, in order to enhance the life span & efficacy of these drugs instead of preparing decoctions (Kwatha), it would be a timely decision to prepare concentrated tablets (Ghana vati) of these formulations.

Lets have a look on some of the important drug substances

1) Shilajatu (*Black Bitumen / Mineral pitch*) –

It is Tikta, Katu & Kashaya by rasa with Ushna veerya proving its anti-diabetic activity by working as kleda shoshaka, medo – mamsa karshaka. It is one of the best Rasayana drugs acting at Dhatvagni level. Gupta et al suggested that long term use of shilajatu shows *pancreato tropic action* increasing the number of *beta cells* which helps insulin secretion in large amount.⁶

2) Naga bhasma (Lead Pb) –

It helps to reduce blood glucose levels and also prohibits degeneration of testes. It shows Rasayana effect (Rejuvenation) chiefly by enhancing the immunity i.e. Oja.

3) Vanga bhasma (Tin Sn)

Two way ANOVA test showed that Vanga bhasma has significant influence ($p < 0.0001$) on blood glucose levels in alloxan induced hyperglycemia rats. Post hoc test indicated that long term administration of Vanga bhasma (25 – 50 mg/kg) significantly reduced the ($p < 0.05 - 0.001$) blood glucose levels in alloxan induced hyperglycemic animals only after 24 h & on 3rd & 7th day. In alloxan hyperglycemic rats, Vanga bhasma at a dose of 25 & 50 mg/kg showed a dose dependent decrease in glucose levels and brought to near normal on 7th day of treatment.

4) Bijaka / Vijayasara (*Pterocarpus marsupium*)

Vijayasara is a huge tree whose bark is used in various forms for treating diabetes. It is a very rich source of pterospin, marsupin, epicatechin which are found to be very effective blood glucose lowering components. It also modulates tissue glucose utilization in insulin dependent tissues, regenerates beta cells of pancreas to produce insulin.⁷

5) Jambu (*Syzygium cumini*)

Due to Kashaya rasa it is stambhaka (astringent) showing mutra-sangrahaneeeya action. Aqueous extracts of *Syzygium cumini* resulted in significant increase in level of superoxide dismutase (SOD), glutathione peroxidase & glutathione-s-transferase resulting in reduced free radical formation in diabetic rats along with significant reduction in blood glucose level.⁸

These are the examples of some of the routinely used anti-diabetic drugs with their recent studies. The combinations of different drugs advocated for obesity by Acharya Charaka in his 21st chapter of Sutrasthana are to be given with these ten drug formulations prescribed for ten Kaphaja prameha processed in Ghana vati (Concentrated tablets) type of formulation with a suitable vehicle like luke warm water or Madhoodaka (Honey + water).

CONCLUSION

As part of the continuous process to find out the best remedy for dreadful diseases like Diabetes occupying the whole world, it is customary to think about the pre-diagnosis of the diabetes i.e. Prediabetes.

Thus, the rationale behind treatment of prediabetes includes, prevention of development of diabetes & its complications. The main stay in controlling the conversion of Prediabetes to Diabetes is understanding the pathogenesis of Obesity with Ayurvedic perspective in order to break the pathophysiology

(Samprapti) of the disease. Thus, to check & get rid of the forthcoming dreadful pathology of diabetes it is necessary to change the life style along with the support of proper diet & effective medication. Therefore, most of the published literature also suggests the targeted physical exercise, Yoga, Diet & proper medicines to stop the conversion of prediabetes to diabetes.

At present there is no concrete evidence to formulate clinical guidelines for treatment of prediabetes. Life style interventions remain an essential part of the management of prediabetes. The use of pharmacotherapy should be on an individual case based approach.

Therefore as a part of application of pharmacotherapy, Ayurvedic principles for the treatment of 'Atisthaulya' & Kaphaja prameha should be judiciously applied to treat prediabetes to stop its conversion to diabetes.

Further clinical studies & statistical data analysis may explore the concept.

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