



A CONCEPTUAL REVIEW OF MADHUMEHA ACCORDING TO AYURVED AND CONTEMPORARY SCIENCE

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ABSTRACT:

Diabetes Mellitus (*Madhumeha*) is a group of metabolic diseases associated with hyperglycemia which is due to absolute deficiency of insulin or diminished biological effectiveness of it characterized by polyuria, polyphagia and polydipsia. It is a single most important metabolic disorder that affects almost every organ/system in the body.

In Ayurveda, acharyas have mentioned disease according to the strotasas involved and these diseases are classified according to the Dosha predominance. Out of the four types of *Vataj prameha*, *Madhumeha* is one of the type. It is a common chronic metabolic disease which is correlated with Diabetes Mellitus. Diabetes Mellitus is prevalent all over the world with an alarming rise in its prevalence day by day. As per Indian Council of Medical Research – India Diabetes (ICMR INDIAB) study published in 2023, the prevalence of diabetes is 10.1 crore. By 2030, 643 million people will have diabetes globally, increasing to 783 million by 2045. The management of *Madhumeha* is considered as a global problem. Thus the study has been done to get through the depths of all the insights about the pathogenesis of disease according to both modern as well as ayurved literature which would later prove helpful to precisely establish the curability of disease and to acknowledge the limitations of treatment.

Keywords: IDDM, NIDDM, *Prameha*, *Madhumeha*, *Sahaj*, *Appathyanimitaj*

INTRODUCTION

Diabetes Mellitus (*Madhumeha*)^[1] is defined as a metabolic disorder of multiple etiology, characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both^[2]. It is a single most important metabolic disorder that affects almost every organ / system in the body.

Diabetes is divided into two types – Type 1 Diabetes and Type 2 Diabetes. Type 1 Diabetes results from failure of pancreas to produce enough insulin due to loss of beta cells which is also referred as 'Insulin Dependent Diabetes Mellitus (IDDM)' or juvenile-onset diabetes, usually arises in childhood.

Type 2 Diabetes begins with insulin resistance, a condition in which cells fail to respond to insulin properly which is also referred as 'Non-Insulin Dependent Diabetes Mellitus (NIDDM)' or adult-onset diabetes, usually occurs after age 40 and becomes more common with increasing age.^[3]

Prameha is one of the "Ashtho mahagadas" [eight major disorders]^[4]. Inclusion of *Prameha* among the eight major disorders in *Charak Nidanasthan*, shows the importance of disease that was given by our *Acharyas*.

Madhumeha is a sub type of *Vataj Prameha* or the terminal stage of *Prameha* and *Aacharya Sushrut* described *Madhumeha* in two types^[5]

1. *Sahaja*

2. *Apathyanimittaj*

Sahaja refers to natural which are originated due to precipitating factors from the inherited or congenital factors. In all 20 types of *Doshaj prameha* have been described based on the predominance of *vata*, *pitta* and *kapha*^[6]. *Madhumeha* is a subtype of *Vata Doshaj prameha*^[7]. It has been dealt in *nidana* and *chikitsasthana* of the *Brihatrayees*, *Laghutrayees* and in many other classics along with *prameha*. The descriptions explained in these texts for *prameha* in regards of *Nidana* (etiological factors), *Purvaroop*a (primordial symptoms), *Roopa* (signs and symptoms), *Upashaya* (alleviating factor) and *Samprapti* (etiopathogenesis) applies well to *Madhumeha* too. And more over it has been clearly stated that other *pramehas* if neglected or left untreated terminates into *Madhumeha*^[8].

मधुमेहशब्दः सामान्येन प्रमेहवचनः।^[9]

Looking into all these points the description of *Prameha* has been done along with *Madhumeha*.

Rationale:

For the last several decades a large number of oral hypoglycemic drugs have been discovered besides the discovery of insulin, which could

be administered directly to control the blood sugar level. As a matter of fact, today control of blood sugar level in a diabetic is no more a problem. But in spite of all these developments, *Madhumeha* continues to be a major incurable disease, millions of people dying every year due to diabetic episodes or its complications. The incidence of the disease is rising alarmingly all over the world including developing countries like India.

Today, the main issue in the management of *Madhumeha* swings in between the problem of prevention and management of the complications of *Madhumeha* rather than the treatment of *Madhumeha* itself.

Thus the study has been done to get through the depths of all the insights about the pathogenesis of disease according to both modern as well as *ayurvedic* literature which would later prove helpful to precisely establish the curability of disease and to acknowledge the limitations of treatment.

Prevalence:

India is deemed as world's capital of Diabetes. Diabetes Mellitus is prevalent all over the world with an alarming rise in its prevalence day by day. As per Indian Council of Medical Research – India Diabetes (ICMR INDIAB) study published in 2023, the prevalence of diabetes is 10.1 crore. By 2030, 643 million people will have diabetes globally, increasing to 783

million by 2045. Diabetes is the 7th leading cause of death and is on the rise in developed as well as developing countries^[10].

Aims:

To study the depths of all the insights about the pathogenesis of IDDM (Insulin Dependent Diabetes Mellitus) & NIDDM (Non- Insulin Dependent Diabetes Mellitus) according to both modern as well as *ayurvedic* literature.

OBJECTIVES:

1. To highlight the ancient Indian knowledge according to *Bruhatrayee* of the disease *Madhumeha*.
2. To critically analyse the knowledge of *Madhumeha* according to Ayurveda and modern science.

MATERIAL AND METHODS:

The basic and conceptual materials were collected from the *Ayurveda* classics from *Bruhatrayee* with their available commentaries, modern medical literature of Medicine and concerned research papers and journals.

Nirukti and Paribhasha [Etymology]:

Prameha and Diabetes:

- ETYMOLOGY OF PRAMEHA: According to Sanskrit literature,
Prameha = Pra + Mih
Wherein 'Pra' = excessive frequency and
'Mih' = watering, wetting etc.

Prameha = Disease in which there is excessive micturition.

- ETYMOLOGY OF DIABETES: The term Diabetes has been derived from Greek term Diabainein which means to cross through a siphon, applied to mean elimination of large quantity of urine [11].

Thus we can come to a conclusion that *Prameha* and diabetes both the terms have same meaning.

Madhumeha and Diabetes Mellitus:

Moreover to bring the attention to more interesting fact that the terms *Madhumeha* and Diabetes mellitus are analogues, wherein *madhu* and mellitus mean honey. Thus both the terms '*Madhumeha*' and 'Diabetes Mellitus' mean passing of large quantity of sweet urine.

Etiology:

Not only etymology but also etiology and even therapeutic aspects of *Madhumeha* and Diabetes Mellitus go side by side.

All those *nidanas*, which cause *kapha vrudhhi* are the *samanaya nidanas* or *hetus* for *Prameha (kapha krutcha sarvam)* [12]. *Charaka* mentions different etiological factors for *Vataja*, *pittaja* and *Kaphaja Pramehas* in *Nidanasthana* [13]. However no other classic touches this aspect. Even *Charaka* in *chikitsasthana*, talks only about the common etiological factors [14]. This prompts one to

accept that *Kaphakara Ahara Viharas* are the prime factors in causation of the disease process and all *Kaphakara Bhavas* are *Pramehakara Bhavas*. Though these are the *nidanas* of *Prameha*, they are to be considered as the *nidanas* of *Madhumeha* also (as it is a type of *prameha* only).

Sushruta has stated that *Madhumeha* is caused due to the indulgence in *sheet* (cold), *snigdha* (unctuous), *madhur* (sweet), *dravanna* (liquified) foods [15].

Acharya Vagbhata signifies the importance of those *ahara* and *viharas* that vitiate *kapha*, *medas* and increases *mootra* to be the cause of *Madhumeha* [16]. *Vayaj* and *Kalaj hetus* also play role in *Madhumeha*.

Madhumeha has been stated as *Sahaja* as well as *Kulaja vikara*. The genetic predisposition and familial aggregation have been considered as the prime etiological factor.

Kapha medokara nidanas are responsible for the abnormal increase of *sneha* and *kleda* in the body forms the etiological facet of *Madhumeha*.

Similarly, the factors which abnormally increase the serum free fatty acids with increase of VLDL and triglyceride, leading to malfunctioning of lipid metabolism forms the etiological facet of Diabetes Mellitus [17].

Clinical Features of Diabetes Mellitus:

Madhumeha is a *medovaha strotodushti janya vyadhi*^[18]. The *pratyatmaka lakshanas*[cardinal features] become *vyakta*[manifest]in the *mootravaha srotas*[urinary system] with abnormal changes in *rasa*[taste], *gandha*[smell], *varna*[colour]and *sparsha*[touch]of *mootra*[urine].

Features of Prameha patients are described uniquely in Sushruta Samhita. “A walking person preferring to sit; sitting one opting to lie down; lying one desires to sleep; sleeping

one dislikes awakening are the signs of Prameha^[19].

A comparison of features has been made here, the aim of which is to establish a correlation with modern signs & symptoms. It clearly shows that the symptoms are similar.

Table No. 1: Comparison of features of Madhumeha according to Ayurveda and modern science.

Sr.No.	Signs & Symptoms according to Ayurveda ^[20]	Signs & Symptoms according to Modern Science ^[21]
1.	<i>Praboota mootrata</i>	Polyuria
2.	<i>Avila mootrata</i>	Increased Turbidity of urine
3.	<i>Bahvasheetva</i>	<i>Polyphagia</i>
4.	<i>Trushna</i>	<i>Polydipsia.</i>
5.	<i>Alasya</i>	<i>Lassitude</i>
6.	<i>Sthoulyata (caused due to santarpana/margavarana janya)</i>	Obesity (where in rapid weight gain is seen) especially in NIDDM
7.	<i>Karshyata (seen in krusha mehi's)</i>	Lean Diabetic where in there is rapid weight loss (IDDM)
8.	<i>Mootramadhuryata</i>	Glycosuria
9.	<i>Tanu madhuryata</i>	Hyperglycemia

Pathogenesis:

Madhumeha is a disorder due to ‘*vikara vighata bhava abhava*’^[22] with the involvement of almost all the components i.e *dhatu*s [tissues] and *ojas*[essence of all seven *dhātu*] of the body.

Concept of ‘*vikaravighata bhava abhava*’:

- *VIKARA* - Disease

- *VIGHATA* - To Obstruct
- *BHAVA* - Factors which prevents the Disease
- *ABHAVA* - Factors which causes the Disease

A factor which inhibits/hinders the manifestation of a disease in an individual is known as *Vikara Vighata Bhava*.

The *Vikaravighata Abhava* like *Asyasukha* (sedentary lifestyle), *Swapnasukha* (excess sleeping), *Kaphaj aahar* (diet vitiating *Kapha dosha*) leads to *Agnimandya* (decreased digestive power) which leads to the formation of the disease. Whereas, *Vikaravighata Bhava* like following proper dietary regime, regular exercise, can lead to the prevention of the disease, *Madhumeha*.

Diabetes Mellitus is an endocrinal metabolic disorder with the multi factorial facet along with wide spread complications sparing no cell in the body [23].

Table No. 2: Illustrating *Samprapti ghatakas* of *Madhumeha*.

1.	<i>Dosha</i>	<i>Kapha Pitta Vata</i>
2.	<i>Dooshya</i>	<i>Meda, Mamsa, Kleda , Shukra, Rakta, Vasa, Majja, Lasika, Rasa and Oja.</i> [24] (Ch. Ni.4/7)
3.	<i>Strotas</i>	<i>Medhovaha, Mootravaha, Udakhavaha, Swedavaha.</i>
4.	<i>Srotodusti</i>	<i>Atipravrutti.</i>
5.	<i>Agni</i> [digestive factors]	<i>Vaishmya in all agnis or Dhatwagnimandhya</i>
6.	<i>Adhistana</i>	<i>Basti</i>
7.	<i>Udbhavasthana</i>	<i>Aamashaya</i>
8.	<i>Ama</i>	<i>Ama produced due to Jathragnimandhya & Dhatwagnimandhya.</i>
9.	<i>Vyadhiswabhava</i>	<i>Chirakari</i>
10.	<i>Bhedavastha</i>	Types and Occurrence of <i>Upadravas</i> .

Madhumeha is a disorder resulting from *medovaha strotodushti*[channels carrying fat tissue] including the *strotomoolas*[roots of channels] the *Vapavahana*[omentum]and *Vrukka*[kidney]. These organs can be conveniently correlated to the Pancreas and

the suprarenals respectively with the references available in the classics. Diabetes Mellitus results from destruction or malfunctioning of endocrine pancreas. Diabetes Mellitus develops secondarily to hypersecretion of adrenal glands.

Two kinds of *Pramehis/Madhumehis* have been identified as *Krusha* and *Sthoola*^[25]. The Diabetes Mellitus also considers this classification terming them as Obese Diabetic and Lean Diabetic^[26].

Sthoulayata forms an important factor causing the *medodhatwagni mandya* [decreased metabolic factors located in fat tissues] leading

to manifestation of *Avaranajanya Madhumeha*. This can be correlated to the risk of obesity, inducing the Diabetes Mellitus in individuals resulting in NIDDM.

Diagnosis of Diabetes Mellitus:

Table No.3: Test results for diagnosis of prediabetes and diabetes ^[27]

Diagnosis	Fasting Plasma Glucose	Oral Glucose Tolerance Test*	Random Plasma Glucose Test‡	HbA1C
Normal	99 mg/dL or below	139 mg/dL or below	N/A	< 5.7%
Prediabetes	100 to 125 mg/dL	140 to 199 mg/dL	N/A	5.7% to 6.4%
Diabetes	126 mg/dL or above	200 mg/dL or above	200 mg/dL or above	6.5% or more

Source: American Diabetes Association

Mutra pariksha is the first prior primary examination to diagnose *Madhumeha* according to ayurveda. There are some

similarities found in *mutra pariksha* of *Ayurveda* with modern urine examination.

Table No.4: Physical examination of Urine according to Ayurvedic and modern sciences, diagnostic to Madhumeha. ^[28]

Sr.No.	Examination Criteria	Mootra lakshana according to Ayurveda in Madhumeha	Mootra lakshana according to Modern Science in Diabetes Mellitus
1.	Volume	Prakrut <i>Mutrapraman</i> = 4 Anjali. The quantity & frequency of urine increased in <i>Mahumeha</i>	Polyuria >2000ml/24 (Osmotic Diuresis)
2.	Colour	Madhu varni	Colorless dilute urine
3.	Appearance	<i>Phenil mutrapravartan</i>	Foamy urine occurs due to protein presence, uniformly cloudy, do not settle at bottom due to bacteria.
4.	Odour	<i>Madhugandhi</i>	Abnormal odour, fruity due to

			ketoacidosis
5.	Specific gravity	-	> 1.030 g/mL
6.	pH	<i>Amla dharmi</i>	Acid urine
7.	Taste (Rasa)	<i>Madhu sama</i>	Honey like sweet
8.	Taste examination	specimen of urine or urine passed area gets attracted by ants, flies (<i>Pipalika</i>) suggest that urine is having <i>madhura rasa</i>	Examined by using benedicts reagent
9.	Transparancy	Avil	traces of haziness
10.	Tailbindu pariksha (oil drop test)	Owl bird shape spread of oil in mutra suggests non-curability of madhumeha	-

Prognosis of Madhumeha/Diabetes Mellitus [29], [30], [31]:

Table No.5: Prognosis of Madhumeha/Diabetes Mellitus

Sr.No.	Madhumeha	Diabetes Mellitus	Prognosis
1.	<i>Sthool/Apathyanimitaja / Kapha sambhav Madhumeha</i>	Obese diabetics	<i>Kashtha Sadhya/</i> favorable prognosis
2.	<i>Madhumeha with Upadravas</i>	Diabetes with complications	<i>Asadhya/</i> bad sign of prognosis
3.	<i>Jataha Madhumeha</i>	Lean Diabetics or IDDM	<i>Asadhya/</i> bad sign of prognosis
4.	<i>Nava vyadhi</i>	Diabetes with short duration or of recent onset	<i>Sadhya/</i> good sign of prognosis
5.	<i>Purana</i>	Diabetes of longer duration	<i>Asadhya/Yapya/</i> bad sign of prognosis
6.	Availability of <i>chikitsa chatuspada</i>	Early diagnosis, co-operative and intelligent patient and	<i>Sukhsadhya/</i> good sign of prognosis

		prompt treatment	
7.	<i>Nidana parivarjana</i> during the diseased state	Carefulness regarding diet, exercise etc	<i>Sadhya/</i> favorable prognosis

Management of Diabetes Mellitus [32], [33] :

- If the disease is diagnosed in the early stage itself then proper diet alone is sufficient to control the disease, which is equally accepted by both system of medicines.
- A person suffering with *margavarana janya madhumeha* is usually *sthoola* and *balavan* hence *apatarpana chikitsa* is followed. NIDDM patients are usually obese so diet, exercise and oral hypoglycemic are advised.
- *Santarpana chikitsa* is advised to *Dhatukshaya janya madhumehis* as they are *krusha* and *durbala*. IDDM patients are thin and weak and hence insulin is administered.

RESULT:

In the presence of *madhura, pichhila* and *madhusamam lakshanas* in *Madhumeha* one has to consider two possibilities for differentiation i.e. whether the condition is *anilatmaka* due to *dosha dhatu kshneeta(apatarpana)* or *Kapha janya* as a result of *santarpana*.

Table No.6: Showing Differentiation Between *Anilatmaka* and *Kaphasambhava Madhumeha*^[34]

Sr.No.	<i>Vyadhi bodhaka hetu</i>	<i>Lakshanas in Anilatmaka</i>	<i>Lakshanas in Kapha</i>
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Thus from above one gets the inference that *Madhumeha* occurs as a consequence of:

1. *Vata vruddhi* as a result of *dhatukshaya* where *vata* is '*Anubandhya Dosha*'. (Herein *Dhatukshaya* occurs as a consequence of *apatarpana*).
2. *Vata vruddhi* due to *margavarodha* by *Kaphadi dosha dooshyas* where *vata* acts as '*Anubandha dosha*' where in it depends on the condition of *Kaphadi dosha dooshayas*. (Herein *margavarodha* by *Kaphadi dosha dooshyas* occurs as a consequence of *santarpana*).

Thereby, *Aptarpanjanya Vyadhi* is treated by *Santarpana* and *Santarpana janya vyadhiis* treated by *Apatarpana chikitsa*.

DISCUSSION:

Based on the above description an effort has been made here to make a differentiation between '*Anilatmaka Madhumeha*' and '*Kapha Sambhava Madhumeha*' as shown in the table below:

		Madhumeha	sambhava Madhumeha
1.	Rogi[patient]	<i>Krusha, Durbala</i>	<i>Sthoola, Balavan</i>
2.	Udbhava[origin]	<i>Doshdhatu Kshaya janya(apatarpana janya)</i>	<i>Santarpana janya</i>
3.	Nidana[causative factors]	<i>a) Vatakara ahara b)Vatakara vihara c) Deergakaleena Madhumeha leading to Vata vrudhi and dhatu kshaya. d) Beeja dosha (sahaja madhumehi)</i>	<i>a) Kaphakara ahara b)Kaphakar vihara- Divaswap ,Avyayam etc. c) Due to vapavahan etc.dhatudushti beeja doshadi dushti leading to sthoulyata.</i>
3.	Rogi vaya[age]	<i>Usually Bal and when diagnosed</i>	<i>Usually a Madhya vayaha and senile age</i>
4.	Samprapti[pathogenesis]	<i>Madhumeha arambhaka dosha dushti leading to Vapavahana dushti especially in Sahaja Madhumehi.</i>	<i>Kaphamedo dushti leading to Madhumeha arambaka dosha dushti in Vapavahana.</i>
5.	Roopa[signs & symptoms]	<i>Vata pradhana</i>	<i>Kapha pradhana</i>
6.	Vyadhiswaroopa[form of disease]	<i>Ashukari</i>	<i>Chirakari</i>
7.	Sadhya-Asadhyata[prognosis]	<i>Asadhya</i>	<i>Sadhya in the beginning,Kashtsadhya</i>
8.	Upadravas[complications]	<i>Vatapradhana upadravas</i>	<i>Kaphapradhana upadravas</i>
9.	Chikitsa siddanta[fundamentals of treatment]	<i>Santarpana</i>	<i>Apatarpana</i>

Table No.7: Shows General Characteristic of IDDM and NIDDM [35]

Sr.No.	Characteristic	IDDM	NIDDM
1	Genetic locus	Chromosome 6	Unknown

2	Age of onset	Usually < 40	>40
3	Body habitus	Normal to wasted	Obese
4	Plasma Insulin	Low to absent	Normal to high
5	Plasma glucagon	High, suppressible	High, resistant
6	Acute complication	Keto acidosis	Hyperosmolar coma
7	Insulin therapy	Responsive	Responsive to resistant
8	Response of sulfonylurea therapy	Poor or Unresponsive	Responsive

Courtesy: Harrison's internal medicine

CONCLUSION:

- *Lakshanas* of *anilatmaka madhumeha* resembles with the features of IDDM.
- *Lakshanas* of *Kaphasambhava Madhumeha* resembles with features of NIDDM.
- IDDM and NIDDM Modern terms can be correlated with *Anilatmaka* and *Kaphadosh sambhav Madhumeha*, and its hetus are noticeable for treating Diabetic patients.
- *Ayurved* have already said *Nidanparivarjanas* the first step of treatment protocol.
- Study will be useful to set guidelines in breaking etiopathogenesis of diabetes /*madhumeha* concern.

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