International Journal of Applied Ayurved Research ISSN: 2347- 6362

MADHUMEHA IN CONVENTIONAL PARLANCE

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ABSTRACT

Ayurveda is one of the very popular and most ancient system of medicine in India as well as all over the world. Literally the meaning of the word *Ayurveda* is the science of life. *Ayurved* system of medicine not only deals with diseases but also equivalently deals with preventive aspect of health. *Madhumeha* is a disease known to mankind since *vedic* period. In ancient text compiled by *Acharya Charaka, Acharya Sushruta, Acharya Vagbhatta* and many others, we get detailed description about this disease under the heading of *Premeha*. The major clinical features of Madhumeha correlates with the earlier notion of Diabetes Mellitus. In upcoming days, Diabetes Mellitus are going to be a burden for human kind. A vigorous searching is going on all over the world to get a potential solution.

Hence a comprehensive understanding of *Madhumeha* in conventional parlance may explore the potential field to find out a solution for Diabetes Mellitus from *Ayurveda*.

Keywords: *Madhumeha*, Diabetes Mellitus

INTRODUCTION: *Madhumeha* is a disease known to mankind since *vedic* period. According to Indian mythology, Lord Gajanana was suffering from this disease because of his dietary and working habits.[1] After the attack of the disease, he started to consume *Kapittha*, *Jambu Phala* and Shiva *Gutika*, on the advice of his father Lord Shiva. In ancient text compiled by *Acharya Charaka*, *Acharya Sushruta*, *Acharya Vagbhatta* and many others, we get detailed description about this disease. *Madhumeha* has been described in ayurvedic compendia either separately or under the heading of *Premeha*. *Premeha* is a disease associated with altered urine synthesis mechanism and is characterized in terms of *avila-prabhuta-mutra*[2] (excessive and contaminated urination). Among 20 types of *Premeha*, *Madhumeha* is concern with *ojo kshaya*.

A similar disease was recognized as early as 1500 B.C by Egyptian physicians,who described a disease associated with "the passage of much urine". The word diabetes, was first used for such type of disease by Areteus of Cappadocia in the 2nd century AD. Artaeus noticed that patients with diabetes had a disease that caused the siphoning of the structural components of the body into the urine. A British Surgeon-General named John Rollo in 1798 coined the term mellitus – a Greek word for honey. It was known for centuries that the urine of patients with diabetes mellitus was sweet.[3]

AIM AND OBJECTIVE :A numbers of drastic efforts are being performed for last few decades to find out a suitable remedy for Diabetes Mellitus (DM) with *Ayurvedic* drugs. In *Ayurveda*, *samprapti* or pathogenesis of a disease plays a key role behind the selection of any drug. Hence before such an evaluation of a drug it is essential to explore the concern disease along with its *samprapti* in conventional parlance or vice-versa. This review aims at providing the conventional scientific rationale behind the concept of *Madhumeha*.

The objective of this study are -

- To evaluate the concept of *Madhumeha* in Ayurvedic literatures
- To explore the concept of *Madhumeha* with conventional parlance

MATERIALS AND METHODS:

Data obtained from various medical text book,classical *Ayurvedic* compendia,published scientific papers has been collected, analyzed and presented in

regard to concern topic. PubMed, Scopus and Google Scholar databases were searched for studies.

CRITICAL ANALYSIS

Vyutpatti (Etymology)

Madhumeha is composed of two words i.e *madhu* and *meha*.

- *Madhu* – refers to honey, sweet, delicious
- *Meha* – refers to excessive flow of urine

The *vyutpatti* gets concised and specific, that the disease in which the excretion is having quality concordant with *madhu* is called *Madhumeha*.

Clinical Presentation

According to *Acharya Vagbhata*

"Madhumehi madhu sama jayate" [4]

The urine of a *Madhumeha* patients has a resemble with honey.

Madhumeha have been characterized in term of both urinary as well as systemic features by *Acharya Yogaratnakar*:[5]

1. *Madhuram taccha mehashu* (Sweetness of urine)
2. *Madhur-yaccha tanorata* (Sweetness of whole body)

Classification of *Madhumeha* in *Samhita*

The etio-pathologically Prameha has been classified by susruth into two distinct types[6]

a) *Sahaja* (Heriditary) – *Sahaja prameha* occurs as a result of *beeja dosha* i.e. genetic origin

a) *Apathyanimittaja* (Acquired)- *Apthyanimittaja* type itself suggests its etiology. It occurs due to both *Ahitahara-vihara*.

So analyzing this classification of *Prameha*, *Madhumeha* also may be classified into above two group based on etiopathogenesis. Although there is no such direct classification of *Madhumeha* in *Ayurvedic* classics, *Acharya Charaka* has mentioned two entity of *Madhumeha* in *Charak Samhita*

1) *Asadhya Madhumeha* - *Sahaja Madhumeha* are *asadhya* or incurable in nature.[7] Also *Madhumeha* caused by acquired etiologies of *vataprokapa* are also considered as *asadhya*.[8]
2) *Kriccha Madhumeha* – *Madhumeha* associated with acquired etiologies of *kapka-pitta prokapa* are *kricchasadhya* or difficult to cure.[9]

Nidana (Etiologies)

Nidana of *Madhumeha* can be categorized into:

- *Bija dosha* (Hereditary)
- *Apattha nimittaja* (Due to improper diet and physical activity)

Acharya Charak only explains specific acquired etiologies for *Kricchasadhya Madhumeha*. They are:

- *Aharaja* (Dietary)*:* Excessive intake of *guru,snigdha,amla,lavan* dravya.[10]
- *Viharaja* (Physical activity) *: Nidra & asya sukha* (Sedentary lifestyle).[11]

Asadhya Madhumeha associated with acquired etiologies that result in *vataprokapa*,[12] such as –

- *Aharara* (Dietary) : Excessive indulgence to *kasaya-katu-tikta-ruksha-laghu-sita dravy*, *anashana* (least fed state)
- *Vihara* (Physical activity) : *Vyayam* (Excessive physical work), *vyavaya* (Coitus), *jagaran* (Sleep deprivation) etc

Samprapti (Pathogenesis)

The *samprapti* of madhumeha includes two important pathological phenomena[13] –

- *Dhatukshaya*
- *Avarana*

In *Mahumeha*, *dhatuksha* initially refers to *ojo kshaya*. *Ojo kshaya* is the characteristic pathological phenomenon in *Madhumeha*.[14] *Ojo* has been defined as the ultimate product of *dhatuposhana* which is associated with *param teja* or energy.[15] The general function of *ojo* are[16]

- *Vartayanti* – It helps to carry out various functions which are essential to continue life
- *Prinitwa* – It helps to synthesis the essential physiological components

Ojokshaya may occurs in *Madhumeha* either directly due to *vataprokapa* or via obstruction in the *gati* of *vayu*.

Increased *kshaya* and *ruksha* guna of *vayu* caused by *vata* provocative *ahara-vihara* may leads to excretion of *ojo* through urine. This type of pathological phenomenon is considered as incurable by *Acharya Charaka*.[17]

Avarana is another factor, which may results in excretion of *ojo* through urine.*Guru snigdhadi ahara, avyayamadi vihara* etc, leads to vitiation of *kapha - pitta dosha* and involves *meda* and *mamsa dhatu*. All these factors obstruct the *gati* of *vata* leading to altered physiological state of *vata*. Vitiated *vata* thereafter withdraws *oja* from the body and takes it towards *basti* and leads to *Madhumeha*, which is *krichhrasadya* for treatment. The *vata*, *pitta* and *kapha doshas* start manifesting their symptoms intermittently depending on their extent of *dushti*.[18]

DISCUSSION:

Concept of *Madhumeha* vis-à-vis Diabetes Mellitus

Madhumeha is the diseases mentioned in ancient Indian medical literature based on an unique character of urine that is honey like urine. In western medical history first the word "Diabetes" was introduced to describe a diseases associated with copious urine. The term "mellitus" (Latin, sweet like honey') was coined by the British Surgeon-General, John Rollo in 1798 to specify a type of diabetes from others in which the urine was tasteless (e.g. diabetes insipidus). In 1921, Banting, Best and Collip established that the deficiency of insulin was the cause of diabetes mellitus.

When screening programs for diabetes mellitus commenced in the 20th century, it became apparent that there were many people who could be classified as having diabetes mellitus but who were in general "asymptomatic".

Presently Diabetes Mellitus is defined as a group of metabolic diseases characterized by chronic elevation of blood glucose (hyperglycemia) that results from defect in insulin secretion, insulin action or both.[18] When fully expressed diabetes is characterized by fasting hyperglycemia.[19]

Concept of *Ojokshaya* in *Madhumeha vis-à-vis* Altered Cellular Fuel Metabolism in Diabetes Mellitus

In *Ayurveda*, *ojo* is considered as *param teja* or energy. *Ojo* is the ultimate product of *dhatuposhana*. It is required to carry out various functions and synthesis.

The concept of *ojo* synthesis have a fundamental similarity with effective cellular fuel metabolism. In this respect, *ojokshaya* may be consider as altered energy homeostasis.

Various fuels like glucose, fatty acid and glycerol, fatty acid are oxidized in cell via different catabolic pathways to generate adenosine triphosphate (ATP) which are energy-rich compounds and are able to supply energy for biochemical processes. Most of the energy required by cell is generated from lipids and carbohydrates. All metabolic processes in which gaseous oxygen is used to oxidize organic matter to carbon dioxide, water, and energy is known as cellular respiration.

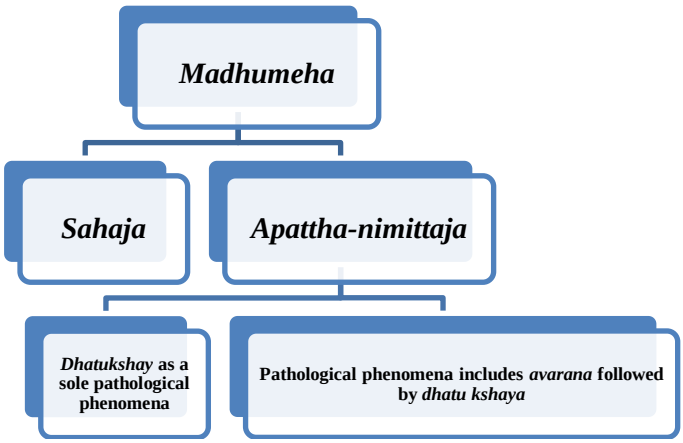
The Insulin is the pivotal hormone regulating cellular energy supply and macronutrient balance, directing anabolic processes of the fed state. Insulin is essential for the intra-cellular transport of glucose into insulin-dependent tissues such as muscle and adipose tissue. In muscle cells, glucose entry provide immediately available energy source for muscle contraction, glycogen to be synthesized and stored, inhibits fatty acids or amino acids to be utilized as the immediately available energy source. Insulin therefore promotes glycogen and lipid synthesis in muscle cells, while suppressing lipolysis and gluconeogenesis from muscle amino acids. In the presence of an adequate supply of amino acids, insulin is anabolic in muscle.[20]

A defect in insulin secretion, insulin action or both therefore affects the energy homeostasis. The resultant metabolic derangement is accompanied by

abnormalities in carbohydrate, protein, and fat metabolism.[21]

Classification and Pathophysiology of *Madhumeha vis-vis* Diabetes Mellitus

Etiopathologically Madhumeha may be categorized as following –



The *Sahaja Madhumeha* strongly corresponds to Type 1 Diabetes Mellitus (T1DM). The pathophysiologic mechanisms in T1DM involve loss of islet beta cell secretory function caused by selective killing of these cells primarily by aggressive autoimmune responses involving both cellular and humoral immune pathways. The complex etiology of T1DM involves a strong genetic predisposition, mainly human leukocyte antigen class II genes, and several putative environmental factors, which are thought to trigger autoimmunity or progression to clinical T1DM.[22]

The concept of *Apthyanimittaja Madhumeha* may be correlated with Type 2 Diabetes Mellitus (T2DM).

T2DM develops because of a coupling of two events[23]

- Acquired insulin resistance
- Progressive deterioration in β - cell function

They are responsible for defect in insulin action and secretion respectively. T2DM may ranging from predominantly insulin resistance with relative insulin deficiency to predominantly an insulin secretory defect with insulin resistance.[24] Most patients with this form of diabetes are obese, and obesity itself causes some degree of insulin resistance although T2DM can affect non obese individual also. Insulin resistance may improve with weight reduction. Metformin is the 'drug-of-first-choice' in obese patients with type 2 diabetes mellitus. In non-obese patients with T2DM, insulin secretagogues are empirically used as first choice.

Lean T2DM variant has been introduced recently associated with non obese individuals as well as earlier and more prevalent use of insulin. In the obese individual, the diabetes develops once the beta cell cannot compensate with the insulin resistance conferred by the growing obesity. In the lean T2DM variant, the early failure of the beta cells results in development of diabetes at much lower insulin resistance. Studies in developing countries have shown that these patients have history of childhood malnutrition, poor socioeconomic status.[25]

T2DM in obese subject have a fundamental similarity with *avarana jannyo madhumeha* in which vitiation of *meda* plays a key role, whereas lean T2DM variant is close to *Madhumeha* caused by *vata prokapaka ahar vihar*.

CONCLUSION

The disease *Madhumeda* bear a resemblance to Diabetes Mellitus in

respect to clinical presentation, etiological and patho-physiological aspects. Prognosis of *Madhumeha* has been well described in Ayurvedic literatures. *Madhumeha* associated with sedentary lifestyle and obesogenic diet have a similar appearance to T2DM having predominantly insulin resistance. Such type of *Madhumeha* is considered as treatable but difficult to cure. Incurable types of *Madhumeha*, conventionally correlates with Diabetes Mellitus associated with insulin secretory defect predominantly.

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Source of support: Nil
Conflict of interest: None Declared

Cite this Article as : [Kundu Suman et al : Madhumeha in Conventional Parlance] www.ijaar.in : IJAAR VOLUME III ISSUE X SEP –OCT 2018 Page No:1481-1486