

## **Madhumeha or T2DM-A Clinical Approach and Management through Ayurveda**

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### **ABSTRACT**

*Diabetes mellitus (DM) is the most common endocrinal and metabolic disorder characterized by chronic hyperglycemia caused by complete or partial insufficiency of insulin secretion and/or insulin action. It is most common non-communicable diseases globally. A data released by International Diabetes Federation (IDF) that approximately 415 million adults between the ages of 20 to 79 years had diabetes mellitus in 2015. DM is proving to be a global public health burden as this number is expected to rise to another 200 million by 2040, with type 2 Diabetes Mellitus (T2DM) accounting up about 90% of the cases. Individuals with T2DM are at high risk for both microvascular complications (including retinopathy, nephropathy and neuropathy) and macrovascular complications. Madhumeha the commonest clinical presentation of Prameha can be compared to Diabetes Mellitus. Acharya Sushruta has classified Prameha as Sahaja and Apathyanimittaja Prameha. Apathyanimittaja Prameha has a resemblance with T2DM. Obesity, an unhealthy diet, physical inactivity and genetic factors contribute to the multiple path physiological disturbances that are the reason for impaired glucose homeostasis in Madhumeha or T2DM. In Ayurveda Pathya Ahar (wholesome diet), Pathya Vihar (correct lifestyle), Panchakarma procedures, Shaman Chikitsa (Medicinal Therapy), & Rasayana Chikitsa (rejuvenation therapy) have been given to prevent, control the disease and avoid its fatal Complication. In this review, we provide an overview of the etiology, pathogenesis, diagnosis, clinical presentation, prevention and principles of management of Madhumeha or T2DM.*

**Key Words:** Madhumeha, Prameha, Apathyanimittaja, Pathya, Shaman Chikitsa, Panchakarma.

### **INTRODUCTION**

The main factors contributing to lifestyle diseases such as Type 2 Diabetes Mellitus and other NCDs include irregular food habits, physical inactivity, overweight, wrong body posture & disturbed biological clock. Diabetes Mellitus is a disorder of metabolism of carbohydrate, protein and fat due to absolute or relative deficiency of insulin secretion and with varying degrees of insulin resistance and characterized by

hyperglycaemia [1]. The high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger (polyuria, polydipsia, and polyphagia). Untreated Diabetes can cause many complications. Acute complications include diabetic ketoacidosis and nonketotic hyperosmolar coma. Serious long term complications include heart disease, stroke, kidney failure, foot ulcers etc. Diabetes Mellitus (DM) is a leading

cause of mortality, morbidity, and health-system costs.

In *Ayurveda*, *Madhumeha* has been classified as one among one of the 20 types of *Prameha* and is a sub-type of *Vatika Prameha* [2]. This classification based on physical abnormalities of urine. According to *Acharya Sushuruta Madhumeha* is considered as one of the *Mahagadas* (disease needing serious concern) and explained as most important among *Anushangi Roga* (chronic disease) [3]. It is also a sign of chronicity *i.e.* All *Prameha* ultimately turn into *Madhumeha* if left untreated or neglected [4]. All diet and life style factors which increase *Kapha*, *Meda Dhatu* and *Kleda*, contribute in the pathogenesis of *Madhumeha*.

### EPIDEMIOLOGY

India has been projected by 'WHO' as the country with the fastest growing population of Diabetes patient. Type2 diabetes is the most common type of diabetes, making for around 90% of all diabetes cases. There are a number of factors that influence the development of type 2 diabetes. The most influential are lifestyle behaviors commonly associated with unplanned urbanization. As per WHO data's released in 2016, the disease burden in India was shifted to non-communicable diseases from communicable diseases (There was a corresponding increase in the contribution of NCDs from 30% of the total disease burden in 1990 to 55% in 2016). The WHO estimates that diabetes resulted in 1.5 million deaths in 2012, making it the 8th leading cause of death. 1 in 2 people currently living with Diabetes is undiagnosed which can cause severe complications.

### Etiology and risk factors for T2DM [5]

- 1) Family history of diabetes
- 2) Obesity

- 3) Unhealthy diet and lifestyle
- 4) Age > 42 years
- 5) Race/ethnicity (Asian American, African American)
- 6) Previously identified IFG or IGT
- 7) H/o GDM or delivery of baby over 4.5 kg
- 8) Hypertension (BP > 140/90)
- 9) HDL < 35 mg% and/or Triglyceride > 250 mg%
- 10) Polycystic ovary syndrome
- 11) Stress induced hyperglycaemia as in
  - Infection
  - Myocardial infarction
  - Trauma
  - Pregnancy
  - Stroke
  - Emotional stress
  - Drugs (glucocorticoids, estrogens, sympathomimetics, nicotinic acid)

### Etiological factors for *Prameha (Madhumeha)* [6]

आस्यासुखं स्वप्नसुखं दधीनि ग्राम्यौदकानूपरसाः पयान्ति ।  
नवान्नपानं गुडवैकृतं च प्रमेहहेतुः कपकृच्च सर्वम् ॥

The main causes of *Prameha* are lack of exercise, sleeping in day time, laziness, sedentary habits and improper food habits, which fall in the category of *Ushna*, *Snigdha* and *Guru*, are the prime cause of this disease. Foods that increase *Kapha* & *Meda* like Sweet, Curd, Dairy products, *Aanup*, *Audak Mans* etc. are the etiological factors for the disease.

### CLASSIFICATION

#### Based on Etiological factors

- a) As per *Acharya Sushuruta* [7]
  1. *Sahaja* (Hereditary) *Prameha*
  2. *Apathyanimittaja Prameha* (Acquired /DM due to unhealthy diet & sedentary lifestyle)
- b) As per *Acharya Charaka* [8]

- 1) *Santarpanajanya Prameha* (DM in obese person or DM due to unhealthy diet)
- 2) *Apatarpanajanya Prameha* (DM due to malnutrition)

**Based on Samprapti (pathogenesis) [9]**

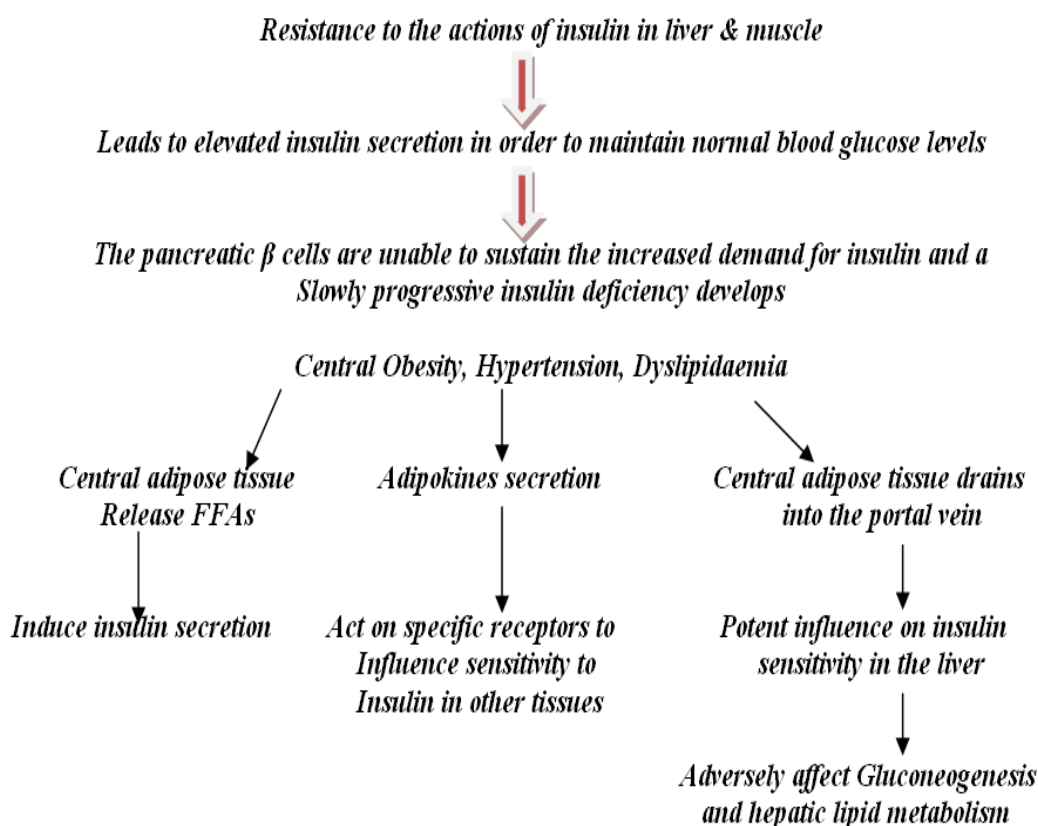
- 1) *Avaranajanya Prameha*
- 2) *Dhatukshayajanya Prameha*

**Based on Doshic involvement <sup>(10)</sup>**

- 1) *Vataja Prameha* – 4 types of *Vataja Prameha* mentioned
- 2) *Pittaja Prameha* – 6 types of *Pittaja Prameha* mentioned
- 3) *Kaphaja Prameha* – 10 types of *Kaphaja Prameha* mentioned in *Samhitas*

**Therapeutic Classification based on Patient's Physical Constitution [11]**

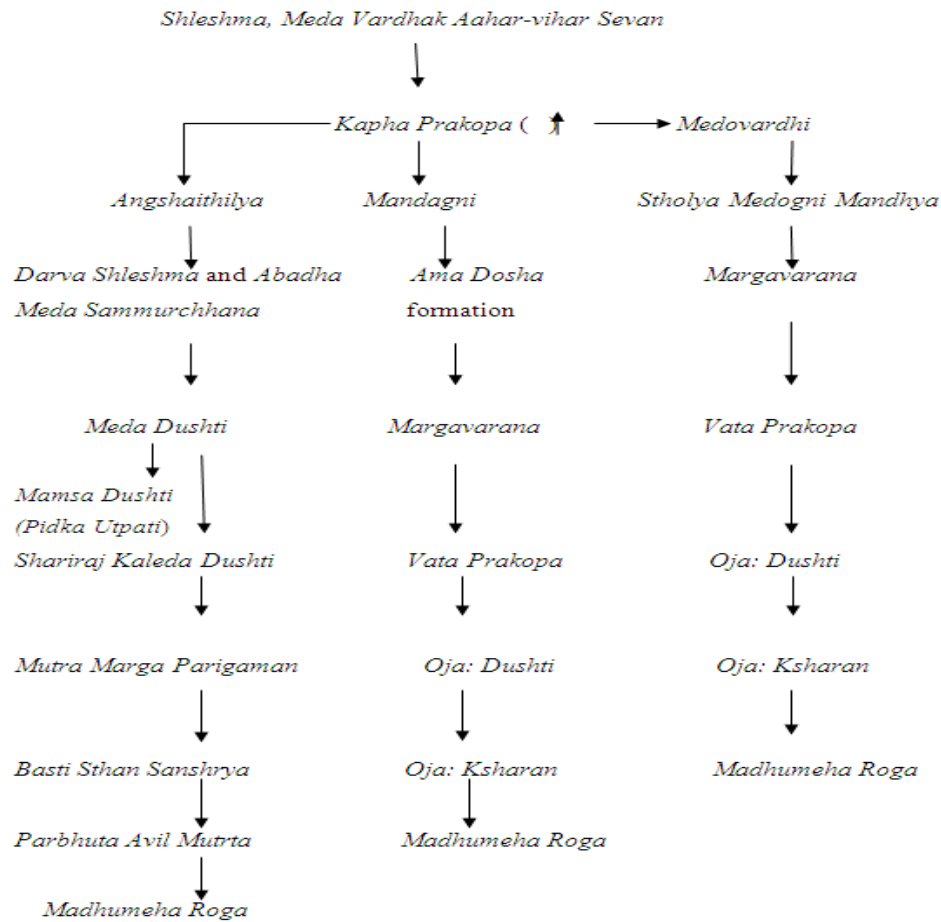
**Pathogenesis of T2DM [12]**



Physical activity is another important determinant of insulin sensitivity. Inactivity is associated with down regulation of insulin-sensitive kinases and may promote accumulation of FFAs within skeletal muscle. Sedentary people are therefore more insulin-resistant than active people with the same degree of obesity. Moreover, physical activity allows non-

insulin dependent glucose uptake into muscle, reducing the 'demand' on the pancreatic  $\beta$  cells to produce insulin. Additional disorders have been associated more recently with insulin resistance. Deposition of fat in the liver is a common association with central obesity and is exacerbated by insulin resistance and/or deficiency.

### Samprapti of Madhumeha [13]



### Samprapti Ghataka [14]

- 1) **Dosha**—Darva Shleshma Pradhan Tridosha
- 2) **Dushya**—Abadha Meda, Mamsa, Kleda, Shukra, Rakta, Vasa, Majja, Lasika, Rasa & Oja
- 3) **Strotas (Channel)**—Mootravaha, Medovaha
- 4) **Strotodusti**—Sanga, Atipravrutti
- 5) **Agni**—Dhatvagnimandhya

- 6) **Udbhava**- Antakoshtha
- 7) **Adhishthan** – Basti, Sarvashrir
- 8) **Vyadhisavbhav**-Chirkari (chronic)

### Prodromal Symptoms [15]

The un-manifested symptoms which precede the appearance of the disease are-

दन्तादीनां मत्ताद्यत्वं प्रागुपं पाणिपादयोः। दाहचिक्रकणता देहे तृट्स्वादादस्यं च जायते ॥

These are accumulation of dirt on the teeth (mouth, eyes, nose, and ears), a feeling of burning sensation in the palms and soles, stickiness of the skin all over the body, thirst and a sweet taste in the mouth etc.

### Signs and Symptoms

*Madhumeha* literally means passage of urine with *Madhu* like properties.

कषायमधुरं पांडु रूक्षं मेहति यो नरः | वातकोपादसाध्यं त प्रतीयान्मधुमेहिनां || [16]

Cardinal feature of *Prameha* is *Prabhut Aavil Mutrta* (polyuria with turbidity in urine).

- Polyuria, polydipsia, polyphagia, weight loss, fatigue and weakness are major symptoms; patient may present with diabetic ketosis (air hunger, Kussmaul's respiration, acetone odor of breath, dehydration, vomiting, abdominal pain, etc.).

### The WHO Diagnostic Criteria for Diabetes Mellitus [17]

- 1) Symptoms of diabetes plus 'random' blood glucose concentration >200 mg/dl, or
- 2) 'Fasting' plasma glucose >126mg/dl, or
- 3) '2h-postload' plasma glucose >200 mg/dl during an oral GTT, or
- 4) HbA<sub>1c</sub> >6.5%

### Characteristics of T2DM [18]

- 1) Usually starts after the age of 30 years.
- 2) Obese persons (or overweight)
- 3) Insidious onset with gradual progress
- 4) Pancreatic islet cells are not totally destroyed. Plasma insulin is normal to high
- 5) Polyphagia, polyuria, and polydipsia-not so classically seen as in T1DM
- 6) Responsive to oral hypoglycaemic agents
- 7) Insulin therapy- responsive to resistant
- 8) Hyperosmolar hyperglycaemic non-ketotic coma occurs very often
- 9) Family H/O DM is usually present

- 10) Absence of other autoimmune diseases and autoantibodies
- 11) No HLA links; 50% concordance in identical twins
- 12) C-peptide persists
- 13) Low mortality, if untreated.

### Differential Diagnosis [19]

If the history and presentation are so classical, no D/D is required. Otherwise, differentiate among the causes of polyuria, nephritic syndrome or peripheral neuropathy.

### Laboratory Investigations

The following investigations can be suggested to a diabetic patient to monitor the symptoms and possible complications.

- 1) Blood Sugar levels  
Fasting Blood Sugar (F.B.S.)
- 2) Post Prandial Blood Sugar (P.P.B.S.)
- 3) HbA<sub>1c</sub> (optional)
- 4) LFT
- 5) Lipid profile
- 6) RFT (Renal Function Test)
- 7) Urine Test: Routine & Microscopic Examination

### Complications of DM [20]

The life-history of diabetes mellitus is full of complications. The patient presents to different specialists or super specialists with different organs/systems involvement. The common cause of death in treated patients is cardiovascular ailments (70%), followed by renal failure (10%) and infections (6%).

#### (a) Acute (Early)

- 1) Hypoglycaemia.
- 2) Diabetic ketoacidosis.
- 3) Hyperosmolar hyperglycaemic non-ketotic coma.
- 4) Lactic acidosis(rare)
- 5) Infections (boils, abscess, cellulitis, carbuncle, tuberculosis).
- 6) Acute circulatory failure.

**(b) Late**

- 1) Circulatory abnormalities (macro-and microangiopathy).
- 2) Retinopathy (microangiopathy)
- 3) Neuropathy(peripheral and autonomic)
- 4) Nephropathy (microangiopathy).
- 5) Gastrointestinal disorders.
- 6) Recurrent infections.
- 7) Diabetic foot (ulcer, gangrene).
- 8) Dermatological complications.
- 9) Miscellaneous- Malignant otitis externa, emphysematous cholecystitis, rhinocerebral mucormycosis, hypertriglyceridaemia, platelet aggregate abnormality etc.

**Disease Prognosis [21]**

*Acharya Charaka* described prognosis in 3 categories:

**1. Sadhya (Curable):** Patients, who have diagnosed early in the onset, do not have all symptoms of the disease, those who are *Sthoola* (obese) and the origin of their disease in *Apathyaja*.

**2. Yasya** – can be managed with palliative treatment: *Pittaja Prameha* and Patients who have mild to moderate symptoms

**3. Asadhya (Incurable):** *Vataja* describes the incurable version of *Prameha* and inherited diabetes, *Krishha* (lean) patient who is suffering with *Sahaja* variety. But *Vataja Prameha* in which *Kapha* and *Pitta Doshas* are curable.

**Management and Treatment of Madhumeha**

Treatment can be divided into 3 categories:

- 1) Prevention of the disease
- 2) Treatment of the disease
- 3) Treatment and management of the complications

**Prevention of the Disease**

T2DM is a lifestyle disorder which accounts 90% cases of diabetes and is preventable through healthy diet and lifestyle. In *Ayurveda Dincharya*,

*Ritucharya*, *Sanshodhana*, *Aharvidhi Vidhan*, *Sadvrita* etc. are mentioned for healthy individuals that are in accordance with *Swasthya Swasthya Rakshanm* concept of *Ayurveda* which are beneficial in prevention of NCDs. In *Ayurveda Agnidushti* is the leading cause for creating any disease. Frequent use of *Deepana* and *Pachana Dravya* like *Shunti* (dry ginger), *Nagkeshar*, warm water and *Ritu Shodhana* like *Vamana* in *Vasant Ritu*, *Basti* in *Varsha Ritu* and *Virechana* in *Sharad Ritu* etc can prevent *Agnidushti* and disease occurrence. Maintaining normal body weight, avoiding sedentary lifestyle, eating healthy diet, modifying lifestyle (as per guidelines of *Ayurvedic* classical texts), and non suppression of natural urges can reduce risk of T2DM. Proper IEC (Information, Education and Communication) at hospitals, routine investigations, and social awareness also play a key role in prevention of DM.

**Treatment of the Disease**

**a) Samprapti Vighatan/Breakdown of Pathogenesis**

*Ayurveda* considers *Prameha*, as a disease of *Medodhatu* (body fats / adipose tissue) *Dushti* with additional derangement in *Mamsa*, *Kleda*, *Majja*, *Dhatu* etc. General Management of Diabetes through *Ayurveda* starts from correction of *Medodhatu Dushti* which is responsible for further Pathophysiology of *Prameha*. Recent researches have highlighted the importance of lipid metabolism and its role in development of diabetes.

**b) Line of treatment for Prameha /Madhumeha**

According to *Ayurveda* removal of etiological factors (*Nidana Parivarjan*) is the 1<sup>st</sup> line of treatment. Along with this concept further *Acharyas* have been given line of treatment for *Prameha /*

*Madhumeha* depends on individual's body constitution. It is based on an entire change in diet and lifestyle along with medication. The patient is also advised to lead a healthy lifestyle and live a stress free life.

**According to Acharya Charaka [22]**

1. *Sthula Pramehi* (Obese Patient)-*Sanshodhana Chikitsa* (elimination of *Doshas*)
2. *Krisha Pramehi* (Lean & Thin Patient)-*Brunhanam Chikitsa* (to improve the nutrition level of the patient)

**As per Acharya Sushruta [23]**

1. *Krisha Pramehi- Aushdh Sidha Annapana*
  2. *Sthula Pramehi- Aptarpan Chikitsa*- which include *Langhana* (fasting therapy-to proper utilization of excess fats), exercise, *Shodhana* and diet which have bitter and pungent properties.
- According to this line of treatment, treatment for the disease can be divided into underlying aspects-  
A) Diet and lifestyle modification  
B) *Panchakarma* procedures  
C) *Shamana Chikitsa*

**A) Diet and lifestyle modification for *Sthula Pramehi* or T2DM**

**Diet [24]**

Diet	Which should take
<b>Cereals</b>	<i>Yava</i> ( <i>Hordeum vulgare</i> - Barley), Old Wheat ( <i>Godooma</i> ), Old Rice ( <i>Purana Shali</i> )
<b>Pulses</b>	<i>Mudga</i> ( <i>Vignaradiata</i> Greengram), <i>Chanaka</i> ( <i>Cicer arietinum</i> Linn.-Bengal gram), <i>Kulattha</i> ( <i>Dolichos biflorus</i> ), <i>Adhaki</i> ( <i>Cajanus cajan</i> - Pigeon pea) etc.
<b>Vegetables</b>	Bitter vegetables ( <i>Tikta Shaka</i> ) e.g. <i>Karela</i> ( <i>Momordica charantia</i> -Bitter gourd), <i>Methi</i> ( <i>Trigonella foenum-graecum</i> -Fenugreek), <i>Patola</i> ( <i>Trichosanthes dioica</i> , Vietnamese gourd), <i>Rasona</i> ( <i>Allium sativum</i> Linn. - Garlic), <i>Udumbara</i> ( <i>Ficus racemosa</i> - Cluster Fig Tree), <i>Haridra</i> ( <i>Curcuma longa</i> -Haldi) etc.
<b>Fruits</b>	<i>Jambu</i> ( <i>Syzygium cumini</i> - Black berry), <i>Amalaki</i> ( <i>Embllica officinalis</i> - Indian gooseberry/Amla), <i>Kapitta</i> ( <i>Limonia acidissima</i> -Wood Apple), <i>Talphala</i> ( <i>Borassus flabellifer</i> -Asian Palmyra palm), <i>Utpala</i> ( <i>Nymphoea stellata</i> ), <i>Parushaka</i> ( <i>Grewia asiatica</i> -Falsa) etc.
<b>Liquor</b>	<i>Saarodak</i> ( <i>Vijaysaar</i> - <i>Pterocarpus marsupium</i> decoction), <i>Triphla</i> decoction
<b>Oils</b>	Mustard oil ( <i>Sarshapa Taila</i> ), <i>Ingudi</i> ( <i>Balanitis aegyptiaca</i> ) <i>Ghritha</i>

But according to Ayurveda one should start with *Laghu Ahara* or should take *Ahara* according to *Agni Bala* and then gradually increase the quantity of food. And one should take meal according *Ashtaharvidhi Visheshayatn*.

**Apathya (Contraindicated Diet) in Prameha/Madhumeha:** *Rajamasha* (*Vigna unguiculata*), Potato, Sweet potato, *Rakta*

*Vrintaka*, Ripened Mango (*Mangifera indica*), Banana (*Musa acuminata*), Custard apple (*Sitaphala* / *Annona reticulate*), Jack fruit (*Artocarpus heterophyllus*), Chikoo (*Menilcara zapota*), Fresh Dates (*Phoenix dactylifera*), Paneer, Cheese, Junk foods, Aerated drinks, Carbonated Deep fried, Pastry foods, Foods prepared from Maida/Refined, Hydrogenated oil Sugar,

sweets, cakes, jam, jelly, Narcotics, Jaggary, sugar, salty snacks, Fruit juices, Soft drinks, *Soviraka*, *Sura*(alcohol), *Asava* (fermented medications), *Dugdh* (bufalo's milk), Oil, *Ghee*, *Ikshuvikara* (food prepared with sugarcane) , *Dadhi*

(curd), *Sarbata* (sugar containing syrups) etc.

- WHO recommends intake of whole grain foods, with a minimum consumption of 5-10 portions of fruits and vegetables per day.

### Lifestyle Modification

S. N.	Lifestyle	Dravya	Duratio n	Frequen cy	Remark
1.	Waking up early in morning		4.00 am to 6.00 am	Daily	
2.	<i>Gandusha/Kavala Dharana</i>	Oil/Decoction/ <i>Sukhos hna Jala</i>	3-5 minutes	Daily	
3.	<i>Ushna Jala Pana</i>	Water kept in copper vessel/ <i>Sarodaka</i>		Daily around ½ to 1 liter	
4.	<i>Vyayama/Yoga/Chankra mana</i>		20- 60 minutes	Daily	Yoga in morning & <i>Chankrama na</i> in evening
5.	<i>Padabhyanga</i>	<i>Tila Taila</i> or any other medicated oil	5 minutes	Thrice a week	
6.	<i>Shirobhyanga</i>	Suitable medicated oil	5 minutes	Twice a week	
7.	<i>Udvaartana</i>	<i>Triphala Churna/Yava Churna</i>	30 minutes	Thrice a week	
8.	Bathing	<i>Sukhoshna Jala</i>		Daily	
9.	<i>Prabhata Bhojana</i>			Daily	
10.	<i>Madhyahna Bhojana</i>			Daily	
11.	<i>Ratri Bhojana</i>			Daily	Avoid eating late in the night
12.	Luke warm water		As per necessity	Daily	
13.	Going to bed at night			1 hour after food	

### Yoga Advice for T2DM

1) *Acharya Sushuruta* has recommended walking of 100 *yojan* in 100 days. (1 *yojan* is = 7.5 km). So patients will be

advised to brisk walk 7.5 km / day or as per capacity.

2) Patient can choose either walk or underlying Yoga practice (yoga should

be performed according to Ministry of Ayush's common yoga protocol).

S.N.	Name of the Practice	Duration
1.	Prayer	1 minute
2.	<p><b>Preparatory Practices</b></p> <p>A. <b>Neck Bending</b> (Elderly people and persons with cervical spondylitis, high blood pressure may avoid these practices.)</p> <p>a) forward and backward bending</p> <p>b) Right and Left bending</p> <p>c) Right and Left Twisting</p> <p>d) Neck Rotation</p> <p><b>B. Shoulder's Movement</b></p> <p>a) Shoulder's Stretch</p> <p>b) shoulder Rotation</p> <p>C. <b>Trunk Movement:</b> Trunk twisting (Avoid this practice in case of severe back pain, vertebral and disc disorders, after abdominal surgery and during menstruation)</p> <p>D. <b>Knee Movement</b> (Avoid this asana in case of acute conditions of arthritis.)</p>	10 minutes
3.	<p><b>Suryanamaskara</b></p> <p>a) 10 step fast <i>Suryanamaskara</i> - 6 rounds</p> <p>b) 12 step slow <i>Suryanamaskara</i> - 1 round (To be avoided by those with knee pain, cardiac &amp; renal problems, low back pain, retinopathy &amp; the elderly)</p>	10 minutes
4.	<p><b>ASANA</b></p> <p>1. Standing Series (1 minute per <i>Asana</i>)</p> <p><b><i>Trikonasana:</i></b> Avoid this posture in case of slipped disc, sciatica, and after undergoing abdominal surgery.</p> <p><b><i>Prasarita Pada Hastasana:</i></b> Avoid this practice in case of cardiac or back problems, abdominal inflammation, hernia and ulcers, high myopia, vertigo, vertebral and disc disorders, and during pregnancy.</p> <p>2. <b>Supine Series ( 1 min per <i>Asana</i>)</b></p> <p>a) <b><i>Bhadrasana-</i></b> Avoid this practice in case of severe arthritis and sciatica.</p> <p>b) <b><i>Vajrasana-</i></b> Persons suffering from piles, knee pain and ankle injury should avoid this practice.</p> <p>c) <b><i>Vakrasna-</i></b> avoids this posture in case of severe back pain, vertebral and disc disorders, after abdominal surgery and during menstruation.</p> <p>3. <b>Prone Series (1 min per <i>Asana</i>)</b></p> <p>a) <b><i>Makarasana-</i></b> Avoid this practice in case of low blood pressure, severe cardiac problems and pregnancy.</p> <p>b) <b><i>Bhujangasana-</i></b> Those who have undergone abdominal surgery should avoid this asana for 2-3 months. Those who suffer from hernia, ulcers should not practice this <i>Asana</i>.</p>	15 minutes
5.	<p><b>Kriya</b></p> <p><b><i>Kapalabhati:</i></b> Avoid this practice in case of cardiac conditions, giddiness, high blood pressure, vertigo, chronic bleeding in the nose, epilepsy, migraine, stroke, hernia and gastric ulcers.</p>	3 minutes
6.	<p><b><i>Pranayama Nadi shuddhi</i></b> (for 6 minutes with <b><i>Antarkumbhaka</i></b> and <b><i>Jalandhara bandha</i></b> for 2 seconds)</p> <p><b><i>Ujjayi</i></b> (2 minutes) and <b><i>Bhramari</i></b> (for 2 minutes)</p>	10 minutes
7.	<b><i>Dhyana</i></b> (Meditation): (For stress management and for deep relaxation)	10 minutes
8.	<b><i>Uchharita Pranava/Shanti Patha</i></b> (1 minute)	1 minutes

**Note:** Caution is to be exercised while selecting various practices for the individuals, considering their age, gender, severity of illness, capacity, presence of complications, status of the Dosha etc

**B) Panchkarma Procedures**

As per Acharya Charaka Sthula (over weight / obese) and Balawan (having good strength) patient should undergo Shodhana (bio cleansing) therapy like Vamana, Virechana, Basti etc followed by Shamana treatment.

- 1) If there is association of Pita along with Vata, then Virechana followed by Basti with Surasadi Gana.
- 2) If there is only Vata dominance then, Mustadi Yapana Basti, Madhu Tailika Yasti should be advised.
- 3) If there is stress and anxiety then, Shirodhara or Shiropichu with

Kshirabala Taila, Nasya with Bramhi Ghrita should be advised.

**C) Shamana Chikitsa**

Formulations which have Deepana, Pachana, Lekhana, Rasayana, Anulomana, Shodhana etc properties, correct Agni Dushti, improve the fat and carbohydrate metabolism, regulate blood sugar levels, stimulates the Beta cells, and treat the symptoms of chronic hyperglycaemia are beneficial to treat the disease.

**Single Formulations**

Drugs	Dose form	Dose	Administration	Anupana
Vijayasara Kwatha/hima [25]	Decoction	40-60 ml	Before meal / twice daily	
Nisha-amalaki /Haridra[26]	Powder	6 gm	After meal/ twice daily	Water
Amalaki	Powder	6 gm	Twice a day	Water
Karavellaka Phala	Powder	3 gm	Twice a day	Water
Guduchi [27]	Juice	10 ml	Twice a day	
Jambu Beej [28]	Powder	3-5gm	Before meal / twice daily	Water

**Compound Formulations**

Drugs	Dose form	Dose	Administration	Anupana
Phalatrikadi Kwatha [29]	Decoction	10-15 ml	Before meal /twice daily	
Katakakhadiradi Kashaya [30]	Decoction	10-15 ml	Before meal/ twice daily	
Nishakatakadi Kashaya [31]	Decoction	10-15 ml	Before meal/ twice daily	
Gokshuradi Guggulu [32]	Tablet	1-2gm	Before meal/twice daily	
Triphala[33]	Powder	3-6 gm	Before meal/twice daily	Water
Nyogrodhadi [34]	Powder	3-6 gm	Before meal/twice daily	Water
Shiva Gutika [35]	Tablet	125-250 mg	Before meal/twice daily	
Vanga Bhasma [36]	Powder	125-250 mg	After meal/twice daily	
Arogyavardhini Vati [37]	Tablet	500 mg	Before meal/twice daily	
Chandraprabha Vati [38]	Tablet	500 mg	Before meal/twice daily	

**Treatment and Management of the Complications**

Prevention, early detection and treatment are keys to keeping long-term complications of diabetes at bay. Patients with diabetes should be screened regularly

(LFT, RFT, Lipid profile ECG etc), at least 6 months for microvascular and macrovascular complications. Those with uncontrolled diabetes should be examined more frequently. Need to pay special attention to keeping blood sugar under

control and adhering to a nutritional meal plan. Diabetic patients should take any ulcer or wound and infection serious and should visit super specialist. In Ayurveda *Prameha Pidika Chikitsa* is mentioned for such conditions. Prof. Kuldip Raj Kohli's (who is currently the director of AYUSH for Maharashtra state) research has mostly been concentrated in the field of Diabetic complications and more so in Diabetic Retinopathy.

Value of *Vasant Kusumakar Ras* in Diabetic Retinopathy has been 1<sup>st</sup> highlighted after his studies only. And he found that *Vasant Kusumakar Ras* is a wonderful antioxidant in Diabetic Retinopathy. According to his studies *Vasant Kusumakar Ras* is not a hypoglycemic medicine but have *Rasayana* properties. Another study by him on *Manjishthadi Ghan vati (Triphala, Kutaki, Vacha, Daruharidra, Guduchi, and Nimbpatra)* in Diabetic neuropathy and he found significant reduced in hyperesthesia. Another study by him on *Gokshura Ghan Vati* in Diabetic nephropathy and in this study he found significant reduction on macro albuminuria.

## CONCLUSION

*Madhumeha* or T2DM is a chronic and devastating disorder in which involvement of *Tridoshas*, major *Dhatus*, organs and multiple complications are present. T2DM is a common, primarily because of increase in the prevalence of a sedentary lifestyle and obesity. Patient of DM should be well informed about hypoglycemia and hyperglycemia episodes. Prevention should be the 1<sup>st</sup> goal in NCDs especially in T2DM. With Ayurvedic principles (which focus on diet, lifestyle, *Panchakarma* and herbal or herb mineral formulations) we can prevent, control and slow down the disease progress and can manage the complications.

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