

AYURVEDIC APPROACH TO DIABETES MELLITUS: A COMPREHENSIVE REVIEW OF *PRAMEHA* AND *MADHUMEHA*

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycaemia and is associated with serious complications. In Ayurveda, it may be broadly correlated with *Madhumeha*, an advanced form of *Prameha* involving disturbed *Doshas*, impaired *Agni*, and vitiation of *Meda*, *Mamsa*, *Kleda*, and *Ojas*. Major causative factors include an unhealthy diet, sedentary lifestyle, excessive sleep, obesity, and genetic predisposition. Ayurvedic management emphasizes *Nidana Parivarjana*, dietary regulation, exercise, *Shodhana*, *Shamana*, and individualized treatment according to the patient's constitution and disease stage. This review discusses the Ayurvedic understanding of diabetes, including its etiology, pathogenesis, clinical features, prevention, and management. Integrating appropriate Ayurvedic dietary and lifestyle measures with standard diabetes care may support comprehensive management; however, further clinical research is required to establish the safety and efficacy of specific interventions.

KEYWORDS: Diabetes mellitus, *Madhumeha*, *Prameha*, Ayurveda, hyperglycaemia, *Medovaha Srotas*, lifestyle modification, integrative management.

INTRODUCTION

Diabetes mellitus is a group of chronic metabolic disorders characterized by persistent hyperglycaemia resulting from defects in insulin secretion, insulin action, or both.^[1] It includes type 1 diabetes, type 2 diabetes, gestational diabetes, and other specific forms. Type 2 diabetes is the most common form and develops through a complex interaction

between insulin resistance, progressive pancreatic β -cell dysfunction, genetic susceptibility, environmental influences, and lifestyle-related factors.^[2]

Diabetes has emerged as a major global public-health concern. According to the International Diabetes Federation, approximately 589 million adults aged 20–79 years were living with diabetes in 2024, representing about one in nine adults worldwide; this number is projected to reach 853 million by 2050.^[3] Poorly controlled diabetes may lead to serious microvascular and macrovascular complications, including retinopathy, nephropathy, neuropathy, cardiovascular disease, peripheral vascular disease, and diabetic foot disorders.^[4] These complications increase disability, premature mortality, healthcare expenditure, and the overall socioeconomic burden of the disease.

The prevention and management of type 2 diabetes require a comprehensive approach involving dietary modification, regular physical activity, weight management, glucose-lowering medicines, monitoring of blood glucose, and screening for complications.^[5] However, the chronic and progressive nature of the disease, poor adherence to lifestyle recommendations, treatment-related adverse effects, and the continuing risk of complications have increased interest in preventive, individualized, and integrative approaches to diabetes care.

In Ayurveda, diabetes mellitus may be broadly correlated with *Madhumeha*, which is described as a subtype and advanced stage of *Prameha*. *Prameha* comprises a group of metabolic and urinary disorders characterized mainly by increased quantity and altered quality of urine. It is classified into 20 types based on *Dosha* predominance: ten *Kaphaja*, six *Pittaja*, and four *Vataja Prameha*.^[6] *Madhumeha* is predominantly associated with aggravated *Vata Dosha* and is characterized by the passage of urine that is excessive, sweet, astringent, pale, and comparable to honey in its appearance or nature.^[7]

The principal causative factors of *Prameha* include excessive consumption of sweet, unctuous, heavy, cold, and liquid foods; excessive intake of milk products and newly harvested grains; sedentary habits; lack of physical activity; and excessive daytime sleep. These factors initially aggravate *Kapha Dosha* and contribute to impairment of *Agni*, formation of *Ama*, excessive *Kleda*, and disturbance of fat metabolism. The vitiated *Doshas* affect various *Dushyas*, particularly *Meda*, *Mamsa*, *Kleda*, *Rakta*, *Shukra*, *Vasa*, *Majja*, *Lasika*, *Rasa*, and *Ojas*, and subsequently involve the *Mutravaha Srotas*.^[8]

Ayurvedic management of *Prameha* is individualized according to the patient's constitution, physical strength, predominance of *Dosha*, stage of disease, body weight, digestive capacity, and associated complications. In obese and physically strong patients, *Apatarpana*, *Langhana*, *Shodhana*, controlled diet, and physical activity are emphasized. In lean or debilitated patients, carefully planned nourishing and *Vata-pacifying* measures may be required.⁹ Internal medicines possessing *Deepana*, *Pachana*, *Kledahara*, *Medohara*, and *Pramehaghna* properties may be used with appropriate dietary and lifestyle interventions.

Ayurveda places considerable importance on prevention through *Nidana Parivarjana*, regulation of food and daily activities, maintenance of healthy body weight, and regular exercise. These principles share common ground with contemporary recommendations for the prevention and control of type 2 diabetes. Nevertheless, Ayurvedic interventions should be used under qualified supervision and should complement prescribed diabetes treatment, regular glucose monitoring, and screening for complications rather than replace them.

The present review aims to explore the Ayurvedic understanding of diabetes with special reference to *Prameha* and *Madhumeha*, including their etiology, classification, pathogenesis, clinical manifestations, prevention, and management. It also examines the potential role of Ayurvedic dietary, lifestyle, and therapeutic principles within a safe, evidence-informed, and integrated approach to diabetes care.

AIM

To review the Ayurvedic concept, pathogenesis, prevention, and management of diabetes mellitus with special reference to *Prameha* and *Madhumeha*.

METHODOLOGY

Classical Ayurvedic texts, standard medical textbooks, and relevant research and review articles were systematically searched, reviewed, and analyzed.

Detailed Review

Diabetes Mellitus: A Contemporary Perspective

Diabetes mellitus is a group of chronic metabolic disorders characterized by persistent elevation of blood glucose. It develops when the pancreas does not produce sufficient insulin, when body tissues cannot effectively utilize insulin, or through a combination of both mechanisms. Insulin is essential for maintaining glucose homeostasis by facilitating the uptake and utilization of glucose by cells. Impairment of insulin secretion or action causes glucose to accumulate in the blood and produces disturbances in carbohydrate, protein, and fat metabolism.

Diabetes is broadly classified into type 1 diabetes, type 2 diabetes, gestational diabetes, and other specific forms. Type 1 diabetes results from autoimmune destruction of pancreatic beta cells and generally requires lifelong insulin therapy. Type 2 diabetes, the most common form, is characterized by insulin resistance and progressive beta-cell dysfunction. Gestational diabetes develops during pregnancy and increases the future risk of type 2 diabetes in both the mother and child.

Etiological Factors

Type 2 diabetes is a multifactorial disorder caused by interactions among genetic, metabolic, environmental, and behavioural factors. Important risk factors include:

- Family history of diabetes
- Overweight and obesity
- Abdominal fat accumulation
- Physical inactivity
- Excessive intake of refined carbohydrates and energy-dense foods
- Increasing age
- Chronic psychological stress
- Inadequate sleep
- Tobacco and excessive alcohol use
- History of gestational diabetes
- Polycystic ovarian syndrome

- Hypertension and dyslipidaemia
- Certain medicines and endocrine disorders

Pathophysiology

Insulin resistance and impaired insulin secretion are the principal abnormalities in type 2 diabetes. In the early stage, pancreatic beta cells compensate for insulin resistance by producing additional insulin. As the disease progresses, beta-cell function gradually declines and insulin production becomes insufficient to maintain normal blood glucose.

Excessive glucose production by the liver, reduced glucose uptake by skeletal muscles, increased breakdown of stored fat, altered secretion of gastrointestinal hormones, renal glucose reabsorption, and dysregulated appetite also contribute to hyperglycaemia. Chronic hyperglycaemia causes oxidative stress, inflammation, endothelial dysfunction, and tissue injury, leading to microvascular and macrovascular complications.

Clinical Manifestations

The classical symptoms of diabetes include:

- Excessive urination
- Excessive thirst
- Increased hunger
- Unexplained weight loss
- Fatigue and weakness
- Blurring of vision
- Recurrent infections
- Delayed wound healing
- Tingling or numbness in the hands and feet
- Dryness and itching of the skin
- Recurrent urinary or genital infections

Type 2 diabetes may remain asymptomatic for several years and may be detected during routine screening or after the development of a complication.

Diagnosis and Monitoring

Diabetes is diagnosed through laboratory investigations such as fasting plasma glucose, postprandial plasma glucose, oral glucose-tolerance testing, random plasma glucose in a symptomatic patient, and glycated haemoglobin. Abnormal findings generally require confirmation unless unequivocal hyperglycaemia with classical symptoms is present.

Regular monitoring includes blood glucose, glycated haemoglobin, blood pressure, body weight, lipid profile, kidney function, urine albumin, retinal examination, foot examination, and assessment for neuropathy and cardiovascular risk. The frequency of monitoring is individualized according to the type of diabetes, treatment, glucose control, and associated complications.

Complications

Acute complications include severe hypoglycaemia, diabetic ketoacidosis, and hyperosmolar hyperglycaemic state. Chronic complications are broadly divided into microvascular and macrovascular disorders.

Microvascular complications include:

- Diabetic retinopathy
- Diabetic nephropathy
- Diabetic neuropathy

Macrovascular complications include:

- Coronary artery disease
- Cerebrovascular disease
- Peripheral arterial disease

Diabetes may also cause foot ulcers, infections, sexual dysfunction, gastrointestinal disturbances, impaired immunity, cognitive decline, and poor wound healing.

Ayurvedic Concept of Prameha and Madhumeha

In Ayurveda, diabetes mellitus may be broadly correlated with *Madhumeha*, an advanced form of *Prameha*. *Prameha* represents a group of metabolic and urinary disorders characterized by increased quantity, frequency, turbidity, and altered quality of urine. The term includes a broad spectrum of abnormalities involving metabolism, adipose tissue, body fluids, and urinary excretion.

Madhumeha is characterized by the passage of urine that resembles honey in taste, colour, appearance, or nature. It is predominantly associated with aggravated *Vata Dosha* and depletion of vital body tissues and *Ojas*. Although *Madhumeha* shares several clinical features with diabetes mellitus, the two concepts should not be considered completely identical because Ayurvedic classification is based on *Dosha*, *Dushya*, constitution, disease progression, and clinical characteristics rather than laboratory glucose values alone.

Classification of Prameha

Ayurveda describes 20 types of *Prameha* based on the predominant *Dosha*:

- Ten types of *Kaphaja Prameha*
- Six types of *Pittaja Prameha*
- Four types of *Vataja Prameha*

Kaphaja Prameha generally represents an early stage dominated by excessive nourishment, heaviness, obesity, increased body fluids, and metabolic sluggishness. If causative factors continue and the disease is not properly managed, involvement of *Pitta* and progressive tissue disturbance may occur. In an advanced stage, aggravation of *Vata*, tissue depletion, weakness, and features of *Madhumeha* may develop.

Types of Madhumeha

Madhumeha may be understood through two principal mechanisms:

Avaranajanya Madhumeha

In this condition, aggravated *Kapha*, excessive *Meda*, and other disturbed tissues obstruct the normal movement of *Vata*. The obstructed *Vata* carries *Ojas* toward the urinary system, leading to its loss through urine. This form is commonly associated with excessive nourishment, obesity, physical inactivity, heaviness, and metabolic dysfunction.

Dhatukshayajanya Madhumeha

This form develops due to progressive depletion of body tissues and aggravation of *Vata*. It is commonly associated with weakness, emaciation, dryness, reduced strength, and loss of vitality. It is considered more difficult to manage because of the advanced involvement of *Vata* and *Ojas*.

Nidana

The causative factors of *Prameha* and *Madhumeha* include:

- Excessive consumption of sweet, sour, salty, heavy, unctuous, and cold foods
- Frequent intake of milk products, sugarcane preparations, jaggery, and newly harvested grains
- Excessive consumption of meat and fatty food
- Repeated overeating
- Lack of physical activity
- Prolonged sitting
- Excessive daytime sleep
- Lack of mental and physical discipline
- Genetic or familial susceptibility
- Disturbance of digestion and metabolism
- Obesity and excessive accumulation of *Meda*
- Chronic stress and inappropriate daily routines

These factors possess qualities similar to *Kapha* and promote excessive nourishment, increased *Kleda*, accumulation of *Meda*, weakening of *Agni*, and obstruction of the body's channels.

Purvarupa

The prodromal features of *Prameha* may include:

- Excessive sweating
- Unpleasant body odour
- Heaviness of the body
- Excessive sleep and drowsiness
- Laziness and lack of enthusiasm
- Excessive thirst
- Dryness of the mouth and palate
- Burning sensation in the hands and feet
- Attraction of ants toward urine
- Increased growth of hair and nails
- Coating or stickiness over the body

- Numbness or altered sensation
- Sweet taste in the mouth
- Increased quantity or turbidity of urine

Recognition of these early features is important because timely dietary and lifestyle correction may help prevent further progression.

Rupa

The principal features of established *Madhumeha* include excessive and frequent urination, sweet or turbid urine, excessive thirst, increased appetite, fatigue, weakness, dryness, and progressive loss of strength. Obese patients may initially present with heaviness, excessive sweating, lethargy, and increased body fat, whereas advanced disease may produce emaciation, dryness, muscular weakness, and reduced vitality.

Samprapti

The pathogenesis begins with continuous exposure to causative dietary and lifestyle factors. These factors aggravate *Kapha Dosha*, weaken *Agni*, and promote the formation of *Ama*. The aggravated *Kapha*, together with excessive *Meda* and *Kleda*, spreads through the body and affects metabolically vulnerable tissues.

The vitiated *Doshas* interact with *Meda*, *Mamsa*, *Kleda*, *Rakta*, *Shukra*, *Vasa*, *Majja*, *Lasika*, *Rasa*, and *Ojas*. They are subsequently carried toward the urinary system due to weakness or functional abnormality of the *Mutravaha Srotas*. This results in increased quantity and altered quality of urine.

With continuing disease progression, *Pitta* and later *Vata* become involved. Aggravated *Vata* may develop because of tissue depletion or obstruction by *Kapha* and *Meda*. When *Ojas* is displaced and excreted through urine, the disease manifests as *Madhumeha*.

Samprapti Ghataka

- **Dosha:** *Kapha* predominance initially, followed by *Pitta* and *Vata*
- **Dushya:** *Meda*, *Mamsa*, *Kleda*, *Rakta*, *Shukra*, *Vasa*, *Majja*, *Lasika*, *Rasa*, and *Ojas*
- **Agni:** *Jatharagni* and *Dhatvagni* impairment
- **Srotas:** Mainly *Medovaha* and *Mutravaha Srotas*
- **Srotodushti:** *Sanga*, excessive flow, and abnormal movement
- **Udbhava Sthana:** *Amashaya* and gastrointestinal metabolic system
- **Adhithana:** Whole body with predominant urinary and metabolic involvement
- **Vyakti Sthana:** *Mutravaha Srotas*
- **Rogamarga:** *Bahya* and *Madhyama Rogamarga*
- **Nature:** Chronic, progressive, and difficult to manage in advanced stages

Ayurvedic Management

Ayurvedic management is individualized according to the type and stage of *Prameha*, predominance of *Dosha*, body constitution, body weight, strength, digestive capacity, associated complications, and presence of *Ama*. The principal

objectives are to avoid causative factors, improve digestion and metabolism, reduce excessive *Kapha*, *Meda*, and *Kleda*, regulate *Vata*, preserve *Ojas*, and prevent complications.

Nidana Parivarjana

Avoidance of causative factors is the first and most important component of management. The patient should avoid overeating, excessive sweet and fatty food, prolonged sitting, excessive daytime sleep, irregular routines, tobacco use, and inappropriate alcohol intake. Dietary discipline, regular activity, adequate sleep, and stress management should be adopted.

Management According to Body Constitution

In obese and physically strong patients with *Kapha-Meda* predominance, reducing therapies such as *Langhana*, *Rukshana*, controlled dietary intake, physical exercise, and appropriately selected purification procedures may be considered.

In lean, weak, or tissue-depleted patients, excessive reducing therapy may worsen *Vata*. Such patients require carefully planned nourishment, strengthening measures, and *Vata*-pacifying treatment while maintaining glucose control.

Shodhana Chikitsa

Purification therapy may be considered in selected patients who are physically strong and clinically suitable. *Vamana* may be selected in predominant *Kapha* conditions, whereas *Virechana* may be considered when *Pitta* and metabolic waste are significantly involved. *Basti* may be useful when *Vata* predominance, dryness, weakness, or neuropathic manifestations are present.

These procedures should only be undertaken after detailed examination and under the supervision of a qualified Ayurvedic physician. They are not suitable for every patient, particularly those who are elderly, severely debilitated, pregnant, acutely ill, or affected by advanced complications.

Shamana Chikitsa

Internal medicines may be selected according to *Dosha*, *Dushya*, stage of disease, digestive capacity, and associated symptoms. Substances possessing *Tikta*, *Kashaya*, and *Katu Rasa*, as well as *Deepana*, *Pachana*, *Kledahara*, *Medohara*, and *Pramehaghna* properties, are commonly considered.

Frequently discussed medicinal plants include *Gudmar*, *Meshashringi*, *Jambu*, *Vijayasara*, *Haridra*, *Daruharidra*, *Amalaki*, *Haritaki*, *Bibhitaki*, *Nimba*, *Guduchi*, and *Karela*. Classical compound formulations may also be selected by a qualified practitioner. Their quality, dose, duration, safety, potential herb–drug interactions, and effects on blood glucose must be carefully monitored.

Ayurvedic medicines should not be presented as substitutes for insulin or other prescribed glucose-lowering medicines. Combining therapies without supervision may cause hypoglycaemia or other adverse effects.

Ahara

Dietary management is central to both prevention and treatment. Food should be selected according to body constitution, digestive capacity, body weight, glucose status, associated diseases, and treatment plan.

Suitable dietary principles include:

- Controlled portion sizes
- Regular meal timings
- Preference for fibre-rich vegetables
- Appropriate use of whole grains and pulses
- Limitation of refined carbohydrates and added sugars
- Avoidance of frequent fried and highly processed foods
- Selection of foods with lower glycaemic impact
- Adequate protein according to individual requirements
- Moderate use of healthy fats
- Avoidance of overeating and unnecessary snacking
- Individual adjustment in the presence of kidney or liver disease

Traditional dietary items such as barley, certain millets, green gram, bitter vegetables, and appropriately selected pulses may be incorporated according to individual tolerance and nutritional requirements. Dietary advice should remain practical, nutritionally adequate, and compatible with prescribed medical treatment.

Vihara and Exercise

Regular physical activity helps improve insulin sensitivity, glucose utilization, body-weight control, cardiovascular fitness, and psychological well-being. Exercise should be selected according to age, strength, glucose control, complications, and cardiovascular status.

Walking, yoga, stretching, resistance exercise, breathing practices, and moderate aerobic activity may be beneficial when appropriately prescribed. Patients with proliferative retinopathy, severe neuropathy, active foot ulcers, uncontrolled hypertension, cardiovascular disease, or recurrent hypoglycaemia require individualized exercise guidance.

Yoga and Stress Management

Chronic stress may influence eating patterns, sleep, hormonal balance, and glucose regulation. Yoga practices, relaxation techniques, breathing exercises, meditation, and adequate sleep may support stress reduction and improve adherence to treatment. These measures should complement rather than replace medical care.

Contemporary Management

Modern diabetes care aims to achieve safe glycaemic control, reduce cardiovascular and renal risk, prevent acute and chronic complications, and maintain quality of life. Management usually includes:

- Individualized nutrition therapy
- Regular physical activity
- Weight management
- Glucose-lowering medicines
- Insulin when indicated
- Blood-pressure management
- Lipid management

- Tobacco cessation
- Vaccination
- Screening for eye, kidney, nerve, cardiovascular, and foot complications
- Patient education and self-monitoring

Treatment selection depends on the type of diabetes, glucose level, age, body weight, kidney and liver function, cardiovascular status, risk of hypoglycaemia, pregnancy status, affordability, and patient preference.

Integrative Approach

An integrative approach may combine the preventive and lifestyle-oriented principles of Ayurveda with evidence-based diabetes diagnosis, monitoring, and pharmacological treatment. Ayurvedic assessment may help individualize diet, activity, daily routine, digestive support, and supportive therapies. Modern investigations provide objective information about glycaemic control, organ function, and complications.

Safe integration requires communication among healthcare professionals, use of quality-controlled products, monitoring of glucose levels, identification of potential herb–drug interactions, and avoidance of abrupt changes to prescribed medicines. Patients using insulin or glucose-lowering drugs require particular caution because the addition of herbal products, dietary restriction, or intensive exercise may increase the risk of hypoglycaemia.

Prevention

The Ayurvedic emphasis on *Nidana Parivarjana* is highly relevant to diabetes prevention. Important preventive measures include:

- Maintaining a healthy body weight
- Following a balanced and portion-controlled diet
- Performing regular physical activity
- Avoiding prolonged sitting
- Obtaining adequate sleep
- Managing psychological stress
- Avoiding tobacco
- Limiting alcohol
- Screening individuals at increased risk
- Managing hypertension and dyslipidaemia
- Monitoring women with a history of gestational diabetes
- Encouraging healthy habits from childhood

DISCUSSION

Diabetes mellitus and *Madhumeha* represent chronic metabolic conditions requiring continuous care. Contemporary medicine explains diabetes through insulin deficiency, insulin resistance, beta-cell dysfunction, and related metabolic abnormalities. Ayurveda describes *Prameha* through the interaction of disturbed *Dosha*, impaired *Agni*, excessive *Kapha*, *Meda*, and *Kleda*, involvement of multiple *Dushyas*, and abnormal functioning of the urinary channels.

Both systems recognize the importance of diet, physical activity, body weight, individual susceptibility, and early intervention. Ayurveda offers a broader preventive framework based on constitution, metabolism, daily routine, and behavioural factors. Contemporary medicine provides standardized diagnostic criteria, effective glucose-lowering treatment, and systematic screening for complications.

The two approaches may be complementary when integration is rational, individualized, and medically supervised. Claims that Ayurvedic treatment can permanently cure every case of diabetes should be avoided. Type 1 diabetes requires insulin, and many patients with type 2 diabetes require long-term medication to prevent complications.

CONCLUSION

Ayurveda understands diabetes through the concepts of *Prameha* and *Madhumeha*, involving disturbances of *Dosha*, *Agni*, *Meda*, *Kleda*, *Ojas*, and *Mutravaha Srotas*. Its management emphasizes avoidance of causative factors, dietary regulation, exercise, purification in selected patients, individualized internal medicines, and preservation of tissue strength.

A safe and comprehensive diabetes-management strategy should combine lifestyle modification and preventive Ayurvedic principles with regular blood-glucose monitoring, prescribed medical treatment, and systematic screening for complications. Further high-quality clinical research is required to establish the effectiveness, safety, dosage, and standardization of specific Ayurvedic interventions.

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