

A Comprehensive Etiopathogenetic Study on Madhumeha (Diabetes Mellitus) and the Therapeutic Potential of Classical Ayurvedic Formulations

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Abstract

India has a disproportionately high burden of diabetes mellitus, one of the metabolic diseases with the fastest rate of growth in the world. While controlling blood glucose levels is a major emphasis of modern medicine, underlying metabolic and psychological aetiologies are frequently not addressed holistically. On the other hand, under the heading of *Prameha*, notably *Madhumeha*, which is strongly related to Type 2 Diabetes Mellitus (T2DM), *Ayurveda* provides a deep, systemic understanding of metabolic imbalances. This thorough analysis connects contemporary metabolic pathophysiology with traditional *Ayurvedic* concepts to investigate the etiopathogenesis of *Madhumeha*. Additionally, it assesses the therapeutic justification for two traditional formulations: *Puga Khadir Kwatha* [Su. Chi. 11/9].^[1] and *Deepaniya Mahakashaya* [Ch.Su. 4/8]^[2] creating an integrative baseline for clinical comparison with conventional contemporary treatments like Glipizide.

Key words - *Madhumeha*, *Prameha*, *Puga Khadir Kwatha*, *Deepaniya Mahakashaya*,

1. Introduction

1.1 The Conceptual and Philosophical Basis of Ayurveda

In order to guaranty health and longevity, *Ayurveda*, the science of life, provides a dual framework that includes both preventive and therapeutic procedures.

According to *Acharya Charaka* in *Charak Sutra Sthana* (1/46), the fundamental contribution of *Ayurveda* is the treatment of the living human being (*Purusa*) as an absolute, indivisible agglomeration of the physical body (*Pancha Mahabhutatmaka Sharir*), the mind (*Satva*), and the spirit (*Atma*).^[3]

Health is a dynamic balance rather than a static state. The definition of life itself is *Nityaga* (Cha.Su. 1/42), which means that the body's structural and functional elements the *Doshas* (bio-regulatory forces), *Dhatus*, and *Malas* as well as the mind (*Satva*, *Raja*, *Tama*) undergo constant physiological changes. Variations in fundamental *Gunas* control these fluctuations. *Dravya*, which is fundamental to the *Chikitsa Chatuspad*,^[4] [Cha.Su. 9/3] is the sole means of disease mitigation in classical therapies. Each *Dravya* has particular *Gunas* that are directly in charge of its healing properties (*Karma*).

Karma has active qualities (*Chestya*), but *Guna* is intrinsically static or inactive (*Nischestya*). This means that any medicine's clinical effects immediately reflect its underlying qualitative composition.^[5] [Cha.Su. 1/49]

1.2 Metabolic Diseases' Origins

Properties like *Guru*, *Snigdha*, *Sthula*, and *Sandra* are highlighted in *Acharya Charaka's* discussion on *Gurvadi Gunas*.^[6] [Su.Su.46/514-525] Their particular elemental composition gives them these physical characteristics (*Panchbhautik Sangathana*).^[7] [Cha.Su. 26/40]

An inappropriate rise in *Kapha Dosha* and *Meda Dhatu* (adipose tissue) occurs when a person's eating choices and lack of exercise correspond to these specific qualitative qualities. A group of illnesses called *Medovridhijanya Roga* are caused by this metabolic overload.^[8] [Su.su.15/37]

The unrelenting pursuit of material and professional objectives has jeopardised human health in contemporary culture. An epidemic of lifestyle disorders has been caused by sedentary behaviour, artificial routines, and disregard for natural laws, such as *Dincharya*, *Ritucharya*, and *Ashta Ahara Vidhi Visheshayatana* (dietetic norms).

Among these, Type 2 Diabetes Mellitus is the most catastrophic metabolic crisis, along with obesity, hypertension, and hyperlipidemia.

1.3 The Global and National Burden of Diabetes

The World Health Organization's (WHO) early predictions have been far exceeded by the current transition into the twenty-first century by 2021; the number of people with diabetes has increased dramatically worldwide, with India being the "diabetes capital" of the globe, home to almost 74 million diabetics.^[9]

Year	IDDM Prevalence (Millions)	NIDDM Prevalence (Millions)	Total Global Prevalence (Millions)
1994	11.5	98.9	110.4
2000	18.1	157.3	175.4
2010	23.7	215.6	239.3

2. Research Core & Methodology

2.1 Research Question

Is there a significant difference in the clinical efficacy among patients treated with *Deepniya Mahakashaya churna*, *Puga Khadir Kwath* and Glypizyde ?

2.2 Primary Research Hypotheses

Null Hypothesis (H₀): There may not have significant difference between the three groups—*Deepniya Mahakashaya churna* (Group A), *Puga Khadir Kwath* (Group B), and Glypizyde (Group C) in *Madhumeha*

Alternative Hypothesis (H₁): *Deepniya Mahakashaya churna* (Group A) is more effective than the *Puga Khadir Kwath* (Group B) and Glypizyde (Group C) in *Madhumeha*.

Alternative Hypothesis (H₂): *Deepniya Mahakashaya churna* (Group A) and *Puga Khadir Kwath* (Group B) are more effective than the standard drug Glypizyde (Group C) in *Madhumeha*.

2.3 Aims and Objectives

Aim

To comprehensively study the etiopathogenesis of *Madhumeha* with special reference to Diabetes Mellitus and evaluate the therapeutic efficacy of classical compound formulation.

Objectives:

- To assess the presence of various etiological factors explained by *Ayurvedic* in the diagnosed cases of *Madhumeha*.
- To establish a relationship of *Nidanas* mentioned in *Ayurvedic* and Modern Literature.
- To analyze the pathogenesis of *Madhumeha* (DM).
- To assess the efficacy of "classical formulations" *Deepniya Mahakashaya Ch. Sutra 4/8 (6)* & *Puga Khadir Kwath (Su. Chi. 11/9)* in *Madhumeha* (DM).

3. Review of Literature

3.1 Etymology, Definitions, and Classifications

The term **Prameha** is an extension of the prefix *Pra* combined with the root verb *Mih Sechane*. Clinically, it describes a pathology characterized by the continuous excretion of excessive, turbid urine.

The term **Madhumeha** blends two components: *Madhu* and *Meha*. Thus, *Madhumeha* refers to a systemic metabolic state where the urine matches honey in color, taste, odor, and consistency. ^[10,11]

3.2 Comprehensive Ayurvedic Classification Systems

Ayurvedic literature categorizes *Prameha* across four main axes to guide prognosis and treatment selection:

3.2.1 Doshic Classification across Major Samhitas

Doshic Category	Acharya Charaka	Acharya Sushruta	Acharya Vagbhata
Kaphaja Meha (10 Types)	1. Udakameha, 2. Ikshualikameha, 3. Sandrameha, 4. Sandraprasadameha, 5. Shuklameha, 6. Shukrameha, 7. Sheetameha, 8. Sanaimeha, 9. Alalameha, 10. Psitameha	1. Udakameha, 2. Ikshumeha, 3. Sandrameha, 4. Siktameha, 5. Lavanameha, 6. Pishtameha, 7. Surameha, 8. Phenameha, 9. Lalameha, 10. Sanaimeha	1. Udakameha, 2. Ikshumeha, 3. Sandrameha, 4. Siktameha, 5. Sheetameha, 6. Surameha, 7. Shukrameha, 8. Lalameha, 9. Sanaimeha, 10. Pishtameha
Pittaja Meha (6 Types)	1. Ksharameha, 2. Kalameha, 3. Neelameha, 4. Haridrameha, 5. Manjishthameha, 6. Raktameha	1. Ksharameha, 2. Amlameha, 3. Neelameha, 4. Shonitameha, 5. Manjishthameha, 6. Haridrameha	1. Ksharameha, 2. Kalameha, 3. Neelameha, 4. Lohitameha, 5. Manjishthameha, 6. Haridrameha
Vataja Meha (4 Types)	1. Vasameha, 2. Majjameha, 3. Hastimeha, 4. Madhumeha	1. Vasameha, 2. Sarpimeha, 3. Hastimeha, 4. Kshaudrameha	1. Vasameha, 2. Majjameha, 3. Hastimeha, 4. Madhumeha

3.2.2 Prognostic ^[12]

- **Sadhya** : Typically observed in *Sthula* patients with *Kaphaja* dominance.
- **Yapya** : Observed when *Pitta* dominates the pathology.
- **Asadhya (Incurable)**: Associated with *Krishha* individuals, *Sahaja*

4. Etiopathogenesis: Bridging Ayurveda and Modern Science

4.1 Theoretical Integration of *Nidana*

4.1.1 *Ahara Nidana* ^[13]

The illness is brought on by consuming excessive amounts of meals with *Madhura*, *Snigdha*, and *Guru* attributes. *Dadhi*, *Ikshu Vikara*, *Navanna*, *Sura*, *Asava* is some meals that pose a particular risk.

4.1.2 Vihara Nidana ^[14]

The main causes are a *Asyasukha*, *Divaswapna*, and *Avyayama*. These behaviours lower systemic energy expenditure, which results in a state of *Medodushti* and *Agnimandya*.

4.1.3 Manasika Nidana

Prameha, especially *Vatika* versions, are known to be independently caused by chronic emotional discomfort, which includes *Chinta*, *Shoka*, *Bhaya*, and *Krodha*. All three levels of *Agni Jatharagni*, *Dhatvagni*, and *Bhutagni* are weakened by mental stress, which results in inadequate digestion and the build-up of *Ama*.

4.1.4 Sahaja Nidana

Sahaja Prameha is caused by structural flaws in the reproductive elements of the parents *Shukranu* and *Dimba*. This genetic line is broken down into three distinct levels by *Acharya Charaka*: *Beeja*, *Beeja-bhaga*, and *Beeja-bhagavayava*.

5. Samprapti ^[15]

The progression of *Prameha* follows the *Shatkriyakala* :



5.1 The following are *Dushya* involved in *Madhumeha*:

Meda: The tissue involved is *Bahu* and *Abaddha*. This describes a state of lipotoxicity, where adipose tissue fails to store lipids safely, leading to ectopic fat accumulation in the liver, pancreas, and skeletal muscle.

Mamsa : The muscle tissue loses its natural tone, resulting in a state of *Shaithilya*. This tissue degradation mimics systemic protein catabolism driven by insulin deficiency.

Sharira Kleda & Udaka : The body's fluid management mechanisms collapse under an influx of un-metabolized fluid wastes. This fluid accumulation flows into the urinary tract (*Mutravaha Srotas*), causing the classic symptoms of *Prabhuta Mutrata* (polyuria) and *Avila Mutrata* (turbid, high-density urine).

6. Clinical Symptomatology

6.1 Purvarupa ^[16]

Identifying early warning signs is vital for preventing permanent tissue damage.

- *Karapada Daha / Suptata*
- *Mukha Madhurya*
- *Mukha Talu Kantha Shosha*
- *Pipasa Adhikya*
- *Alasya / Nidra / Tandra*
- *Visra Sharira Gandha*
- *Shatpada Pipilakabhi Mutrabhisaranam*
- *Kesha Nakha Ativriddhi*

6.2 Rupa ^[17]

When the pathology matures, the diagnostic signs expand from localized urinary changes to systemic symptoms:

6.2.1 Cardinal Urinary Signs

- *Prabhuta Mutrata* (Polyuria)
- *Avila Mutrata* (Turbidity)

6.2.2 Systemic Symptoms

- *Kshudhadhikya* (Polyphagia)

- *Daurbalya & Karshya*
- *Rukshata*

7. Pharmacological Review of Classical Formulations

To counter the complex pathogenesis of *Madhumeha*, this study utilizes two classical Ayurvedic formulations.

7.1 Formulation 1: *Deepaniya Mahakashaya*

7.1.1 Ingredients

Pippali, Pippalimoola, Chavya, Chitrak, Shringavera, Amlavetasa, Maricha, Ajamoda, Bhallataka, Beej, and Hingu.

7.1.2 Mechanism of Action

Agni Deepana & Ama Pachana: Collectively, these herbs possess *Laghu* (light) and *Ruksha* (dry) properties, paired with *Katu* (pungent) and *Amla* (sour) tastes. This combination creates a potent *Ushna* (heating) bio-thermal effect.

7.2 Formulation 2: *Puga Khadir Kwatha*

This formulation features a simplified, highly focused design, combining two primary ingredients in equal proportions:

7.2.1 Ingredients

1. **Khadira** (*Acacia catechu*)
2. **Puga** (*Areca catechu*)

7.2.2 Mechanism of Action

Medohara & Kleda-Upashosana: This formulation relies on a strong *Kashaya* (astringent) taste and *Ruksha* (drying) quality. It acts directly on loose fluid accumulations (*Kleda*) and unstructured adipose tissues (*Bahu-Abaddha Meda*). It helps consolidate these tissues and counters the systemic liquefaction driving polyuria.

Enzymatic Inhibition: *Acacia catechu* is rich in polyphenols, specifically catechins, epicatechins, and taxifolin.

Pancreatic Beta-Cell Protection: The intense antioxidant profile of this formulation scavenges reactive oxygen species (ROS) within the pancreas.

8. Historical Clinical Trials & Comparative Analysis

To evaluate the potential outcomes of these experimental formulations, we must analyze prior clinical research examining related *Ayurvedic* interventions for T2DM management:

9. Material & Methods

9.1 Study Design: A randomized, open-label, comparative clinical trial.

9.1.1 Setting & Sample Size: Conducted at the **Government Ayurveda College & Hospital, Jabalpur** with **N = 60 patients** distributed evenly across three arms ($n = 20$ per group).

9.1.2 Inclusion Criteria

- Diagnosed cases of *Madhumeha* (DM).
- Patients with mild hypertension and controlled diabetes mellitus were included.
- Apparently normal individuals between 30-70 years of age exposed to various type of stress.
- Patients will be including complaints of *Purvarupas* of *Prameha*.

9.1.3 Exclusion Criteria

- Patients of age less than 30 years and above 70 Years.
- Patients taking drugs like corticosteroids, tricyclic antidepressant, cyproheptadine which leads to weight gain.
- Secondary Diabetes Mellitus.
- Patients with complaints of complication of DM and Gestational DM.

9.1.3 Diagnostic Criteria

9.1.3.1 Ayurvedic Diagnostic Criteria (*Madhumeha*)

Diagnosis was made based on classical *Lakshanas* described in *Ayurvedic* texts:

- *Chala, Sphiga, Udara* and *Stana*,
- *Ayathopachaya, Prabhoot Mootrata*,
- *Aavil Mootrata, Pipasaddhikya, Kshudhadhikya*,
- *Swedatipravritti, Daurbalya, Aalasya, Atinidra*,
- *Vibandh, Malavritta Jihwa, Kar-Paada Daha*,
- *Mukhmadhurya, Tandra, Krichvyavyata, Sandhi Shula*

9.1.3.2 Modern Diagnostic Criteria (Type 2 Diabetes Mellitus)

Diagnosis was confirmed according to American Diabetes Association (ADA) criteria:

- Fasting Blood Sugar (FBS) ≥ 126 mg/dl
- Post-Prandial Blood Sugar (PPBS) ≥ 200 mg/dl
- HbA1c $\geq 6.5\%$
- Hematological - T.L.C., D.L.C., E.S.R., Hb%
- Biochemistry - F.B.S., P.P.B.S., HbA1C
- Urine Examination - Routine and microscopic

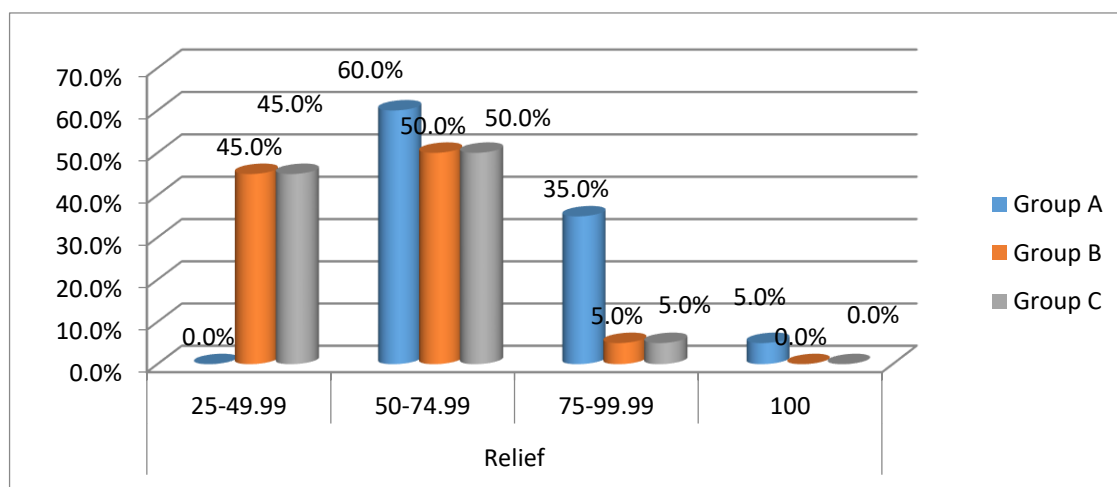
9.1.3.3 Table No: Comparative Drug

Clinical / Operational Parameter	Group A: <i>Deepaniya Mahakashaya Churna</i>	Group B: <i>Puga Khadir Kwatha</i>	Group C: Standard Modern Drug (Glipizide)
Form of Drug	<i>Churna</i>	<i>Kwath</i>	Tablet
Dose	2-2.5 gm	50 ml	5 mg
Mode of Administration	Oral	Oral	Oral
Time of Administration	twice daily	twice daily	OD
Anupana	Lukewarm water	Lukewarm water	Lukewarm water
Treatment Duration	90 Days.	90 Days.	90 Days.
Follow-up Period	One Month.	One Month.	One Month.

9.1.3.4 Table No : Overall Effect of Therapy

Group	Relief				Total
	25-49.99	50-74.99	75.99	100	
Group A	0	12	7	1	20
	0.0%	60.0%	35.0%	5.0%	100.0%
Group B	9	10	1	0	20
	45.0%	50.0%	5.0%	0.0%	100.0%

Group C	9	10	1	0	20
	45.0%	50.0%	5.0%	0.0%	100.0%
Total	18	32	9	1	60
	30.0%	53.3%	15.0%	1.7%	100.0%



9.1.3.5 Table No: Overall Effect of Therapy

The data proves that Group A (*Deepniya Mahakashaya churna*) achieved the highest efficacy, with 40.0% of patients experiencing marked to complete improvement (75–100% relief), including the only case of complete remission (5.0%). Conversely, Groups B (*Puga Khadir Kwath*) and C (*Glypizyde*) showed identical, moderate responses, with 95.0% of their respective cohorts clustered strictly between mild and moderate improvement tiers (25–74.99% relief) and no cases reaching complete recovery.

Consequently, the **Null Hypothesis is rejected**, and the **Alternative Hypothesis is accepted**, confirming a statistically significant difference in clinical efficacy among patients treated with *Deepniya Mahakashaya churna*, *Puga Khadir Kwath*, and *Glypizyde*.

10. Discussion & Clinical Rationale

Madhumeha is a systemic breakdown of *Agni* affecting *Meda*, *Mamsa*, and *Udaka*, mirroring the modern medical shift from glucose-centric management toward treating cellular insulin resistance and chronic tissue inflammation.

The trial formulations provide distinct, complementary mechanisms: *Deepaniya Mahakashaya* utilizes pungent, heating properties to clear *Ama* blockages, optimizing cell-level *Agni* and insulin sensitivity, whereas *Puga Khadir Kwatha* applies astringent, drying properties to bind excess *Kleda* (fluids) and slow down intestinal carbohydrate absorption.

Unlike conventional sulfonylureas like Glipizide which force pancreatic insulin release and risk beta-cell exhaustion, hypoglycemia, and weight gain—this dual botanical protocol safely corrects the root metabolic error, offering a sustainable, long-term therapeutic strategy for Type 2 Diabetes Mellitus.

11. Conclusion

Madhumeha represents a complex metabolic disorder that mirrors the clinical progression of Type 2 Diabetes Mellitus. This review highlights that its treatment requires a holistic approach that goes beyond simply lowering blood sugar numbers. Bridging classical Ayurvedic concepts shows that *Deepaniya Mahakashaya* and *Puga Khadir Kwatha* work through synergistic pathways to address the systemic imbalances driving disease.

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