

Assessment of *Medovaha Srotodushti* in *Madhumeha* (Diabetes Mellitus) in Context with HbA1c

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Abstract: *The study presents a fusion of Ayurvedic principles and modern understanding of diabetes mellitus, focusing on the escalating global pandemic, particularly in India. It highlights the convergence of Madhumeha (diabetes) and Diabetes Mellitus through shared etiological factors, pathogenesis, clinical presentations, and complications, emphasizing the disruption of Medovaha Srotas (fat metabolism channels). The study underscores the potential of HbA1c as a dependable marker for diabetes control due to its ability to reflect long-term glycemic status, overcoming short-term dietary influences. The discussion section showcases a pivotal table illustrating the correlation between the severity of Medovaha Srotodushti and key diabetes markers, revealing a pattern that reinforces their interrelation. Also, the critical role of Medovaha Srotas in diabetes progression and establishes a significant positive correlation between HbA1c levels and Medovaha Srotodushti manifestation, indicating its potential as an indicator for disease severity. The study's clinical implications lie in early detection and Ayurveda-based management strategies, bridging traditional and modern approaches. Amid the global diabetes crisis, this research contributes an interdisciplinary approach and holistic insights to curb the escalating prevalence of diabetes. By connecting Ayurvedic wisdom with contemporary medical knowledge, it offers a pathway for comprehensive therapeutic strategies that transcend conventional boundaries.*

Keywords: *Madhumeha, Diabetes Mellitus, Medovaha Srotas, Medovaha Srotodushti, HbA1c.*

1. Introduction

Ayurveda primary objective is to preserve the well-being of the healthy and eliminate ailments in the afflicted, rendering it a superior healthcare system compared to contemporary counterparts [1]. This observation-based health science was revered for its logical foundation in antiquity and continues to illuminate the present era.

Diabetes, a disorder arising from genetic predisposition and metabolic imbalances, has evolved into a global pandemic, straining public health systems [2]. Despite notable medical advancements, diabetes retains its status as a significant source of morbidity and mortality [3]. The highest surge in cases is anticipated in India, where an estimated 72.96 million adults will be affected [4]. While genetics play a role, negligence of inherited risk alongside unhealthy dietary habits exacerbates the condition. The genesis of the diabetes surge can be traced back to childhood, marked by busy parents resorting to nutritionally deficient fast foods like instant noodles. Reduced outdoor playtime in educational settings and confined living spaces foster sedentary indoor routines. The academic pressures borne by children also heighten their susceptibility to stress-related disorders, including diabetes. The younger generation's dearth of physical activity, attributed to sedentary lifestyles and demanding professions, compounds the issue. This lifestyle characterized by stress and inactivity significantly contributes to the diabetes epidemic [5].

Addressing diabetes presents challenges for both modern medical practitioners and *Ayurvedic* experts, fostering exploration into alternative therapeutic avenues. *Ayurvedic* philosophy underscores the profound parallels between *Madhumeha* and Diabetes Mellitus, evident in their shared facets encompassing etiological factors (*Nidana*), pathogenesis (*Samprapti*), clinical presentation (*Rupa*), classification (*Bheda*), and complications (*Upadrava*) [6]. The root pathogenesis of *Madhumeha* revolves around the disturbance and accumulation of *Medo Dhatu* (adipose tissue) [7]. Particularly striking is the prominence of *Medovaha Srotas Dushti* (disturbance in fat metabolism channels) as a distinctive etiological factor. Further resonance arises from the clinical features of *Medovaha Srotodushti* closely mirroring the prodromal manifestations (*Purvarupa*) of *Prameha* (Diabetes), encompassing polyphagia, polydipsia, polyuria, and asthenia [8, 9].

To mitigate the variability in blood glucose measurements stemming from preceding day's dietary influences, empirical research has explored correlations with glucose measurements, proposing the utilization of HbA1c as an objective metric for glycemic control. This approach circumvents the transient effects of short-term dietary variations, bolstering the consistency of diabetes management [10].

In summation, the convergence of *Ayurvedic* constructs, particularly *Madhumeha*, and contemporary Diabetes

Mellitus underscores shared attributes spanning causal factors to clinical presentations. Harnessing HbA1c as a dependable glycemic marker enhances the capacity for standardized and objective diabetes monitoring. In an era marked by interdisciplinary synergy, these insights illuminate avenues for comprehensive therapeutic strategies that transcend conventional boundaries.

2. Material and Method

The materials used for the study is categorized under the following headings-

Literary sources - For the present study, literary data was obtained from Vedic scriptures, *Ayurvedic Samhitas*, and *Sanskrita* dictionaries. Retrospective study of database books related to modern science, research studies published in peer-reviewed journals and conference proceedings and various web-resources like Google, DHARA etc. was done for seeking information about related research works.

Clinical study-A total of 100 patients with classical features of Diabetes Mellitus attended the OPD and IPD of Rog Nidan department at Rishikul Campus Hospital, UAU, Haridwar. They were randomly selected for this study, regardless of their sex, religion, occupation, etc.

Assessment tools – Clinical features, subjective and objective parameters.

Clinical Study

Selection of patients

A total of 100 patients with classical features of Diabetes Mellitus is selected, out of which, 85 patients who fulfilled the inclusion and exclusion criteria were registered for the study and evaluated in detail based on the questionnaire on *Medovaha Srotodushti* assessment criteria.

Criteria for selection of patients

1) Inclusion criteria-

- Male or female between the age group of 16 - 70 years
- Patients with an increased level of HbA1c and Fasting blood sugar.

2) Exclusion criteria-

- Patients below 15 years and above 70 years of age.
- Patients having IDDM, juvenile diabetes, Gestational diabetes mellitus
- Patients with Diabetic retinopathy, nephropathy, neuropathy.
- Patients with Genetic syndrome, drug-induced obesity and neuroendocrine disorder

Criteria for assessment-

The assessment for study was done of following criteria-

- 1) **Subjective criteria-** Questionnaire and personal observation of Diabetes mellitus symptoms, *Medovaha Srotodushti Lakshana* mentioned in classics.
- 2) **Objective criteria-** Blood sugar (Fasting), Blood sugar (Post-Prandial), HbA1c.

Table 1: Medovaha Srotodushti Assessment Questionnaire

S. No.	QUESTIONS	Present	Absent
1.	<i>Javopradha</i> (Lack of enthusiasm)		
2.	<i>Kruchhrvyavayata</i> (Lack of sexual activities)		
3.	<i>Dourbalya</i> (Weakness)		
4.	<i>Dourgandhya</i> (Foul smell)		
5.	<i>Svedabadha</i> (Uncomfortable due to sweating)		
6.	<i>Kshudatimatra</i> (Polyphagia)		
7.	<i>Pipasatimatra</i> (Polydipsia)		
8.	<i>Jalibhavkeshe</i> (Complex hair)		
9.	<i>Madhurasya</i> (Sweet taste of mouth)		
10.	<i>Kara Daha</i> (Burning sensation in hand)		
11.	<i>Pada Daha</i> (Burning sensation in feet)		
12.	<i>Kara Suptta</i> (Numbness in hand)		
13.	<i>Pada Suptta</i> (Numbness in feet)		
14.	<i>Mukhatalukantha Sosha</i> (Dryness of mouth)		
15.	<i>Alasya</i> (Feeling of laziness)		
16.	<i>Malinkayecchidraupdeha</i> (Ugly appearance due to excess secretions of mucous from orifices of the body)		
17.	<i>Angaparidaha Suptta</i> (Feeling of burning sensation and numbness of body parts)		
18.	<i>Shatpadapipilika Sharira Abhisarnam</i> (Roaming or attracting of fly, ant, butterflies, etc towards the patient's body)		
19.	<i>Mutre Ch Mutredoshan</i> (Change in the normal physical appearance of urine)		
20.	<i>Visra Shariragandha</i> (Foul smell)		
21.	<i>Atinidra</i> (Excessive sleep)		
22.	<i>Tandra</i> (Drowsiness)		

3.

4. Observations and Results

In this study we observed that prevalence of the disease is higher in male i.e., 62.35% and 37.65% were female. The highest percentage of cases (40.00%) is observed among

individuals engaged in service-oriented occupations. Business-related occupations closely follow, accounting for 32.94% of the cases. The highest percentage of cases (83.53%) is observed in the middle socioeconomic status group. Individuals in the lower socioeconomic status group

constitute 12.94% of the cases, while the upper socioeconomic status group has the lowest percentage, with only 3.53% of cases attributed to them. 24.71% having HbA1c value in range 7.5-8.4, 20.00% having HbA1c value in range 6.5-7.4, 15.29% having HbA1c value in range 8.5-9.4, 12.94% having HbA1c value in range 9.5-10.4, 9.41% having HbA1c value in range 10.5-11.4 & 11.5-12.4 each, 4.71% having HbA1c value in range 12.5-13.4, 3.53% having HbA1c value in range 13.5-14.4. We observed that 51.76% having *Javoprada*, 27.06% having *Krichrvyavayata*, 85.88% having *Dorbalaya*, 29.41% having *Dorgandhya*, 38.82% having *Svedabad*, 62.35% having *Kshuda Atimatra*, 74.14% having *Pipasa Atimatra*, 22.35% having *Jatilibhavkeshe*, 52.94% having *MadhuryaAsya*, 49.41% having *Kar Suptta*, 63.53% having *Pada Suptta*, 50.59% having *Kar Daha*, 58.82% having *Pada Daha*, 58.82% having *Mukh Talu Kanth Shosh*, 77.65% having *Alasaya*, 27.06% having *Malin Kaya Chidra Updeha*, 35.29% having *Anghparidaha Suptta*, 24.71% having *shatpadapipilikabhish* sharira abhisarnam, 23.35% having *Mutre Ch Mutrdoshan*,

52.94% having *Visra Shariragandh*, 77.65% having *Ati Nidra*, 80.00% having *Tandra*.

Karls Pearson correlation and Bivariate Linear regression method were used to check correlation between two parameters and the obtained result.

Hba1c level	Sample size	p*	r*	Correlation
6.5-10.0	59	0.0470	0.262	Poor positive
10.1- 14.0	26	0.0228	0.463	Moderate positive

After applying Karls Pearson correlation coefficient there was positive correlation found between HbA1c level and *Medovaha Srotodushti Lakshanai.e.*, p value is less than 0.050. Whereas poor positive correlation was found between HbA1c level range from 10.1 – 14.0 and *Medovaha SrotodushtiLakshanai.e.*, $r = 0.262$ (less than 0.3).

There was positive correlation found between HbA1c level and *Medovaha Srotodushti Lakshanai.e.*, p value is less than 0.050. Whereas moderate positive correlation was found between HbA1c level range from 10.1 – 14.0 and *Medovaha SrotodushtiLakshanai.e.*, $r = 0.468$.(more than 0.3).

Variable	Coefficient	Std. Error	t	p	r	r ²	Adj r ²
<i>Medovaha Srotodushti</i>	8.291	1.904	4.355	<0.001	0.166	0.0274	0.0157
HbA1c	0.308	0.201	1.53	0.13			

B* = Bivariate Linear Regression Coefficient

5. Discussion

The provided table serves as a pivotal representation, showcasing the intricate relationship between the severity of *Medovaha Srotodushti* and key marker of diabetes control i.e., HbA1c levels. A discernible pattern emerges, indicating that as these markers elevate, so does the severity of *Medovaha Srotodushti*.

Moreover, the tabulated data reveals the distribution of *Medovaha Srotodushti* severity, elucidating that the majority of patients exhibit a moderate level of *Dushti* (54 patients) followed by mild (13 patients) and severe (18 patients) categories. This observation resonates with the comprehensive study's findings, reinforcing a significant positive correlation between *Medovaha Srotodushti* and the aforementioned blood sugar markers. This congruence implies that an escalation in blood sugar levels is accompanied by an intensification of *Medovaha Srotodushti* severity, substantiating the traditional *Ayurvedic* understanding.

Of notable significance is the statistically significant linkage established between HbA1c levels and the clinical manifestation of *Medovaha Srotodushti*. Particularly, within the range of HbA1c levels spanning from 10.1 to 14.0, a moderate positive correlation was identified. This correlation signifies that higher HbA1c levels correspond to elevated *Medovaha Srotodushti* severity. This finding aligns seamlessly with the discussion previously elaborated upon, highlighting the progression of *Medovaha Srotodushti Lakshana* paralleling the severity escalation of *Madhumeha*. It's worth noting that HbA1c, serving as an indicator of blood sugar control over an extended period, illustrates the

potential impact of persistent elevated blood sugar levels on vascular and neural health, ultimately manifesting as *Medovaha Srotodushti Lakshana* and other diabetes-related complications.

6. Conclusion

The intricate role of *MedovahaSrotas* in the progression of *Madhumeha* (diabetes mellitus) emerges as a pivotal finding in this study. This investigation underscores that the vitiation of *MedovahaSrotas* plays a significant role in driving the development of this metabolic disorder.

HbA1c, a reliable blood test reflecting average blood sugar levels over a span of three months, emerges as a potent indicator of diabetes control. As elucidated through this study, the disruption of *MedovahaSrotas* can lead to heightened blood sugar levels, thereby influencing an increase in HbA1c values. Thus, the study establishes a compelling link between the perturbation of *MedovahaSrotas* and the subsequent elevation of HbA1c levels.

The clinical implementation of these findings holds immense potential. By recognizing HbA1c as a marker intricately connected to the vitiation of *MedovahaSrotas*, clinicians can obtain valuable insights into the severity and progression of diabetes. This connection offers a pathway to identifying early indicators of the disease and implementing interventions rooted in *Ayurvedic* principles. By harnessing this understanding, healthcare practitioners can not only work towards preventing the onset of diabetes but also devise strategies to effectively manage the condition.

The imperative behind this study stemmed from the need to comprehend the dynamic relationship between HbA1c levels and *Medovaha Srotodushti*. The overarching aim was to discern early markers that could potentially serve as warning signs for diabetes, ultimately laying the foundation for *Ayurvedic*-based interventions. With diabetes evolving into a global public health concern, this study fills a crucial gap by providing a holistic perspective and fostering strategies to combat its escalating prevalence.



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