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EXPLORING CHARAKOKTA DUSHYA INVOLVEMENT IN MADHUMEHA: AN OBSERVATIONAL STUDY OF TYPE 2 DIABETES MELLITUS

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Abstract:

Background: Madhumeha (Diabetes Mellitus Type 2) is a serious, lifelong condition. It touches almost every part of life. It can cause various health problems over time ranging from neuropathy, nephropathy to retinopathy. The importance of diagnosing the disease before initiating treatment is emphasized, as proper therapeutic measures can only be applied once the disease and its cause are properly identified. **Aim and objectives:** This study aimed to investigate the involvement of Dushya in Madhumeha according to both Ayurvedic and modern medical perspectives. **Materials and Methods:** The research was conducted in two phases, conceptual and clinical, with a sample size of 140 patients. The study assessed Dushya involvement in Madhumeha patients based on age, chronicity of the disease, and blood sugar levels. **Results:** The findings indicate the significant involvement of various Dushyas in Madhumeha, with Oja Dushti being predominantly observed. Dominion of Rasavaha Srotasa Dushti was observed followed by Medovaha, Asthivaha, Majjavaha Srotasa Dushti descendingly. The substantial involvement of the Annavaha, Raktavaha, Shukravaha, Purishavaha and Swedavaha Srotasa suggests that disruptions in the respective Dushya and their functions. **Conclusion:** The study concluded that the Dushyas mentioned by Charakacharya were found to be involved in Madhumeha along with Asthi, Mutra, Sweda, Purisha in addition to Charaka samhita in present days with predominant involvement of Oja Dushti seen. It emphasized the equal distribution of Dushya involvement in all age groups and chronicity of the disease, indicating no progressive Dushya involvement with respect to age or chronicity. Additionally, the study found a progressive involvement of specific Meda, Majja, Lasika and Oja Dushyas with increasing blood sugar levels. The conclusion emphasized the need for further research with larger sample sizes and the exploration of single Dushya involvement evaluation.

Keywords: Madhumeha, Dushya Dushti, Srotasa Dushti, Diabetes Mellitus.

INTRODUCTION:

As the man became civilized and designed things for his luxury, convenience, pleasure; But then soon he suited slaves to them. As he was developing faster, his physical activity reduced and mental stress increased. People have no time even for healthy food. This lifestyle causes lack of exercise, unnecessary intake of fast food, burden of mental stress, the overpowering race to survive in the race of the world. This type of lifestyle leads to a number of diseases, one of them is Diabetes Mellitus. Prameha is Anushangi Vyadhi, Commentator Chakrapani explained the meaning as Punarbhavi (common recurrence) which signifies it a lifestyle disorder. [1]

Madhumeha (Diabetes Mellitus Type 2) a type of Prameha, is a serious, lifelong condition. It touches almost every part of life and can cause various health problems over time ranging from neuropathy, nephropathy to retinopathy. It causes impairment in the peripheral blood flow and micro vasculature and leads to end organ damage. [2] India has been projected by WHO as the country with the fastest growing population of diabetic patients. It is estimated that between 1995 to 2025 diabetic patient in India will increased by 195 %. [3]

According to a study carried out in the year 2013 by the Indian council of medical research India has 62.4 million people with Diabetes out of which >90% have type 2 diabetes. [4] Diabetes Mellitus is a metabolic disorder, in which there is accumulation of glucose in the urine and blood of person. This condition is known as Hyperglycemia. It is caused due to the malfunctioning of the pancreas which is responsible for the production of the hormone insulin. The problem with Diabetes Mellitus is that it is very difficult to diagnose in the early stage. Diabetes Mellitus described in Ayurveda as Madhumeha which literally means excessive urine with sweet taste like honey, or Dhatupakjanya Vikriti which means a disease caused by a defective metabolism leading to derangement in body tissues (seven Dhatu) transformation process. [5]

According to Chrakacharya Dushya of Prameha are Meda, Rakta, Shukra, Ambu, Vasa, Lasika, Majja, Ras, Oja, and Mamsa. [6] In Prameha Sthansamshraya of vitiated Dosha take place at Basti which is Mulsthana of Mutravaha Srotas. The complex nature of Madhumeha was well understood in ancient times. Therefore, the disease is enlisted in 'Maha Roga.' The challenge

is being faced with raised or uncontrolled blood sugar levels contributing to various complications like Diabetic nephropathy, Diabetic retinopathy, Diabetic neuropathy and ultimately disturbing quality of life. Ayurveda considers Prameha, as a disease of Meda Dhatu (Body Fats / adipose tissue) Dushti with additional derangement in Mansadhatu (muscle tissue), Kleda, Rasa Dhatu, Rakta Dhatu, Majja, Shukra etc. The Ayurvedic line of Treatment starts from the correction of Meda Dhatu Dushti, which is responsible for further pathophysiology of Prameha. Until recently, it was a belief of Modern Science, that Diabetes is a disease of deranged Carbohydrate Metabolism. But research in this field has highlighted the importance of lipid metabolism and its role in the development of diabetes. [7]

Disease should be diagnosed first and then rational therapeutic measures should be employed. Physician, who starts the treatment without diagnosing a disease, succeeds by chance even if he is expert in medicine. So, diagnosing a disease is far more important before initiating the treatment to overcome the disease. Today the Physicians have difficulty to recognize disease progression, Dushyadushti involved and its involvement sequence thereby failing to achieve the goal of treating Madhumeha. So by this study we could at least assess or predict the Dushya involvement in present days, their sequence and their progression that would help to fix the standard goals of treatment thereby contributing to good prognosis and welfare of human beings. So it was decided to study Dushya Dushti involvement in Madhumeha according to Charak Samhita and present days.

AIM AND OBJECTIVES:

AIM:

Study of Dushya involvement in Madhumeha according to Charaka samhita and present era w.s.r. to Diabetes mellitus type 2

OBJECTIVES:

1. To study the Dushya dushti in Madhumeha according to Charaka samhita and present days.
2. To study the Dushya Dusti involvement in the patients of Madhumeha-
 - a. According to age of patient

b. According to chronicity of disease

c. According to blood sugar level

MATERIAL AND METHODS:

1) The detailed review of Dushya of Madhumeha was done according to Ayurveda and Diabetes Mellitus type 2 from modern medical text books, related research articles and websites.

2) Dushya involvement in Madhumeha was studied with the help of Dushya dushti lakshana in the patients of Diabetes Mellitus Type 2.

Place of work: OPD and IPD and Pathology Laboratory of Ayurveda Hospital.

Duration of Study: Total duration of study was 14 months.

Sample size Calculation: According to Daniel's formula (1999)

$$n = z^2 p (1-p) / d^2$$

$$n = [(1.96)^2 \times 0.097 (1-0.097)] / (0.05)^2$$

$$n = 134.59$$

Where -

n = sample size

z = statistical level of confidence = 1.96

p = prevalence (proportion) = 9.7 % [8] (p = 0.097)

d = precision rate 5% = 0.05

For the sake of convenience sample size was taken as 140

Sampling Technique: Patients were selected by simple random sampling technique irrespective of Age, Sex, Religion, Socioeconomic status, Education etc.

CRITERIA FOR SELECTION OF PATIENT

INCLUSION CRITERIA:

1. Patients of Either sex.

2. Age between 30 to 70 yrs.
3. Known cases of Diabetes Mellitus type 2.
4. Patients coming under diagnostic criteria.

EXCLUSION CRITERIA:

1. Patients suffering from type-1 Diabetes mellitus.
2. Unconscious and uncooperative patients.
3. Pregnant women, lactating women and children.
4. Patients with major systemic illness prior to diagnosis of DM type 2 e.g. HIV infection, Tuberculosis, Hepatitis, Malignancy, Severe malnutrition.

DIAGNOSTIC CRITERIA:

1. Plasma glucose concentration

Fasting (F) : >126 mg/dl

Postprandial (PP): >140 mg/dl

2. Symptoms of Madhumeha: Prabhutmutrata, Avilmutrata, Naktamutrata.

ASSESSMENT CRITERIA:

Assessment was done according to the following subjective criteria where they will be assigned with scores (absent/ mild/ moderate/ severe)

A) SUBJECTIVE CRITERIA- Special examination for Dushyas in Madhumeha patients.

UDAKA – Udakavahastrodushti Lakshana ^[9]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Trishna / Pipasa	No Trit	Occasional trit	Very often trit	Always trit
Jivha – Talu- Oustha – Kantha Shosha	Absent	Shosha present in any one organ.	Shosha present in any two organs.	Shosha present in all organs.

RASA- Rasapradoshaja Roga ^[10]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Aruchi	Willing towards all bhojya padartha.	Unwilling towards some specific ahara but less than normal	Unwilling for food but could take the meal	Unwilling towards un liking food but not to other.
Angasad / Gaurava	No heaviness	Occasionally feeling of heaviness for some times in hands and feet.	Feeling of heaviness for some time in hands and feet not affecting daily living.	Daily feeling of heaviness over body.
Tamha-darshan	Nil	Rare tamaha - darshan for short duration	Rare tamaha darshan for short duration leads to bhrama.	Constant tamaha-darshan.

RAKTA- Raktapradoshaja Roga ^[10]

LAKSHANAS	ABSENT (0)	PRESENT (1)
Pak (Guda / Medhra / Mukha)	Absent	Present
Raktastrav	Absent	Present
Twachavikruti	Absent	Present

MAMSA/ PISHITA/ VASA- Mamsapradoshaja Roga ^[10]

LAKSHANAS	ABSENT (0)	PRESENT (1)
Arbuda	Absent	Present
Granthi	Absent	Present

MEDA- Medapradoshaja Roga ^[10]

LAKSHANAS	NORMAL RANGE	OVER WEIGHT	PRE-OBESE	OBESE
Sthoulya (BMI) (according to WHO)	18.5– 24.99	≤ 25.00	25.0 – 29.99	≥ 30
	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Karpadtala Daha	No Karpadtala daha	Karapadtala daham found occasionally / mild / bearable	Continuous Karapadtala daha bearable but not sever	Continuous Karapadtala daha unbearable, sever

ASTHI- Asthipradoshaja Roga ^[10]

LAKSHANS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Danta Vikruti	No dental deformity	Occasional dental pain with dental caries or loosening at least one tooth.	Dental pain That don't responds to analgesics along with caries / Loosening / loss 2-4 teeth	Loosening / loss of 4 – 8 teeth.
Nakha Vikruti	No nail deformity	Mild loss of natural texture & maliability of nails. .	Moderate loss of texture & maliability of nails.	Visible brittleness of nails (which breaks easily)
Kesha Vikruti (Palitya)	No greying of hair.	Very few grey hairs.	Partial graying of hair.	Significant graying of hair.
Asthi Shula / Bheda	No piercing pain in bones.	Mild piercing pain in bones not affecting daily activities.	Occasional moderate piercing pain in bones not affecting daily activities. Pain can be relieved by rest no need of medication.	Continuous severe piercing pain in bones with restricted movements not relieved even by simple medications.

MAJJA- Majjapradoshaja Roga ^[10]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Bhram	No Reeling of head/ Bhrama	Sometimes feeling of reeling head/ Bhrama	Feeling of reeling head/ Bhrama < 3 times a day	Feeling of reeling head/ Bhrama > 3 times a day
Murcha	No murccha	Murccha only after exertion, lasting for few seconds	Murccha on exertion lasting for few minutes.	Murccha without any exertion lasting for few minutes. The patient can stand or walk slowly.
Parvaruk / Parva bheda	No pain in the phalanges	Mild pain in the phalanges	Discomforting pain in the phalanges	Distressing pain in the phalanges

SHUKRA- Shukrapradoshaja Roga ^[10]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
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KLAIBYA (LINGA SHAITHHILYA) /Lack of	Proper stiffness to maintain erection and	Some loss of stiffness but can maintain the erection	Some loss of stiffness, able to maintain	Loss of stiffness, can initiate sexual act
Penile rigidity	To continue the sexual intercourse till last	Continue the act till last	Erection, but unable to continue act till last	But unable to maintain erection till last
Apraharsha: / Lack of orgasm:	Enjoyment In every sexual intercourse by ejaculating the semen	Enjoyment in 75% of the encounters by ejaculating the semen	Lack of enjoyment in most occasions	No enjoyment at all
	ABSENT (0)	PRESENT (1)		
ANAPATYATA	Absent	Present		

MUTRA- Mutrapradoshaj Roga ^[10]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
PRABHUT MUTRATA	3-5 times per day, no rarely at night	6-8 times per day, 1-2 times per night	9-11 times per day, 3-4 times per night	>11 times per day, > 4 times per night
AAVIL MUTRATA	Crystal clear fluid	Faintly cloudy, smoky or hazy with slight turbidity.	Turbidity clearly visible but newsprint easily read through test tube	Newsprint not easily read through test tube
NAKTA MUTRATRA	< 2 times at night	2-4 times at night	4-6 times at night	> 6 times at night

PURISHA- Purishapradoshaja Roga ^[10]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Malbadhhata	Stool passes as per normal schedule	Passes stool with strain, sometime takes purgatives	Passes stool more than 24 hours, frequently takes purgatives	Passes stool after gap of one day, normal purgatives does not Work
Dravamala Pravrutti	No dravamala pravrutti	Once in week > 3 episodes of watery stool	Twice in week > 3 episodes of watery stool	Thrice & above in week > 3 episodes of watery stool

SWEDA- Swedapradoshaja Roga ^[10]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
SWED ATIPRAVRUTTI	Sweating after heavy work and fast movement or in hot weather	Profuse sweating after moderate work and movement	Sweating after little work and movement (stepping ladder etc.)	Sweating even at rest or in cold weather
ANGAGANDHA	No odour	Bad odour but not offensive	Strong odour but can be lessened by use of deodorants or perfumes	Very strong odour even after using fragrances (use of deodorants or perfumes)

LASIKA- (Twak- Vranagatam Lasika) ^[11]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Srava- Discharge (Exudation) Present in Diabetic Wound	No srava	Mild srava after itching	Moderate srava without itching	Severe srava without itching

OJA- Oja Kshaya Lakshanas ^[12]

LAKSHANAS	ABSENT (0)	MILD (1)	MODERATE (2)	SEVERE (3)
Daurbalya (General debility)	Can do routine exercise / work	Can do moderate exercise / work with hesitancy	Can do mild exercise / work only, with difficulty	Cannot do mild exercise / work too
Abhikshanam (Chintayati) / stress	No stress	Stress Present from < 3 months	Stress Present from 3 – 6 months	Stress Present From above 6 months
Durmanah (Gatotsaha / Utsahahani)	No Alasya (doing Work satisfactory with) proper vigor in time	Doing work with desire with initiation but late in time	Does work without Desire with lot of Mental pressure and late in time	Does not initiate work, does little work very slowly
Rukshata (Dryness)	No line on scrubbing with nail without winter season	Faint line on scrubbing by nail without winter season	Excessive Ruksata leading to itching without winter season	Ruksata leading to crack formulation and Bleeding without winter season

B) OBJECTIVE CRITERIA:

1. Blood sugar level (Fasting and postprandial)

STUDY DESIGN:

- Single Open Labeled Observational Study
- Screening the subject for Inclusion Criteria.
- Random selection of 140 patients suffering from Madhumeha (Diabetes Mellitus type -2)
- Blood Sugar Level and Urine sugar level was done
- Recording of cases was done as per case record form
- Dushyadushti involvement was observed according to Age of the patient, chronicity of Disease and Blood Sugar Level
- Statistical Assessment
- Discussion and Conclusion

OBSERVATIONS AND RESULTS:

The study found significant involvement of various Dushyas in Madhumeha, with Oja Dushti being predominantly observed. The involvement of Dushyas was assessed based on age, chronicity of the disease, and blood sugar levels.

Age and Dushya Involvement (Values in Percentage): Table No. 01

Age Group	Udaka	Rasa	Rakta	Pishita/ Mamsa	Meda	Asthi	Majja	Shukra	Mutra	Sweda	Purisha	Lasika	Oja	N
31-40 Years	88.8	100	44.4	5.5	100	72.2	88.8	55.5	83.3	55.5	61.1	5.5	100	18
41-50 Years	80.5	97.2	58.3	19.4	88.8	91.6	83.3	41.6	100	72.2	69.4	8.3	100	36
51-60 Years	86.0	97.6	37.2	11.6	97.6	100	86	62.7	95.3	74.4	72	11.6	97.6	43
61-70 Years	88.3	100	58.1	11.6	100	95.3	100	72	88.3	65.1	62.7	4.6	100	43
TOTAL	85.7	98.5	50	12.8	96.4	92.8	90	59.2	92.8	68.5	67.1	7.8	99.2	140

Chronicity of Diabetes Mellitus and Dushya Involvement (Values in Percentage):
Table No. 02

Chronicity	Udaka	Rasa	Rakta	Pishita /Mamsa/ Vasa	Meda	Asthi	Majja	Shukra	Mutra	Sweda	Purisha	Lasika	Oja	N
0 - 1 Years	84.2	94.7	36.8	10.5	94.7	89.4	84.2	42.1	84.2	63.1	42.1	26.3	94.7	19
1 - 5 Years	85.7	100	51.7	16	98.2	94.6	94.6	57.1	96.4	62.5	67.8	5.3	100	56
5 - 10 Years	92.3	97.4	48.7	10.2	97.1	92.3	89.7	71.7	89.7	76.9	82	2.5	100	39
10 -15 Years	83.3	100	58.3	16.6	91.6	91.6	83.3	58.3	100	75	58.3	8.3	100	12
>15 Years	71.4	100	57.1	7.1	92.8	92.8	85.7	57.1	92.8	71.1	64.2	7.1	100	14
TOTAL	85.7	98.5	50	12.8	96.4	92.8	90	59.2	92.8	68.5	67.1	7.8	99.2	140

Blood Sugar Level and Dushya Involvement:

1. BSL (Fasting) (Values in Percentage): Table No. 03

BSL (F)	Udaka	Rasa	Rakta	Pishita / Mamsa /	Meda	Asthi	Majja	Shukra	Mutra	Sweda	Purisha	Lasika	Oja	N
126-200	86.6	99	50.4	16.1	96	96	89.5	62.8	94.2	69.5	67.6	6.6	99	105
201-275	80.6	96.7	48.3	3.2	96.7	80.6	90	48.3	87	67.7	67.7	9.6	100	31
>275	100	100	50	0	100	100	100	50	100	50	50	25	100	4
TOTAL	85.7	98.5	50	12.8	96.4	92.8	90	59.2	92.8	68.5	67.1	7.8	99.2	140

2. BSL (Post Prandial) (Values in Percentage): Table No. 04

BSL (PP)	Udaka	Rasa	Rakta	Pishita / Mamsa /	Meda	Asthi	Majja	Shukra	Mutra	Sweda	Purisha	Lasika	Oja	N
140-250	85.9	98.5	49.2	9.8	94.3	98.5	87.3	56.3	91.5	81.6	76	4.2	98.5	71
251-350	80.7	98	51.9	19.2	98	88	92.3	63.4	96.1	50	57.6	11.5	100	52

>350	100	100	47	5.8	100	82.3	94	58.8	88.2	70.5	58.8	11.7	100	17
TOTAL	85.7	98.5	50	12.8	96.4	92.8	90	59.2	92.8	68.5	67.1	7.8	99.2	140

Dushya Dushti (Values in Percentage): Table No. 05

DUSHYA DUSHTI	PERCENTAGE (%)
1. Udak	85.7
2. Rasa	98.5
3. Rakta	50
4. Mamsa/Pishita/Vasa	12.8
5. Meda	96.4
6. Asthi	92.8
7. Majja	90
8. Shukra	59.2
9. Mutra	92.8
10. Purisha	67.1
11. Sweda	68.5
12. Lasika	7.8
13. Oja	99.2

Srotas Dushti: Table No. 06

Stroto Dushti	Percentage
Pranvaha	1.4
Udakavaha	85.7
Annavaha	48.6
Rasavaha	98.6
Raktavaha	49.3
Mamsavaha	10.7
Medovaha	97.1
Asthivaha	92.9
Majjavaha	88.6
Shukravaha	59.3
Purishavaha	67.9
Mutravaha	92.9
Swedavaha	68.6

DISCUSSION:

The discussions offer insights into the relationship between various aspects of Madhumeha and the involvement of Dushya (body tissues), chronicity of the disease, blood sugar levels, and Srotas Dushti (pathological changes in the channels of the body)

Age and Dushya Involvement:

Observations reveal an equal distribution of Dushya involvement across all age groups, indicating that the disease affects people of different ages indiscriminately. However, the involvement of Shukra (reproductive tissue) increases progressively with advancing age, suggesting a correlation between age and the severity of reproductive tissue involvement. Additionally, Oja (nutrient fluid) involvement is consistently present across all age groups, reflecting the significance of Oja in Madhumeha, often referred to as Ojomeha.

Chronicity of Madhumeha and Dushya Involvement:

There appears to be an equal distribution of Dushyas regardless of the chronicity (duration) of Madhumeha. This suggests that the progression of the disease over time does not significantly impact the involvement of various body tissues. It implies that the severity of Dushya involvement may not necessarily worsen with the duration of the disease.

Blood Sugar Level and Dushya Involvement:

The discussion highlights a progressive involvement of certain Dushyas, namely Meda (fat tissue), Majja (bone marrow), Lasika (lymphatic system), and Oja, with an increase in blood sugar levels, both fasting and postprandial. This indicates a correlation between elevated blood sugar levels and the worsening of Dushya involvement, particularly in tissues associated with metabolism and fluid regulation.

Srotas Dushti in Madhumeha:

The concept of Srotas Dushti in Madhumeha, suggests a multi-faceted involvement of various bodily systems, indicating a profound disruption in the homeostasis of the body. One of the primary implications of Srotas Dushti in Madhumeha is the significant derangement in Udakavaha and Rasavaha, which is crucial for overall homeostasis. The profound disturbance in Medovaha can lead to conditions like obesity, which further exacerbates

insulin resistance and increases the risk of cardiovascular diseases and metabolic syndrome. Furthermore, the significant impact on Asthivaha and Majjavaha health, potentially leading to Dant vikruti, Nakha vikruti, and Asthishula or Bheda and Bhrama, Murcha and Parvaruka respectively. Finally, the significant involvement of the Mutravaha can lead to symptoms like Prabhut, Aavil and Nakta mutrata. Furthermore, the substantial involvement of the Annavaha, Raktavaha, Shukravaha, Purishavaha and Swedavaha Srotasa suggests that disruptions in the respective functions leading to the progression of diabetes-related complications. Additionally, the relatively lower but still notable involvement of Pranvaha and Mamsavaha suggests the impact on overall quality of life for individuals with diabetes. Overall, Srotas Dushti in Madhumeha reflects a systemic disruption in the body, affecting multiple organ systems and highlighting the importance of comprehensive management strategies in the treatment of diabetes.

CONCLUSION:

The study concluded that the Dushyas mentioned by Charakacharya are found to be involved in Madhumeha (Diabetes Mellitus Type 2) along with Asthi, Mutra, Sweda, Purisha in addition to Charaka samhita in present days with predominant involvement of Oja Dushti seen. It emphasized the equal distribution of Dushya involvement in all age groups and chronicity of the disease, indicating no progressive Dushya involvement with respect to age or chronicity. Additionally, the study found a progressive involvement of specific Meda, Majja, Lasika and Oja Dushyas with increasing blood sugar levels. The conclusion highlighted the need for further research with larger sample sizes and the exploration of single Dushya involvement evaluation.

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