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MICROALBUMINURIA IN TYPE 2 DIABETES MELLITUS- AN AYURVEDIC PERSPECTIVE

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ABSTRACT

Introduction: Microalbuminuria is the presence of albumin, a protein in urine. Microalbuminuria is an early sign of kidney damage or Nephropathy, a common and serious complication of Diabetes. Diabetic renal disease was originally described as glomerulopathy associated with diffuse or nodular glomerulosclerosis. **Methodology**: In Ayurveda there is no direct reference, which can directly be correlated with Diabetic. Based on the Complications of Diabetes mellitus, it can be related to the *Upadrava* of *Vatika Prameha*, the presence of protein in urine is a complication of untreated Diabetes, likewise in our *Samhithas*, it is mentioned that when *Prameha* if left untreated, may become *Madhumeha*. **Results and Discussion**: *Madhumeha* is serious condition which will affect the functions of multiple organs including kidney, the *Asraya Sthana* is *Basthi*, one among *Trimarma*. It is greatly important to keep the blood sugar level normal, in order to prevent one from further complications.

Keywords: *Madhumeha*, Diabetic Kidney Disease, Microalbuminuria.

INTRODUCTION

Diabetic Nephropathy is one among the major complications of Type 2 Diabetes Mellitus. There are 5 distinct stages of Diabetic Nephropathy so far identified. Stage 1 is Hyper Filtration – Hypertrophy stage,

stage 2 is stage with Structural Glomerular Lesions, stage 3 is stage of Microalbuminuria, stage 4 is Overt Nephropathy and stage 5 is End Stage Renal Disease. Among these 3rd stages of Microalbuminuria, which is characterised by Albumin excretion in the range of 30-300mg/day or 20-200mcg/minute[1] Many of the mechanisms involved in diabetic microvascular complications likely play a crucial role in the progression of diabetic nephropathy. Hyperglycemia is clearly implicated in initiating renal injury, as individuals without diabetes do not typically develop this form of nephropathy.

The metabolic sequence of hyperglycemia appears to be the most important causative factor in the development of Diabetic Nephropathy. Although this can be marked by individual variations, better glucose control can reduce the risk of Nephropathy and other Microvascular complications. The dysregulation of tubular functions in diabetes can precede or accompany the changes in the renal glomerulus and the onset of albuminuria. Indeed, the functional and structural changes in the proximal tubule may be a key contributor to the development and contributor to the development and progression of Diabetic Nephropathy[2]. In Ayurvedic classic *Prameha* is said to be *Tridoshaja Vikara,* and there are three major types of *prameha* based on the predominance of Dosha like: *Vataja, Pittaja* and *Kaphaja Prameha*. In Ayurveda classics *Madhumeha* is mentioned as a *Vata Pradhana Tridoshajanya vikara*. Acharya Charaka in *Sutra Sthana* has described in detail about the Nidana of Madhumeha, by the excess intake of *Guru Snigda, Amla, Lavan Rasa Pradhana Ahara,* one who have the habit of taking *Samasanam, Navannam, Nava Madhyam, Nidradhikya, Asyasukham,* without doing proper *Vyayama, Achinthanath,* without adopting *Samsodhana Karma* at proper *Kala,* in them there will be *Ativridhi* of *Sleshma, Pitta, Meda* and *Mamsa*. These *Dooshyas* are traversed by *Apana Vata* along *Ojas* into the *Basti* causing *Madhumeha*. Here the term '*Ojas'* can be considered as the '*Saramsa'* of *Meda* and *Mamsa Dhatu*. Primarily *Meda Dhatu* itself gets vitiated then, it further vitiated *Utharothara Dhatu* like *Mamsa,* which finally results in improper formation of *Mamsa Dhatu*[3].

BACKGROUND AND RATIONALE

Diabetic nephropathy is one among the major causes of hardship and fatality for people conversely having Type 1 Diabetes Mellitus (T1DM) or Type 2 Diabetes Mellitus (T2DM) in western countries, diabetes is foremost single source of End stage renal disease. Indeed, in many countries, such as the United States, more than 50% of people in renal replacement therapy programs have diabetes as one primary rationale behind renal failure. However, the consequence of diabetic nephropathy is far greater. Broadly, most patients with diabetes in developing countries do not have many resources or health frameworks to be prepared for universal renal replacement therapy.

In patients with T2DM, microalbuminuria is incidental, with a double to fourfold increase in the risk of perishability. People with overt proteinuria and hypertension face far up the risk of complications. Therefore, lessening End Stage Renal Disease (ESRD) is a crucial goal to preside over diabetes; it is the only one regarding the broader intention of preventing diabetic kidney disease[4].

AIMS AND OBJECTIVES

Aim: To study the Ayurvedic perspective of Microalbuminuria in Type 2 Diabetes Mellitus

MATERIALS AND METHODS

The materials and methods for this study were chosen from Ayurvedic classics such as *Charaka Samhitha*, *Ashtanga Hrudaya*, and *Susrutha Samhitha,* as well as authentic textbooks, published journals, and some clinical experiences. They were analysed together to understand microalbuminuria from an Ayurvedic perspective better.

DIABETIC NEPHROPATHY, A COMPLICATION OF DIABETES MELLITUS

Diabetic nephropathy remains the most common single cause of end-stage renal failure. It develops over many years to decades, with a prolonged "silent" period before clinical detection, followed by a more rapid progression to overt renal disease. In the classic view, the hallmark of diabetic nephropathy is the development of proteinuria due to an alteration in glomerular basement membrane permeability and an increase in intraglomerular pressure.

Pathological changes typical of diabetic nephropathy include increased glomerular basement membrane thickness and increased accumulation of extracellular matrix, which leads to mesangial expansion and the classic Kimmelstiel-Wilson nodular lesion[5].

The theory explains that nodular lesions in human DN arise from focal mesangiolysis caused by mesangial and endothelial injury[6]. Mesangial cells are increased at sites of focal mesangiolysis, resulting in the production of mesangial matrix components such as type IV collagen, fibronectin, and laminin. Focal nodular mesangial expansion due to increased mesangial matrix production produces a nodule[7—r]ecurrent focal mesangiolysis results in a concentrically layered nodule, a complicated (Kimmelstiel-Wilson) nodule[8].

Microalbuminuria is an essential indicator of the risk of developing overt Diabetic nephropathy. The two significant functional changes in diabetic nephropathy are metabolic and haemodynamic. The initiation of Diabetic nephropathy is closely related to the severity and duration of hyperglycemia. Increased interglomerular pressure associated with vasodilation of the afferent glomerular arteriole and constriction of the efferent arteriole is a characteristic feature of early Diabetic nephropathy. In recent years, it has been increasingly clear that reasonable glycaemic control is beneficial in preventing and postponing Diabetic renal disease, as documented in Diabetes control and complication trials. Improved metabolic control also seemed to protect against deterioration in renal function in patients with microalbuminuria.

MICROALBUMINURIA AND ITS AYURVEDIC PERSPECTIVE

NIDANA

According to *Acharya Charaka*, the cause of *Madhumeha* in his *Sutrasthana*, about the Ahara, *Vihara*, and *Chintha* yo*ga*, a consequence of not doing *Sodhana Karma* at the proper time will cause *Madhumeha* in a later stage. *Acharya* has stated a simile that "as the birds are enchanted towards their nest" Likewise, *Prameha* affects people who are very greedy for food and have a disinclination to take baths and do physical exercises[3].

POORVAROOPA

Matting of hair, sweet taste in the mouth, numbness and burning sensation in hands and feet, dryness in the mouth, palate and throat, thirst and laziness, increased amount of manure from the body, attraction of insects and ants by the body and urine, the smell of raw flesh in the urine, excessive sleep and continuous drowsiness. In the case of *Madhumeha,* separate premonitory symptoms are not mentioned. As said earlier, *Prameha,* if not treated for a longer time, becomes *Madhumeha*.

In microalbuminuria, there are no specific premonitory symptoms apart from symptoms of diabetes mellitus; therefore, *Madhumeha* can be corelated to microalbuminuria, which is a complication of Diabetes Mellitus, which occurs when proper glycaemic control was not done to treat Diabetes.

SAMANYA LAKSHANA

'*Prabhootha Avila Mootratha'*- increased quantity and turbidity of the urine**.** Though the *Dosas* and *Dushyas* are similar, and their combination is different, there are differences in the properties of *Mootra, and* based on these differences, they are classified.

BHEDA

Acharya *Vaghbata* says there are twenty *Pramehas*, ten of which are *Kaphaja Pramehas,* six of which are *Pittaja Pramehas,* and four of which are *Vataja Pramehas*.

Table No: Types of *Vatika Parameha*

Sl. No	Names	Caraka Samhitha	Astanga Sangraha & Astanga Hrudaya
1	*Vasa Meha*	+	+
2	*Hasti Meha*	+	+
3	*Madhumeha /ksaudrameha*	+	+

4	*Majja Meha*	+	+
5	*Sarpi Meha*	_	_

SAMPRAPTHI

Acharya Charaka in *Sutra Sthana* has put forward that one who consumes *Guru Snigda, Amla, Lavan Rasa Pradhana Ahara* in *Athimatra*, one who has the habit of taking *Samasanam, Navannam, Nava Madhyam*, who has *Nidradhikya*, *Asyasukham*, without doing proper *Vyayama*, *Achinthanath*, without adopting *Samsodhana Karma* at proper *Kala*, in them there will be Ativridhi of *Sleshma*, *Pitta, Meda* and *Mamsa*. These *Dooshyas* are traversed by *Apana Vata* along *Ojas* into the *Basti*, causing *Madhumeha.* Here, ' *Ojas'* means the '*Saramsa'* of *Meda* and *Mamsa Dhatu*. Primarily, *Meda Dhatu* itself gets vitiated. Then, it further vitiated *Utharothara Dhatu* like *Mamsa*, which resulted in the improper formation of *Mamsa Dhatu*[3].

The Nidana mentioned above, and *Dooshya* of *Prameha* have a strong affinity for *Kapha*, and '*Gunathaha Vridhi'* occurs in *Avalambaka Kapha*.

Avalambaka kapha owns *Jala Vyapara Karma',* that helps in *Kledana, Tarpana* and *Purana* of *Dhathu*. When their functions become vitiated, this results in the '*Saithilyam*' of *Dhathu and, simultaneously, the* '*Karmatha Kshaya'* of *Sleshmaka Kapha*.

Avalambaka kapha is formed from the essence of the food we eat. It nourishes the body; this is clear from the name '*Avalambanam'* itself. When this kapha becomes vitiated, it also impairs nourishment, leading to a depletion of *Dhatus.*

As said in our *Samhithas,* the function of *Sleshaka Kapha* is '*Sandhi Samsleshaka*'; this *Kapha* attaches all *Sandhi*. When *Sleshaka Kapha* gets vitiated, which holds the *Kapha Satwa* of all *Dhatus*. Then it gets pulled into *Basti*. In *Prameha Sleshaka Kapha*, vitiation causes *Sandhi Saithilyatha*, which can be correlated to *Mamsa Saithilya*[9].

Acharya Susrutha, in *Prameha Samparpthi*, mentions that *Ama* was formed due to *Prameha Hetu*. The '*Aparipakva Ama'* reaches *Basti* and causes *Prameha*. The increased glucose level in the blood can be correlated with that of *Ama*. While mentioning *Meda Dhatu,* Acharya Charaka mentions that '*Abadhamedas'*, '*Aghanathwam',* can be related to Free fatty acids[10]**.**

After analysing Chakrapani Datta's commentary, I found that the *Madhura Guna* of *Medas* can also be related to blood glucose.

Even though there is not much information about the role of urine and the kidney, in our *Samhithas*, the functions of urine excretion are explained using *Apana Vata*. Depicting the above statement, Susrutha Acharya has described the formation of *Mootra* in a most beautiful way, where *Basti* is considered as '*Maladhara'*, one among the *Trimarama* and thus the seat of *Prana*, situated in the *Pakwasaya. Mootra* fills it out in numerous minutes. '*Nadi'* is like a pot immersed in water body till its neck portion gets filled with water through the sides, the same way *Mootrasaya* is filled with *Mootra* throughout.

In *prameha samparapthi*, *Acharya* Vaghbhata has explained that, like *Vyana Vata*, *Jala Vyapara Karma* of *Avalambaka Kapha* brings the *Kledamsa* of *Sareera* and reaches *Basti* with the help of Apana *Vata.* The *Sithilathwa Roopa* of *Mamsadi Dhatu,* which reaches *Mootradhara,* will then reach *Vasti*. *Acharya Vaghbata*, while describing *Prameha,* has described *'Prameham Madhuram Sa Piccham',* which may be correlated to proteinuria. From the above *Samprapthi*, we can conclude that *Upadrava* of *Vataja Prameha* with that of microalbuminuria, a complication of Diabetic Nephropathy[11]. In Ayurveda *Samhithas*, it is said that every *Prameha* will become *Madhumeha* in time, a type of *Vataja Prameha*.

Kaphaja Prameha Nidana alone may lead to *Vatika Prameha* by *Dooshya* vitiation; likewise, *Pittaja Prameha* may also end up in *Vatika Prameha,* that is, *Madhumeha*, which may further lead to *Mootraugasadam*.

As said in *Nidanarthakararoga* by Acharya Charaka, here '*Madhumeha* is the *Nidanarthakararoga* of *Mootraugasadam*, and the *vyakthavastha* of *Madhumeha* can be considered as *Mootraugasadam'.*

Samprapti Ghatakas* of *Madhumeham

Dosha*: *Vata Pradhana Tridosha
Dooshyam*: *Meda, Raktha, Sukra, Ambu, Vasa, Lasika, Majja, Rasa, Ojas, Mamsa
Agni: *Jataragni*, *Dathuagni Mandyam*
Srotas: *Medovaha Srotas, Mamsavaha Srotas, Mootravaha Srotas,*
Srothodushti: *Atipravrithi*
Udbhava sthana: *Amasyam*
Vyaktha sthana: *Sarva Sareeram*
Sadyasadyatha: *Krichrasadyam*

Ashtanga Hridaya	Ashtanga Samgraha	Susrutha samhitha	Madhava Nidana
• *Udavarta* • *Kampa* • *Hrudgraha* • *Lolatha* • *Soolam* • *Anidrata* • *Sosa* • *Kasa* • *Swasa*	• *Hridgraha* • *Laulytha* • *Anidratha* • *Kampa* • *Soola* • *Badha purisham* • *Sosha* • *Kasa* • *swasa*	• *hridgraham* • *loulyam* • *atinidra* • *sthamba* • *kampa* • *soolam* • *badha purisham*	• *udavartha* • *kampa* • *hridgraha* • *lolatha* • *soola* • *anidratha* • *sosa* • *kasa* • *swasa*

Sohsa in *Prameha* can be considered from two perspectives:

- Due to excess loss of protein, which occurred as a result of *Mamsa Saithilyatha*. Muscular atrophy may be due to an imbalance in the synthesis and degradation of the protein.
- *Galathalukanda Sosa*- dryness in throat and palate as seen in polydipsia.

PATHYA-AHARA and VIHARA[12, 13]

Purana Sali, Godhuma, Shashtika, yava, Jangala mamsa, Kodrava, Uddalaka, Vyayama, Snana, Abyanga, Udwarthanam, Nisi-jagarana. etc.

APATHYA-VIHARA and VIHARA[14]

Nava-dhanya, Sura-Asava, milk, oil, ghee, *Dadhi, Ikshu-Vikara, Yavagu, Panaka,* which are sour, *Gramya-Anupa-Oudhaka Mamsa*.

DISCUSSION

The main feature of Microalbuminuria is a protein in the urine, which is a reversible stage of Diabetic Nephropathy. In Ayurveda, it has been taken as *Madhumeha*, a subtype of *Vatika Prameha*. *Sosa* is seen as an *Upadrava* of *Vatika Prameha. A*s a result, the '*Piccha' Avastha* of *Mootra* is considered as Proteinuria, which occurs due to *Mamsa Saithilya* and *Sleshaka Kapha Vikrithi*. *Praboothа Mootratha,* a common feature in *Madhumeha,* is that excess protein leak occurs through frequent urination.

CONCLUSION

Diabetes kidney disease reflects the changing demographics of diabetes and carries an increased burden on ethnic and racial minorities. The search for biomarkers to identify those at risk for their development and progression continues. Microalbuminuria is a third stage of Diabetic nephropathy and features *Madhumeha,* which the uncontrolled Prameha causes. From the above-said *Nidana* and *Samprapthi*, we can conclude that the vitiation of Sleshaka Kapha causes *Mamsa Saithilya* and results in *Prabhootha Mootratha*, which is *Madhu Samam. The* froth in urine is due to *Mamsa kshaya* being *Madhumeha*. *Acharya Susrutha's* term *Ojas* can be considered the essence of *Mamsa* and *Meda Dhatu*.

Here, we can conclude that strict blood sugar control and following Pathya can control *Prameha*, which can halt the progression of diabetes to diabetic nephropathy. Monitoring the level of microalbumin in urine can also help.

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