BRIEF COMMUNICATION

Prediabetes: Correlating the Ancient and Modern Schools of Medicine

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ABSTRACT

Modern medicine has recognized prediabetes as a well-characterized syndrome only in the last two decades. However, Ayurveda has clearly described distinct stages of diabetes thousands of years ago. The Ayurvedic classification represents the entire clinical spectrum of diabetes that we encounter today. In this article, we present the Ayurvedic perspective on prediabetes with regard to etiology, clinical features and management, which emphasizes lifestyle modification as the key approach to manage the dysglycemia.

Keywords: Ayurveda, dysglycemia, *kapha prameha, pitta prameha, vata prameha, shadakriyakaal*

PREDIABETES IN MODERN MEDICINE

The first use of the word 'prediabetes' dates back to 1918, when it was used[1] to describe dogs with partial damage to the pancreas. The term was used in clinical medicine, mostly in obstetric medicine, intermittently, with only 6 more PubMed citations in the next 30 years.[2] Interest has spiked in the last two decades, and prediabetes is now a well-characterized and well-described, clinical syndrome.

PREDIABETES IN AYURVEDA

Ayurveda, however, has clearly described distinct stages of diabetes thousands of years ago. *Charaka Samhita*, Nidanasthanam, Chapter 4, lists 20 types of *prameha* or urinary disorders.[3] These are further classified into 10 types of *kapha prameha*, 6 types of *pitta prameha* and 4 types of *vata prameha*.

While there is controversy regarding the appropriateness of this classification, *kapha prameha* seems equivalent to prediabetes, and *pitta prameha* appears to allude to early uncomplicated diabetes. The various types of *vata prameha* suggest a catabolic or advanced state of diabetes with vascular or visceral complications. Put together, the Ayurvedic classification represents the entire clinical spectrum of diabetes that we encounter today.

Murthy et al[4] present a comprehensive analysis of the classification, pathophysiology and clinical features of *prameha*. We must note that this opinion piece was written at a time when modern diabetology was not well developed, and when the concept of prediabetes had not been established.

DIVERSITY OF DYSGLYCEMIA

Atreya clearly mentions that the disease can present in asymptomatic or symptomatic manner, with varied natural trajectories and combination of clinical features. Many of the symptoms and complications of diabetes are listed in the narrative. There is a rightful emphasis on the relationship of fat and *prameha*. A step-wise progression of dysfunction is delineated, with various stages being described. The etiopathogenesis of diabetes is shared, as are the precipitating and aggravating factors for worsening. In fact, the concept of diabetes remission is alluded to as well.

The particular etiology, *dosha* and *dhatu* (tissue strength), in combination, decide the response of the body to diabetes. Asymptomatic, mild, late-onset, partial or full-blown manifestations may occur based upon various permutations and combinations of etiopathogenesis. This implies that Ayurveda understood the epidemiological triad (host, etiological factor and environment) as well as

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Table 1. Etiology of *Prameha*

Food
• Excessive and prolonged use of new grains, new legumes, meat, rice preparations
Beverages
• Excessive and prolonged use of sugarcane products, milk, fresh wine
Hygiene
• Abstinence from cleanliness
Physical activity
• Abstinence from physical exercise
• Indulgence in sleep, lying down, sitting

the epidemiological quartet (including time) that have been postulated in modern medicine. The multifaceted causation is clearly mentioned, in a way similar to that of the ominous octet.[5]

ETIOLOGY

The etiological factors listed by Charaka are mentioned in Table 1.

Prameha approaches immediately like a bird to its nest-tree, the person who is greedy in eatables and has dislike for bath and walking.

Death, in the form of prameha, takes away immediately the person who is dull in activities, over-obese, over-uncted and voracious eater.

(*Charaka Samhita*, Nidanasthanam, Chapter 4:50-52.)

CLINICAL FEATURES

Clinical features that are mentioned in Nidanasthanam, Ch. IV are listed in Table 2. Rastogi et al[6] classify symptoms and signs of prediabetes as anatomical, physiological and neurocognitive. While some of these are symptoms and signs of hyperglycemia and its neurological complications, others may be associated with micronutrient malnutrition, urinary tract or skin infection. While this approach encourages astute clinical observation, it would be fallacious to create a separate clinical symptomatology for prediabetes.

MANAGEMENT

Prediabetes is best managed by lifestyle modification. This is taught in *Charaka Samhita*. It is noteworthy that the following verse discusses "happy life" in diabetes, a concept that is now termed as glycemic happiness or euthymic euglycemia.[7]

Table 2. Clinical Features of *Prameha*

Kapha and *Pitta Prameha*
• Obesity
• Boils
• Abnormal urine, in term of quantity, color, smell, taste, consistency, precipitants
Vata Prameha: Urinary Symptoms
• *Vasameha*: muscle fat in urine = albuminuria
• *Majjameha*: marrow in urine
• *Hastimeha*: increased frequency
• *Madhumeha*: sugar in urine
Vata Prameha: Systemic Symptoms
• Osmotic symptoms: thirst, "morbidities in urine", crawling of bees and ants on body and urine
• Skin: matting of hair, dirt in the body, smearing in body orifices
• Oral cavity: sweetness in mouth, dryness of mouth, palate, throat
• Nervous system peripheral: numbness, burning over hands and feet
• Nervous system, central: lassitude, frequent sleep and drowsiness
• Complications: fleshy smell in body (ketosis), diarrhea, fever, anorexia, indigestion, boils due to sloughing of muscles (muscle necrosis)

The person who takes food which maintains the equilibrium of dhatus and also practices various physical activities enjoys happy life.

(*Charaka Samhita*, Nidanasthanam, Chapter 4:50-52.)

Ayurveda also enjoins us to practice prevention at all levels, from primordial to tertiary. These concepts are worded in Ayurveda as the six stages of *shadakriyakaal*.[6] While *sanchaya* refers to the stage of primordial prevention, *prakopa* and *prasaara* call for primary prevention. *Sthaana samshraya* is a stage where both primary and secondary prevention can be practiced. *Vyakti* and *bheda* are full blown clinical stages in which secondary and tertiary prevention are required.

Khirodkar et al[8] reinforce this concept, calling for preventive action during the phase of *purva rupa* or predisease. They point out the importance of managing *atisthaulya* (obesity) as a means of managing prediabetes as well as preventing diabetes and its complications.

SUMMARY

A rational reading of Ayurvedic texts demonstrates the clarity of thought with regards to multifactorial etiology and multifaceted presentation of diabetes. The natural

history of dysglycemia is well delineated, with an emphasis on possible remission of diabetes through a healthy lifestyle. While frank diabetes is thought to be incurable, this does not hold true today. With modern management diabetes can easily be managed, even though it may not be cured. Use of physio-friendly pharmacotherapy and lifestyle interventions can help achieve diabetes remission, provided that therapy is instituted in a timely manner. Prediabetes management holds the promise of preventing establishment of diabetes.

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Impaired Awareness of Hypoglycemia in Pediatric Type 1 Diabetes

The prevalence of impaired awareness of hypoglycemia (IAH) in children with type 1 diabetes is high and it is associated with episodes of severe hypoglycemia and an increased fear of hypoglycemia, says a study from Norway published January 13, 2024 in the journal *Diabetes Research and Clinical Practice*.[1]

The aim of this study was to investigate the prevalence and associations of IAH in children with type 1 diabetes using data from the Norwegian Childhood Diabetes Registry. The study included a total of 1,329 participants, with 53% being males. The ages of the participants ranged from 2 to 19 years, with a median age of 13.3 years. The participants had been diagnosed with type 1 diabetes for at least 6 months, with a median duration of 4.6 years.

Awareness about hypoglycemia was checked with the help of the Clarke questionnaire, which was self-assessed. For the 235 participants below the age of 9 years, parents responded on their behalf. The study also examined the associations between impaired awareness of hypoglycemia and clinical data from the Norwegian Childhood Diabetes Registry.

The overall prevalence of IAH was found to be 22%. But this prevalence declined gradually from 53% in preschoolers to 12% in adolescents aged 16 years and older. The study also identified several factors associated with IAH. These included a history of severe hypoglycemia with adjusted odds ratio (aOR) of 6.0 and diabetic ketoacidosis (aOR: 3.45) in the preceding year, increased fear of hypoglycemia (highest quartile vs. lowest: aOR: 2.27), female sex (aOR 1.41) and glycated hemoglobin (HbA1c) levels ≥8.5% (vs. 7.5-8.4%) (aOR 1.48). However, the study did not find an association between IAH and duration of diabetes, use of insulin pump or continuous glucose monitoring or HbA1c levels below 7.5%.

To conclude, IAH is indeed prevalent in pediatric type 1 diabetes, with a higher likelihood of being reported in young children. However, it is important to note that good metabolic control can still be achieved without an increased risk of developing IAH. This suggests that with proper routine evaluation and education on hypoglycemia awareness, pediatric patients with type 1 diabetes can maintain stable blood sugar levels while minimizing the risk of impaired awareness of hypoglycemia.

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