WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 24, 409-415. Review Article ISSN 2277–7105

ROLE OF *BALA* AND *MAMSA KSHAYA* IN PROGNOSIS OF PRAMEHA (DIABETES MELLITUS)

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Article Received on
28 October 2024,

Revised on 18 Nov. 2024,
Accepted on 08 Dec. 2024

DOI: 10.20959/wjpr202424-34934

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ABSTRACT

This article explores the prognostic evaluation of *Madhumeha* (Diabetes Mellitus) with respect to *Bala Mamsa Kshaya* (diminution of strength and muscle mass). In *Indriya Sthan* regarding the prognosis of disease *Acharya Charaka* has mentioned *Bala Mamsa* assesment as a prognostic tool in diseases like *Vatavyadhi, Apasmara, Kushtha, Shopha, Udara, Gulma,* ***Madhumeha*** and *Rajayakshma*. According to *Acharya* these diseases become *Asadhya* in nature because of continuous *Bala Mamsa Kshaya* and it should be avoided by the physician. With the global rise in diabetes mellitus, understanding traditional prognostic tools can offer new perspectives on disease management. Integrating traditional Ayurvedic prognostic tools like *Bala Mamsa* assessment into modern diabetes care can enhance early detection and intervention strategies. By recognizing the significance of muscle mass diminution in disease progression, healthcare providers can adopt a more holistic approach, potentially improving patient outcomes and managing complications more effectively.

KEYWORDS: Prameha, Bala Kshaya, Mams Kshaya, Diabetes Mellitus.

INTRODUCTION

The prevalence of lifestyle disorders is undeniably on the rise in the 21st century, marking a concerning trend in global health. With the rapid advancements in technology, urbanization, and shifting societal norms, individuals are encountering increased sedentary lifestyles, poor dietary habits and heightened stress levels. While genetics and other factors play a role in diabetes, the rise in the incidence of diabetes is largely attributed to lifestyle factors.

Madhumeha is enumerated as one of the 20 categories of *Prameha* in Ayurvedic literature. The term *Prameha* is inherently descriptive, denoting *Prabhuta Mutrata* (excessive urination) and *'Avila Mutrata'* (turbid urination)".[1] *Madhumeha* is a condition wherein the patient excretes a significant volume of urine displaying characteristics such as *Kasaya, Madhura , Ruksa* and *Pandu* resembling the attributes of *Madhu* (honey).[2] Additionally, the patient's body itself acquires a sweetness. The term *"Madhumeha"* is composite of two words, *"Madhu"* and *"Meha."* Specifically, *"Madhu"* is employed here to emphasize the resemblance in characteristics, including colour, taste, etc., akin to Madhu (honey). *"Madhumeha"* and "Diabetes Mellitus" convey similar meanings, encompassing etiology, classification, pathogenesis, signs, symptoms, complications and other pertinent aspects. Therefore, *Madhumeha* is effectively correlated with Diabetes Mellitus.

The prevalence of Diabetes Mellitus has risen to epidemic levels and now threatens to become a major goal public health concern. The prevalence rate of Diabetes Mellitus is 11.4 %, according to a study by ICMR-INDIAB. Despite major medical advancements, Diabetes Mellitus is still continuing to be associated with increased morbidity and mortality. It necessitates the need for an early diagnosis in order to improve the treatment.

In *Indriya Sthan* regarding the prognosis of disease *Acharya Charak* has mentioned *Bala Mamsa* assesment as a prognostic tool in diseases like *Vatavyadhi, Apasmara, Kushtha, Shopha, Udara, Gulma,* ***Madhumeha*** and *Rajayakshma.*[3] According to *Acharya* these diseases become *Asadhya* in nature because of continuous *Bala Mamsa Kshaya* and it should be avoided by the physician.

Atur Bala, which refers to the ability to tolerate or endure disease, primarily depends on the status of *'Bala'* (strength) and *'Mamsa'* (muscle). This implies that any *Vyadhi* will become *Asadhya* in nature for individuals with poor *Bala* and *Mamsa* statuses. *Atur Bala* can also be related to immunity, as it is observed that patients with poor *Bala* and *Mamsa* statuses are

more prone to opportunistic infections like tuberculosis. When there is a loss in muscle, it indicates a depletion of protein reserves in the body, which plays a critical role in immune function. Protein deficiency leads to reduced amino acids in plasma, impairing immune responses such as T-cell activation, antibody production, and cytokine regulation. This weakened immune system increases the risk of infections, further exacerbating conditions like diabetes, as infections and inflammation can interfere with insulin regulation and glycemic control. Hence, Assessing *Bala* and *Mamsa* becomes crucial for prognosing diseases like *Madhumeha* (Diabetes).

Therefore *Bala Mamsa Kshaya* assessment can play a crucial role in determining the patient's prognosis and outlook in diseases like *Madhumeha*. So, its applicability in the present may be evaluated and the new vistas can be explored by correlating modern knowledge to this age-old method.

DISCUSSION

"Prakarsena Prabhutam Pracuram Varam Varam Va Mehati Mutratvagam Karoti Iti Pramehah" – Ma. Ni. 33/1.

Premeha is a syndrome encompassing clinical conditions marked by an elevated volume of urine, with increased frequency of urination. The key presenting features of this condition are polyuria and urine turbidity.

On the other hand, Diabetes Mellitus is a clinical syndrome characterized by hyperglycemia, with or without glycosuria, resulting from deficient insulin production or action. It is typically distinguished by polyuria, polyphagia and polydipsia.

The term '*Prameha*' is composed of two parts: '*Pra*,' meaning abundant, and '*Meha*,' meaning passing of urine. Similarly, the term 'diabetes' is derived from the Greek word 'diabainein,' which means 'to cross through a siphon,' indicating the continuous free flow of water and applied to the elimination of a large quantity of urine. Thus, the terms '*Prameha*' and 'diabetes' carry similar meanings.

Interestingly, the terms '*Madhumeha*' and 'diabetes mellitus' are analogous. Both '*Madhu*' and 'mellitus' mean honey, signifying that '*Madhumeha'* and 'diabetes mellitus' both refer to the passing of a large quantity of sweet urine.

The causative factors of the disease are those that increase the quantity of *Kapha* in the body.[4] Sedentary habits and high intake of sweets and fats are among the key factors contributing to this condition. This common etiology applies to all types of *Pramehas*, indicating that whether *Vataja*, *Pittaja*, or *Kaphaja*, the primary focus is on *Kapha*. *Acharya Charaka* explains that the initial aggravation is of *Kapha*, already increased in quantity due to these factors, which sets off the manifestation of *Prameha*.

Etiologically, *Prameha* has been classified into two types by *Acharya Sushruta*.[5]

- *Sahaja* (Hereditary)
- *Apathyanimittaja* (Acquired)

Sahaja Prameha occurs as a result of *Beejadosha* (genetic susceptibility). *Acharya Charaka* has stated that *Prameha* resulting from *Beejadosha* is incurable. *Apathyanimittaja Prameha* is caused by dietary and physical activity factors. According to *Dosha* predominance, *Prameha* is categorized into three major types-

- *Vataja Prameha*
- *Pittaja Prameha*
- *Kaphaja Prameha*

Significance of *Bala* and *Mamsa* in *Prameha* (Diabetes Mallitus)

The concepts of "*Bala*" (strength) and "*Mamsa*" (muscle tissue) hold significant importance in the Ayurvedic understanding and management of *Prameha* (Diabetes Mellitus). When diseases like *Vatavyadhi* (diseases due to *vata*), *Apasmara* (Epilepsy), *Kushtha* (Skin diseases), *Shopha* (Swellings), *Udara* (abdominal diseases including ascitis), *Gulma* (lumps and tumors), *Madhumeha* (urinary disorders including Diabetes) and *Rajayakshma* (Tuberculosis) are associated with loss of strength and muscle wasting then such patient should be discarded by the physician as patient will not recover.

Muscle atrophy, which results from an imbalance between the synthesis and breakdown of contractile proteins, can be triggered by several conditions, including Type 2 Diabetes Mellitus (T2DM). In patients with T2DM, decreased muscle quality leads to impaired muscle function, diminished ability to perform everyday activities, and a lower quality of life. Ultimately, these factors may contribute to an increased risk of premature mortality.

Pathophysiology of Muscle Atrophy in T2DM[6]

- Muscle atrophy in T2DM is due to an imbalance between protein synthesis and degradation.
- Inflammatory pathways, particularly those involving NF-κB and STAT3, play a critical role in promoting muscle degradation.
- Chronic inflammation linked to obesity and overnutrition exacerbates insulin resistance, contributing to muscle atrophy.

Inflammatory Pathways

NF-κB pathway is significantly involved in muscle atrophy in T2DM. Increased NF-κB activity leads to elevated expression of muscle-specific ubiquitin ligases such as MuRF1 and Atrogin-1, which facilitate protein degradation.

- The STAT3 pathway, activated by cytokines like IL-6, also contributes to muscle atrophy by impairing insulin signaling and promoting proteolysis.

Exercise as an Intervention

- Exercise, particularly resistance training, has been shown to counteract muscle atrophy by promoting protein synthesis through the mTOR pathway.
- Regular physical activity reduces systemic and muscle-specific inflammation, thereby attenuating the muscle degradation process.

According to a study published in PUBMed it suggest Exercise improves insulin sensitivity, further contributing to the preservation of muscle suggest that patients with T2DM exhibit upregulation of FoxO1 in skeletal muscle, suggesting greater muscle catabolism in muscle of patients with T2DM. In contrast to previous studies, concurrent upregulation of several inflammatory pathways including NF-κB p65, STAT3 and CCL2 was not observed, suggesting a complex relationship between muscle proteolytic and inflammatory pathways in humans that requires further investigation. Finally, we also found a negative relationship between V̇O2peak and muscle p-STAT3/STAT3, suggesting that endurance exercise may be a useful intervention to reduce muscle inflammation in T2DM.mass.

Professor Ling and colleagues at Lund University have conducted a significant study on the epigenetic mechanisms that regulate gene expression, specifically focusing on the VPS39 gene in individuals with Type 2 Diabetes Mellitus (T2DM).[7] Their research demonstrates how T2DM induces epigenetic changes that lead to the silencing of the VPS39 gene,

resulting in impaired muscle cell development and function. The study highlights that epigenetic modifications, influenced by factors such as illness, lifestyle, and environmental conditions, can switch genes on and off during cell development. In T2DM, these epigenetic changes specifically silence the VPS39 gene, crucial for producing a protein involved in autophagy, a process essential for cellular maintenance and regeneration.

CONCLUSION

The rising global prevalence of diabetes necessitates innovative approaches to disease management. Traditional methods like *Bala* and *Mamsa* assessment can enhance early detection and intervention, offering a holistic approach to patient care. Muscle atrophy, commonly seen in Type 2 Diabetes Mellitus (T2DM), contributes to reduced muscle function, impaired daily activities, and increased mortality risk. The prevention and preservation of *Bala* (strength) and *Mamsa* (muscle tissue) are crucial in improving the prognosis of diabetes when integrated with standard treatment. Loss of *Bala* and *Mamsa* is directly linked to a reduction in protein reserves, which in turn impairs immune function. As highlighted in the article, protein deficiency depletes amino acid levels in plasma, weakening the immune response by reducing T-cell activation, cytokine production, and antibody synthesis. This compromised immune system can exacerbate diabetes by increasing susceptibility to infections and inflammation, both of which negatively impact blood sugar regulation. Therefore, preserving muscle mass and strength through the use of *Rasayana* therapies, a protein-rich diet, and other nutritional interventions alongside conventional diabetes treatments is essential. These approaches help maintain adequate amino acid levels, thereby supporting immune function, reducing infection risk, and enhancing overall treatment outcomes for diabetic patients. By recognizing the significance of muscle mass in disease progression, healthcare providers can potentially improve patient outcomes and manage complications more effectively. The importance of integrating these traditional tools with modern medical practices to provide comprehensive care for diabetes patients. This integration could lead to better management strategies, improved patient resilience, and a reduction in disease-related complications.

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