**MADHUMEGA AVATHAIGAL : A COMPARATIVE REVIEW AS PER SIDDHA AND MODERN CLASS**

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**ABSTRACT:**

In recent years, as the Diabetes Mellitus proliferate worldwide and the disease takes an ever increasing proportion of national and international economy of health care. Though there is numerous existing cause of this dreadful disease the actual factors which become excited according to the Siddha system of medicine are the three humors which are the basic constituents of living body. The term Diabetes Mellitus describes a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. Diabetes Mellitus is a condition which can be compared with Madhumegam in Siddha. The other names described in the texts are the Neerizhivu and Inippuneer. The signs and symptoms explained is increased urination both in frequency and quantity, there will be flies surrounding the urine voided place, weight loss, dryness of the skin, etc. The disease comes under the Mega diseases. The literature of Madhumegaavathaigal described in Siddha School of thoughts still remains the great scope of research in the field of Diabetes Mellitus and its complication. The ancient traditional knowledge of the disease is analyzed here and review is made to compare the disease of tenMadhumegaAvathaigal correlated with complications of Diabetes mellitus in modern classics.

**Keywords:**Madhumegam, avathaigal, neerizhivu, complication, diabetes mellitus.

**INTRODUCTION:**

Siddha system of medicine is an ancient system practised by Siddhars, Siddhars classified diseases into 4448. [1] Meganoi is one among them, meganeer consists of 22 types, *Madhumegam*is a type of mega neer which is characterized by passing of sweet urine as per saint yugi. [2] According to Siddha system, disease occurs due to derangement of 3 vital humours;among 22 types of *meganeer* four comes under vadham, six under pitham and ten under kapham. The one called *madhumegam*comes under pitham. Diabetes associated with complications are responsible for a majority of its morbidity and mortality, complication of diabetes mellitus can be correlated as avaithaikalin yugivaidyachinthamani. [3] DM is leading cause of morbidity and mortality world over.

The prevalence of diabetes mellitus among various countries ranges from 1% - 30% and it is higher in the developed countries compared with the developing countries. By 2036,844 million people will be affected with DM. As of 2016,422 million peoplehave diabetes worldwide, up from an estimated 382 million people in 2013 and from 108 million in 1980. [4]

Accounting for the shifting age structure of global population, the prevalence of DM is 8.5% among adults in2016, nearly double the rate of 4.7% in 1980. Type II makes up 90%of the cases. [5] The WHO estimates that DM resulted in 1.5 million deaths in 2012, making it 8thleading cause of death. This paper deals with brief review about comparision of avathaikal and complications of diabetes mellitus.

**N*eerizhivunooiyilkaanumpathuvagaiAvathaikal [3]***

1. *Nooithoondhuvadharkkumurkuriyagaudalparuthukondaevarum. neerpuzhaiagandhruvarum*
2. *Siruneerperugikettuizhiumveneer(sukkilam) kettuudalinolikundrikaanum.*
3. *Naavaratchiudanvayitrulkaatrukoodiperugum*
4. *Neervetkaimigundhumuppinithodarum.*
5. *Siruneerperugiyizhindhuvindhunattamundagum*.
6. *Padukkaiyilkidakkavottaadhu.morchaiundagum****.***
7. *Vaaikumatisoovaiyatruperumoochiundaaiudalsoorum*.
8. *Udalilkazhalaikattigalundagum.*
9. *Ozhukkamthavaral ,perukazhichal ,puzhusaeralivaiUndagum*
10. *Ilaippunooisayamundaainooiyinanaikollumendrariyaum*
11. ***Nooithoondhuvadharkkumurkuriyagaudalparuthukondaevarum. neerpuzhaiagandhruvarum*[3]**

The existence of many new factors – for example, the increased prevalence of obesity among all age groups and both sex physical inactivity, poor diet, and urbanization – means that the number of patients diagnosed with type 2 diabetes is rising. [6]

A second factor that might contribute to a continuous loss of function of β-cells is increasing plasma NEFA levels. Despite the fact that NEFAs play a major role in insulin release, the continuous exposure to NEFAs is related to significant malfunction in glucose-stimulated insulin secretion pathways and reduced insulin biosynthesis. Moreover, the occurrence of insulin resistance in vivo and a failure of the compensatory mechanism of β-cells in humans contributes to increase amounts of NEFA levels produced by lipids. [7]

The two actions of NEFA contribute to a significant etiology that links β-cell dysfunction and insulin resistance in people with type 2 diabetes, and those who are at risk for the disease. The effect of lipotoxic increases in plasma NEFA levels and the rise of glucose levels might produce a more harmful effect known as glucolipotoxicity. [8]

1. ***Siruneerperugikettuizhiumveneer(sukkilam) kettuudalinolikundrikaanum.***

**Skin changes in Diabetes Mellitus**

Partial fissures, a hallmark of this condition can be explained by the accumulation of advanced glycation and products in the skin. AGEs content is increased in particular by inadequate glycemic control in diabetes. AGEs, impaired production of collagen and extracellular organ on that is associated a lower Hydro proline content and superoxide dismutase activity. Detection effects such as a great impaired and alteration of biochemical properties of the skin, namely, elastic and hydration.

Then is also loss of surface lipids of skin due to impaired of subcase gland function and a tendency of reduced hydration in the stratum cornatum. [9]

**Cutaneous manifestations of Diabetes Mellitus**

Skin disorder will be present in 79.2% of people with diabetes cutaneous diseases can appear as the first sign of diabetes or may develop at any time in the outcome of diabetes AcanthosisNigricans is the most readily recognized skin manifestation of diabetes.

**Acrochordons**

Acrochordons or fibro epithelial polyps, skin tags and soft fibromas are pedunculated outgrowths of normal skin on a narrow stalk, most commonly located on the eyelids, neck, axillae and groin.

**Diabetic dermopathy**

Diabetic dermopathy present as small less than 1 cm well- demarcated, atrophic depressions, macules or papules on the pretibial and is considered to be a sign of insulin resistance. Lesion heal and disappeared within 1-2 years on their own, leaving atrophic hypopigmentation at the site of origin.

**Eruptive Xanthoma**

Eruptive xanthoma presents on the buttocks, elbows and knees as sudden onset crops of yellow papules with an erythematous base. It is rare and occurs more often in patients with poorly controlled type 2 diabetes. It can be the first sign of diabetes.

**Rubeosisfacei**

Rubeosisfacei a relatively common skin manifestation associated with diabetes, is a microangiopathic complication such as retinopathy. These presents as a flushing to the face and correlates with poor glucose control. [10]

1. ***Naavaratchiudanvayitrulkaatrukoodiperugum***

Polydipsia can happen as a result of high sugar levels and is therefore one of the symptoms of diabetes. [11]

**Diabetic Gastroparesis**

Diabetic Gastroparesis (DGP) is a gastric complication of diabetes mellitus that causes nausea, vomiting, early satiety, bloating and abdominal pain. Postprandial discomfort and bloating, significant morbidity as well as significantly impairing glucose control.

Equal prevalence in type 1 and type 2 diabetes mellitus, develops after at least 10 years of diabetes and general have evidence of autonomic dysfunction. Diabetes enteropathy occurs in parallel with other form of diabetic neuropathy. If midgut motility is also hampered similar to the stomach, condition may lead to small intestinal bacterial over growth. Gastro esophageal reflux may occur commonly with diabetic gastroparesis, due to poor gastric emptying.

Constipation is also prevalent in a large subgroup of diabetic patients. [12]

1. ***Neervetkaimigundhumuppinithodarum***

**Diabetic ketoacidosis**

The biochemical criteria for the diagnosis of diabetic ketoacidosis hyperglycemia more than 200 mg/dl, venous PH < 7.3 or serum bicarbonate.Ketonemia blood b- Hydroxybyrate ≥ 3 mmol/L moderate or large ketonuria.

**Clinical signs of diabetic keto acidosis**

Dehydration, Tachycardia, Tachypnea, deep sighing respiration, breathe smell of acetone, nausea and or vomiting, abdominal pain, blurry vision, confusion, drowsiness, progressive decreased in level of consciousness, and eventually, loss of consciousness (coma).

Risk future for DKA for in patient with known diabetes include omission of insulin for various reason. Limited access to medical service and interruption of insulin delivery in patients using an insulin pump.

**Signs and symptoms of cerebral edema**

Cushing’s triad increased blood pressure, bradycardia, and Respiratory depression is a late but important sign of increased intracranial pressure. Decreased O2 saturation. [13]

**Warning signs and symptoms of cerebral edema**

Restlessness, irritability, increased drowsiness, confusion, incontinence. Progressive, worsening or severe headache, slowing of heart rate not related to sleep or improved intravascular volume, clinical neurological status. [14]

1. ***Siruneerperugiyizhindhuvindhunattamundagum*.**

Complication of diabetes mellitus with a variety of lower urinary tract symptoms.Lower urinary tract dysfunction including urinary urgency, frequency, nocturia, and incontinence that may or may not progress to an atonic or flaccid bladder.

High prevalence of incontinence in women with prediabetes and in those with diabetes suggest that incontinence may be an earlier and more common consequence of hyperglycemia. Hyperglycemia, oxidative stress and polyuria play important role in including voiding dysfunction in diabetic individuals.

**Diabetic cytopathic**

Asthe population ages, diabetes and lower urinary tract dysfunction will increase markedly in prevalence. Recent clinical study in 2011 reported that 22.5% of diabetic had overactive bladder, of which 48% had urinary incontinence. Etiology for incontinence is microvascular damages the innervation of the bladder, alter detrusor muscle function or cause urothelial dysfunction.

**Polyuria**

Bladder wall remodeling, including hypertrophy, dilation, increased contractility and compliance, and reorganization of structural relationships among detrusor, urothelial and collagen, reflects a physical adaptation to diuresis and may be a significant factor in the early- staged compensated bladder function in diabetics. In the late – stage decompensated bladder function, a decreased maturation pressure and increased post void residual urine occurs. Therefore, induced polyuria alters bladder function in diabetics. [15]

1. ***Padukkaiyilkidakkavottaadhu.morchaiundagum***

**Restless Legs Syndrome**

Restless Legs Syndrome is a disorder of the part of the nervous system that causes an urge to move the legs. Because it usually interferes with sleep, it also is considered a sleep disorder. Sleep disturbance perhaps one the most destructive symptoms of RLS patients have serious insomnia and wake up periodically throughout the night. Resulting in daytime sleepiness and decreased productivity. In turn, RLS symptoms can be exacerbated by sleep deprivation. [16]

**Uremia**

Chronic kidney disease results in a wide array of neurological complications affecting the central and peripheral nervous system. The central nervous system complications of CKD include stroke, seizures, movement disorders, cognitive dysfunction, encephalopathy, depression and anxiety. [17]

1. ***Vaaikumatisoovaiyatruperumoochiundaaiudalsoorum***

**Impaired taste**

Taste disturbance like ageusis, hypogeusia and dysgeusis and have been associated with DM. Early diagnosis of DM based on these symptom is very important to start treatment early and thereby prevent complications Interesting case of a female presenting with altered taste as the first symptom of Diabetes Mellitus. [18]

Diabetic patients with complications, neuropathy involving taste nerve tracts and microangiopathy involving taste buds may be responsible for the decreased taste sensation. In newly diagnosed DM cases without complications, defects in the taste receptor may be responsible Taste disturbances could be a significant pointer to diabetes in at risk patients. Altered taste was present only during certain time and not throughout the day.

Rather than being an indicator of duration or complications of disease, it could be an indicator of fluctuations in blood sugar levels. Antihypertensive drugs given to hypertensive diabetic patients are known also to have a deleterious effect on taste sensation. Among other drugs known to have a negative influence on taste sensation are sulfonylureas, also frequently used among diabetic patients. [19]

Lowered taste sensation may lead to an increase in glucose intake (sweetened food and drinks) because, to elicit the same taste sensation, a greater amount of glucose would have to be ingested According to some studies, obese patients may have a higher preference for sweetened food than do normal weight individuals .Pneumomediastinum is a rare complication of DKA Kussmaul's breathing, the respiratory compensation mechanism in metabolic acidosis, increases the alveolar pressure 20-30 mmHg above normal inspiratory pressures, predisposing to alveolar rupture. [20]

Vomiting in DKA also increases intrathoracic pressures secondary to the Valsalva maneuver DKA is often associated with severe vomiting, especially in the first 24h caused by acidosis. Gastroparesis is also worsened by hyperglycemia and exacerbates vomiting possibly contributing are the recently described fibrotic changes in the lungs of people with poorly controlled diabetes predisposing to alveolar rupture at lower intrathoracic pressures.

Fatigue is a common and distressing complaint among people with diabetes, and likely to hinder the ability to perform daily diabetes self-management tasks Fatigue in diabetes is likely caused from the interplay of physiological, psychological, and lifestyle-related factors. Fatigue is also likely to be both a cause and a result of poor diabetes self-management. [21]

An Indian study in 2012 evaluating 50 cases of DM with oral complications found taste impairment in 20% cases. Another Indian study found that taste alteration was more common in uncontrolled diabetics than in controlled diabetics. [22]

1. ***Udalilkazhalaikattigalundagum.***

**Carbuncle**

Carbuncles are commonly associated with diabetic patients Carbuncles are not uncommon even in this post-antibiotic era especially in those with uncontrolled diabetes

Diagnosis is frequently delayed as it occurs in the back or nape of neck and hence may not be visualized easily. Carbuncle, also called as infective gangrene of skin and subcutaneous tissue, is most commonly caused by *S. aureus* that usually starts as a furuncle/boil around the root of a hair follicle If left untreated, it can even precipitate diabetic ketoacidosis and cause death. [23]

**Cancer**

Diabetes (primarily type 2) is associated with increased risk for some cancers (liver, pancreas, endometrium, colon and rectum, breast, bladder). Diabetes is associated with reduced risk of prostate cancer. For some other cancer sites there appears to be no association or the evidence is inconclusive.

The association between diabetes and some cancers may partly be due to shared risk factors between the two diseases, such as aging, obesity, diet, and physical inactivity. Possible mechanism for a direct link between diabetes and cancer include hyperinsulinemia, hyperglycemia, and inflammation Healthful diets, physical activity, and weight management reduce risk and improve outcomes of type 2 diabetes and some forms of cancer Early evidence suggests that metformin is associated with a lower risk of cancer and that exogenous insulin is associated with an increased cancer risk.

Worldwide Cancer is the 2nd and diabetes is the 12th leading cause of death in the US, cancer is the 2nd and diabetes is the 7th leading cause of death Latter is likely an underestimate, since diabetes is underreported on death certificates as both a cause and comorbid condition. [24]

***9. Ozhukkamthavaral ,perukazhichal ,puzhusaeralivaiUndagum***

Diabetes affects major components of Qol Physical component especially with coexisting obesity complications as CAD renal failure, diabetic neuropathy or retinopathy or co- morbidities.

Psychological component especially type 1 in younger subjects and in coexistence with depression Social component by destroying family ties and friendships. Mental cognitive component particularly when dementia presents. [25]

**Diabetic Diarrhea**

Diabetic diarrhea is a troublesome gastrointestinal complication of diabetes. This condition persists for several weeks to months, and it frequently accompanies fecal incontinence.

Neuropathy of the small or large intestine may lead to significant diarrhea (often called 'diabetic diarrhea') that can be difficult to manage. [26]

It is fact that, diabetic patients have prone to infectious diseases by various mechanisms Disturbances in cellular innate immunity play a role in the pathogenesis of the increased prevalence of infections in DM. A second important mechanism is the increased adherence of the microorganisms to diabetic cells. Some microorganisms become more virulent in a high glucose environment. [27]

Most common symptoms are diarrhea, abdominal pain, bloating, flatulence, and weight loss resulting from malabsorption Prevalence of Giardiasis was 15% (30/200) in diabetic patients’ large spatial overlap between intestinal parasites and diabetes distribution, and the pathogenic mechanisms of both diseases suggest that they might influence each other. [28]

**Maggots/Diabetic foot/Ulcer**

75-year-old diabetic man came with the complaint of ulcer and boring pain in his big toe. The author removed 30 maggots from that ulcer. [29]

'Myiasis' is a term that refers to non-iatrogenic infestation of tissues by larvae, commonly known as maggots, of dipterous flies. Diabetes, immobilization, poor hygiene and low immune status were predisposing factors for developing myiasis. [30]

1. ***Ilaippunooisayamundaainooiyinanaikollumendrariyaum***

**Tuberculosis**

Ancient works by Yugimahamuni, an Indian siddhar, describe the symptoms of patients with "meganoikal" (urinary disorders), which progressed from obesity to impotence, thirst, and glycosuria, and ultimately, to unconsciousness or tuberculosis. [31]

**Tuberculosis**

Poorly controlled diabetes can lead to multiple complications, including vascular disease, neuropathy, and increased susceptibility to infection. Diabetes might also lead to increased susceptibility to disease caused by *M. tuberculosis* via multiple mechanisms. [32]

**DISCUSSION:**

Madhumegam comprises 20 sub varieties of diseases with various physical and chemical changes in urine and is further classified in to three groups [3] i.e. Kaphaneerizhivu (10), Pithaneerizhivu (6) and Vathaneerizhivu (4) which are resembles very much with different stages of diabetes mellitus. It has been observed that with progression of the disease there is increased hyperglycemia and simultaneously fall in plasma insulin

The Avathaigal mentioned by the Yugimuni are the same as that of diabetes and its complication Thus the concept of ten madhumegaavathaigalis well comparable with the complication of diabetes mellitus. untreated or improper management of madhumegam leads to 10 avathaigal.

**CONCLUSION:**

The review is concluding as Madhumegaavathaigal can be used as a synonym of complication of diabetes mellitus. This work highlights the Siddha perspective of Diabetes based on the derangement of three humors vatham, pitham and kabham. So, it is can be concluded description of etiology, pathogenesis, clinical feature, complications etc. appears to be similar in both Siddha and Modern medicine in respect ofmadhumegaavathaigal i.e.Diabetes Mellitus and its complication. Both systems of medicine should unite and lift the health among humans on to the world arena. However the Siddha System needs to be standardized and validated scientifically in preventing diabetes and its complication.

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