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A NOBEL APPROACH OF DIABETIC NEUROPATHY & ITS MANAGEMENT THROUGH AYURVEDA

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ABSTRACT

Diabetes mellitus vis a vis *Madhumeha* is a multi-factorial metabolic disorder of the 21st century. It is caused by an absolute or a relative lack of insulin. Its manifestations include hyperglycemia, other metabolic derangements, and long-term damage to blood vessels, eyes, nerves, kidneys, and the heart. It is a leading cause of cardiac death, nonfatal MI, heart failure and stroke. It is also the most common cause of adult blindness, end-stage renal disease, non-traumatic leg amputation and neuropathy. Diabetes mellitus is one of the oldest diseases recognized since antiquity. It is amazing that 7 century B.C. Ayurvedic texts like *Charaka* and *Sushruta Samhita* have been described high caloric diet and sedentary habits as an important causative factor of *Apathyanitmittaja Prameha* and genetic/hereditary factors described as *Sahaja Prameha*. Besides this, more profound Ayurveda have been mentioned different complications of *Madhumeha*. These two types of diabetics have been described to be treated on two different lines of management. Its aetiopathogenesis, clinical presentation, complications as well as treatment modalities, appear well comparable to the latest knowledge of conventional medicine. Thus, the present concept will be providing a new outlook about the understanding of aetiopathogenesis and as well management of Diabetic neuropathy.

Keywords: Ayurveda, *Preameha, Madhumeha*, Diabetes mellitus, diabetic neuropathy

INTRODUCTION

Diabetes mellitus is a multifactorial metabolic disorder affecting millions of people all over the world. It is one of the most important medical problems of today because worldwide >246 million people suffer from diabetes mellitus all over the world. By 2025 this figure could be expected to be 380 million. It is estimated that every year a further 7 million people develop diabetes. India has been projected by WHO as the country with the fastest-growing population of diabetic patients. Increasing urbanization, stress, obesity, reduced physical activity and pollution are together responsible to create this position. In 2007, the five countries with the largest numbers of people with diabetes are India (40.9 million), China (39.8 million), the United States (19.2 million), Russia (9.6 million) and Germany (7.4 million). WHO estimates that India may cross figures 57 million by 2025[1,2,3]. Diabetes as such does not kill the patient but it is the complications of diabetes that are responsible for mortality and morbidity. Diabetic neuropathy is one of the commonest complications associated with diabetes mellitus. Insulin is the mainstay of the treatment of both types of diabetes i.e. IDDM & NIDDM. Insulin is a multifunctional protein hormone. It also has some side effects e.g., allergy and resistance. The insulin resistance is alone in the development of spontaneous antibodies directed against insulin receptors, thereby preventing the interaction of insulin with the insulin receptor[4]. The complications associated with diabetes are functionally silent for long period. By the time they manifest, the treatment becomes extremely tedious. The exact cause of diabetic neuropathy is still unknown. It is multifactorial. Poor glycemic control, long duration of diabetes, presence of cardiovascular diseases, hyperlipidemia, stress etc are to be considered the important risk factors for diabetic neuropathy. Advanced glycation end products (AGEs), sorbitol and diacylglycerol are the core factors for most diabetic complications including diabetic neuropathy. These factors appear as tissue toxins implicated in the pathogenesis of neuropathy, retinopathy, nephropathy etc. Recent research in the conventional system of medicine has revealed that the exact aetiopathogenesis of diabetes mellitus and its complications are still vague and it needs further studies. and In-spite of many advances in the and management of diabetes mellitus and its complications it remains unsatisfactory and challenging. This seeks great attention from the present-day practitioners and researchers to evaluate the present status of this chronic health hazard including the desire for a better understanding of the aetiopathogenesis, disease diathesis and its management[5]. It is amazing to note that the knowledge of diabetes mellitus was equally advanced in the ancient time of *Ayurvedic* classics. The *Ayurvedic* texts describe a high carbohydrate diet and sedentary habits as the important causative factors of *Apathyaja Prameha* (type-2, DM) besides hereditary and genetic factors described as *Sahaja Prameha* (type-1, DM). Besides this, diabetics are also categorised into two groups in terms of constitution and body weight viz- I. *Krisha Pramehee* or thin diabetics and *Sthoola Pramehee* or obese diabetics. These two types of diabetics have been described to be treated on two different lines of management. This insight of categorizing into genetic and acquired and further as thin and obese is outstandingly scientific, comparable to the latest development in this field[6,7].

Concepts of Diabetes mellitus in Ayurveda

Diabetes mellitus vis a vis *Madhumeha* has been a clinically known disease entity since antiquity. The first recognized written text of human civilization i.e., Rig-Veda (C 1500, BC) contains hymns that include a detailed description of various medical conditions including diabetes. In classical texts of Ayurveda, diabetes mellitus is mentioned as a subtype of *Prameha*, *Mootratipravriittaja Vikara* and as a complication of *Prameha.* While *Shusruta* has been described *as Madhumeha* as a disease separately. Charaka has described *Prameha* as *Anushangi Vyadhi. Chakrapanidutta* has explained that *Anushangi* means *Punarbhavi i.e.,* the disease which is very difficult to be the cure. The ancient *Acharyas* of *Ayurveda,* viz- *Charaka*(C 600, BC) and *Sushruta* (C 500, BC) have

described the detailed account of this disease. All *Ayurvedic* classics have described in detail the aetiopathogenesis, symptomatology, classification, complication, prognosis, and management of diabetes vis a vis *Madhumeha* (presence of sugar in urine and body also). It is mentioned as a *Maharoga* in the classical text of Ayurveda because it affects all parts of the body and every cell of human physiology[8,9]. The ancient Indian physicians have not only described the sweetness of urine as one of the major symptoms but also the relationship of the disease with disturbance of the five sheaths of life, i.e.-

1- *Annamaya kosha*: sheath of food (Physical dimension).

2- *Pranamaya kosha*: sheath of energy (Energetic dimension).

3- *Manomaya kosha*: sheath of mind (Mental dimension).

4- *Vijnanamaya kosha*: sheath of intellect (Intellectual dimension).

5- *Anandamaya kosha:* sheath of bliss (Spiritual dimension).

According to *Ayurveda* diabetes mellitus may be of two types, viz-

i. *Sahaja* (genetic): Occurring in the younger age group from the very beginning of life. This concept is comparable to the modern concept of insulin-dependent diabetes or juvenile diabetes.

ii. *Apathyaja* (acquired due to faulty lifestyle): Occurring in middle age obese people. This concept is comparable to the maturity-onset, non-insulin-dependent as well as insulin resistance type of diabetes mellitus[10]. The ancient concept of *Bijadosha* (gene defects) is strikingly comparable to present-day knowledge and testifies that the ancients could detect genetic factors involved in the causation of diabetes mellitus (S.S.Ci-11/3). A *Sahaja vikara* is manifested due to certain defects in the *Beeja, Beejabhaga*, *Beejabhaagavayava*. In this connection, Neelakanthadatt clearly states that diabetes mellitus is not since birth, but it develops at a later stage associated with dietetic indiscretions. Sushruta rightly said that *Ksetra, Ambu, Bija* and *Ritu* are the four factors that are to be kept in mind while describing the genetic involvement. Besides this Charaka has also included the psychological factors (worry, anger, anxiety, and stress) in the aetiology of diabetes mellitus in susceptible individuals[7,8].

Vagbhata seems to have paid much attention to diagnosing the disease in its early stage explaining the following in his treatise *Rasaratna samucchaya*.

1- *Asvasthyam Sarva gatreshu* – a persisting & vague uneasiness in the body. This condition is more supported by Susruta as follows- *Gamanat sthanam*- prefers staying to walk., *Sthanat asanam*- prefers sitting to stand., *Asanat shayanam*- prefers lying to sit. *Shayanat svapnam*- prefers sleeping to lying down.

2- *Shosha* /*Asyashosha*- a feeling of dryness/drought in the body.

3- *Tapo angah*- a burning sensation in the body.

4- *Bahumootrata*. Frequency of urination.

5- *Karshyam*- Emaciation[11].

However, when the disease is well established and neglected apart from the above features, urinary changes become more distinct namely- *Prabhootaavilamootrata* (A.H.Ci.10/7).

1. ***Prabhootamootrata***—excessive urination.
2. ***Avilamootrata***-- turbidity in urine.

The former is more akin to impairment of carbohydrate, protein and fat metabolism and the latter one is to urinary tract pathology which occurs in a variety of urinary as well as extra urinary tract pathology. The following features are specific to diabetes mellitus;-

- Urine is astringent, sweet, pale and ununctuous (C.Ci.4/44)
- Urine is just like *Ksaudra* (honey) in taste and colour- *Madhviva mehati* (S.Ni.6/14).
- The whole body becomes sweetened- *Madhuryacha tanoratah* (A.H.Ni.10/18-27).
- *Ojas* (immune strength) is diminished, the person becomes timid, week, worried,
- having disordered of senses, loss of lustre, neurasthenic, dry and emaciated (C.Su.17/43).
- Diabetic patients prefer a sedentary lifestyle. (S.Ni.6/28)[7,10,12,13].

Ayurvedic Approach

In the classical texts of Ayurveda, various complications (*upadravas)* of *Madhumeha* such as *Trishna, Atisara, Jvara, Daha, Dourbalya, Arochaka, Pootimamsa (Gangrene), Pidaka, Hridgraha, Hrithshoola etc* have been described. But the etiopathology of diabetic complications is not very clear in these texts. Thus, the present concept of diabetic complications will provide a new outlook about the understanding of etiopathogenesis as well as management[8, 14,15, 16.] Apart from various etiological factors responsible for the causation of *Prameha,* the *Ayurvedic* texts include *Agni* (bio fire), *Ama* (unwanted, un-metabolized, toxic products etc.), *Ojas* (immune factors) and *Medas* (adipose tissue) as the major morbid factors. These two observations of the ancients again appear to be very scientific comparable with the modern trends of medical science of today. Because it is now well known that in terms of the resulting metabolic disorders, the hallmark of diabetes mellitus is the disorder of fat metabolism and ketosis. Similarly, it is also being gradually recognized that there is strong evidence of immune disorder and immunodeficiency in all diabetics. Possibly because of these factors, the propounders of Ayurveda considered *Ojas* as a *Dushya* of *Prameha* and *Madhumeha* was also termed as *Ojomeha*. *Agni* in the body is responsible for the digestion of food and the metabolism of the essence of food at different levels. When the *Agn*i, i.e. - *Jatharagn*i (gastrointestinal bio fires), *Dhatvagni* and *Bhootagni* (cellular bio fires**)** become weak, it leads to the formation of *Ama,* an unwanted byproduct at respective levels. This form of *Ama* has physical similarity to *Medas*. It impairs the function of *Medoagni,* resulting in qualitative and quantitative defects of *Medas.* This impaired form of *Medas* is known as ***Abadha Medas****,* i.e.-FFAs (a liquid form of *Medas*). Due to increased FFAs levels in serum, the glucose entry to the cells is hampered, resulting in insulin resistance and finally hyperglycemia (diabetes mellitus). thus, the involvement of *Agni* appears to be the initial pathological event in diabetes, which is pointed out by Vagbhata in *Sutrasthana* i.e.- ***"Rogah sarveapi mandeagnau"***[10]**.**

Increased FFAs and sugar levels in the serum (away from the normal range) are also considered as *Ama* state. It tends to block the microchannels, create an antigenic reaction and if retained in the body act as an autotoxin i.e., directly destroy the body cells. *Ama* is predominantly associated with *Dhatukshaya* (degeneration of cells), *Ojokshaya* (diminished immune status) and *Vataprakopa* (an impaired neuro-humoral mechanism). The *Dhatukshaya* due to the *Vyadhi Svabhava* itself can lead to *Vata Vriddhi* in the body, which in turn exacerbates the existing vitiated *Vata dosha* in the diabetics. A vicious cycle is set up, resulting in *Ojokshaya* and *Dhatukshaya*. This may lead to the process of neurodegeneration. Therefore, the manifestation of symptoms can be considered as below.

Vyana Vayu is mainly responsible for the coordinated action of all the body parts including the sensory and motor functions. Due to the *Dhatukshaya, Ojokshaya* and *Vyadhisvabhava*, it can lead to vitiating the *Vyana vayu*. It has a directly or indirectly deleterious effect on *Tarpaka kapha* i.e. neuroprotective factor. *Tarpaka kapha* is mainly responsible for the performance of the neural function. It not only provides a nutritional supplement to the functioning neuron but also acts as a protective barrier against a variety of injurious agents[7,10]. The deranged function of *Tarpaka Kapha* by *Ama* and vitiated *Vata* lead to impair the function of nerves in the general or nervous system. The sequence of pathological events in Ayurveda is as follows-

Apathyaja prameha -- Bija dosha -- Obesity -- Stress
↓
Madhumeha (prolong duration)
(Hyperglycemia in plasma i.e., Increase sugar & FFAs level
↓
Impaired *Dhatvagni* and *Bhootagni* i.e cellular bio fire
(Formation of unwanted, antigenic & auto-toxic products)
↓
Disturbance of *Dhatus parinama &* Disturbance of activities of *Dhatus*
↓
Dhatukshaya +Ojokshaya +Vyadhisvabhava itself
The resulting impairment of *Vyadhikshamatva*
↓
Vataprakopa
(An impaired neuro-humoral mechanism)
↓
Vitiatiation of *Vyana Vayu*
(Improper sensory and motor function)
↓
Vitiatiation of *Tarpaka kapha*
(Deranged neuroprotective factor)
↓
Vitiation of *Vatavaha srotasa*
(Impaired the function of nerve\ nervous system)
↓
Diabetic Neuropathy[10]

Ayurvedic Pathological component in diabetic neuropathy –

- ***Dosha***- *Tridosha* (Specially *Vyana Vata* and *Tarpaka kapha).*
- ***Dooshya***- *Rasa, Rakta, Mamsa, Meda, Kleda, Majja, Oja, Shukra, Jala* (specially *Meda and Mamsa*).
- **Status of *Agni***- *Jatharagni Vriddhi* due to increased function of *Samana Vayu,* this happens due to *Srotavarodha.* Functions of *Dhatvagnis* and *Bhootagnis* (specially *Medoagni*) are also deranged in diabetes
- **Site of *Ama* formation** – At the level of *Jatharagni, Dhatvagnis* and *Bhootagnis.*
- **Involvement of *Srotasa***- Specially *Rasavaha, Vatavaha, Mamsavaha, Medovaha, Mootravaha Srotasa*
- ***Srotodushti***- *Atipravritti* and *Sanga*
- ***Adhishthana***- Initially in *Shakha* and later in *Koshtha, Marma, Asth*i and *Sandhi*
- ***Pratyatma Lakshana***- *Prabhootavilamootrata, Shuptata, Shoola Anganama* etc
- ***Sancharasthana***- *Sarvanga Sharira via, Nadi, Sira, Dhamani, Rasayanee*
- ***Roga Marga***- *Abhyantara* and *Shakha Pradesh*
- ***Vyadhi Svabhava*** – *Chirakari*
- ***Sadhya - Asadhyata*** - *Kaphaja-Sadhya, Pittaja-Yapya, Vataja-Asadhya*[7, 10]

Etiopathogenesis of diabetic neuropathy

Conventional Approach

Diabetic microangiopathy is dysfunctional changes in microvascular beds in which endothelium and associated mural cells are progressively damaged, resulting in capillary occlusion, ischemia, and organ failure. Damage to the microvasculature in peripheral nerves is now becoming recognized as a major pathogenic factor in diabetic neuropathy. Diabetic

neuropathy is one of the commonest complications of diabetes and is certainly one of the most distressing. All neuropathies are characterized by a progressive loss of nerve fibres. Animal and in vitro experiments have implicated a variety of enzymatic and non-enzymatic metabolic mechanisms in the initiation of glucose neurotoxicity. The metabolic initiators include non-enzymatic glycation of proteins, the subsequent chemical rearrangement yielding complex proteins called Advanced glycation end products (AGEs), Auto oxidation of glucose by increased Aldose reductase activity, leading to accumulation of sorbitol and fructose within the cell and activation of protein kinase C. Recently, AGEs have been increasingly implicated in the pathogenesis of diabetic microangiopathy. However, their role in diabetic nephropathy and retinopathy is still under intense investigation[17,18,19.20,21]. These mediators tend to interrupt the nerve blood flow, impaired neurotrophic support, altered protein\ cell function\gene expressions and enhance the process of neural cell apoptosis.

Clinical presentation

1. Patients have a classical presentation like- polyuria, polydipsia, polyphagia, along with features of diabetic neuropathy such as-
2. Peripheral Neuropathy: Loss of senses or feeling of pain is first felt in the extremities, especially in the toes, feet and hands. It may also occur in the other ports of the body, the features are muscle weakness, numbness and pain.
3. Autonomic Neuropathy: It mainly affects the digestive system and the nerves that control blood pressure. This form of Neuropathy causes problems with the bladder, bowel, sexual response and perspiration etc.
4. Central Neuropathy: it may lead to neurological problems like dementia, cognitive impairment, depression, anxiety etc[10, 22,23].

Diagnostic Approach of diabetic neuropathy:

It is broadly divided into two categories-

1. **Clinical diagnosis:** It is mainly based on the classical symptoms of diabetes and symptoms related to diabetic neuropathy such as Polyuria, polydipsia, polyphagia, joint pain, muscle weakness, numbness & pain in the extremities, impotency, incontinence of urine, banalities, fatigue, hypertension, cardiac pain, blurred vision, nephropathy, ulceration, dementia, cognitive impairment etc.
2. **Laboratory diagnosis:** The American Diabetes Association requires the presence of one of the following criteria for the diagnosis of diabetes (ADA-2006). Diabetes is diagnosed by measuring blood glucose levels. It is diagnosed in three ways, and each must be confirmed on a subsequent day. They are- Classical symptoms of diabetes + casual glucose concentration ≥ 200 mg/dl.

- Fasting plasma glucose (FPG) ≥ 126 mg/dl.
- 2- Hour plasma glucose (PPG) ≥ 200 mg/dl during an OGTT

* The fasting plasma glucose test is preferred because of administrative convenience, acceptability to the patients and lower cast. Fasting is defined as no caloric intake for at least 8 hours.
* 2-hour plasma glucose test requires the use of a glucose load containing 75 gm glucose in water followed by plasma glucose measurement 2 hours later.
* Casual plasma glucose test should be performed any time of the day without regard to the last meal.

Category	Fasting plasma glucose in mg/dl	2-hour plasma Glucose in mg/dl	Casual plasma glucose in mg/dl
Normoglycemia	<100	<140	-
IFG/IGT	100-125	140-199	-
Diabetic range	≥126	≥200	>200 + classical Symptoms of diabetes

IFG- impaired fasting glucose OGTT- oral glucose tolerance test. IGT- - impaired glucose tolerance PPG- postprandial glucose.

3. **Glycosylated haemoglobin (HbA1c) test:** It is an important glycemic parameter to assess the severity of disease in clinical practice. By this test plasma glucose can also be calculated. The expected values of HbA1c % are given in the table.

Category	Expected values in %
Nondiabetic	4.5- <7
Good control	7- <9
Fair control	9-<10
Poor control	≥10

< 1% rise in the HbA1c= 1.7mmole/l (30mg/dl) increase in the mean glucose load>

4. **Diagnosis of Neuropathy:** If neuropathy is suspected after preliminary examination, it is also important to perform more extensive tests to determine the degree of the problem. This may include Comprehensive foot examination to assess the circulation and sensation., Check superficial and deep reflexes., Test the ability to Sense vibrations in the foot., Nerve conduction study., Electromyography etc., C- reactive protein.

Other laboratory tests in elderly diabetics: In symptomatic individuals following laboratory tests are routinely performed to assess the therapeutic response and other associated complications, viz- Blood for - TLC, DLC, ESR, Hb%., Urine for – glucose, protein, ketone bodies and microscopic examination for the presence of pus cells., Blood sugar- fasting and PP., Glycosylated Hb- (HbA1c, it is <7% in normal individuals) for assessing the degree of glycemic control & monitoring treatment. Blood urea, Serum creatinine, Lipid profile, Serum cholesterol, CRP, NCV etc[24, 25].

Management of Diabetic Neuropathy

No doubt modern medicine may have found a way to bring the cases of diabetes mellitus and its complications under control to some extent, yet the effort cannot be considered as final. It is because of the danger of complications such as drug resistance, hypersensitivity and antagonist formation with insulin, drug intolerance, fear of hypo and hyperglycemic episode with Sulphonylureas. This seeks great attention from the present-day practitioners and researchers to evaluate the present status of this chronic health hazard and to evolve newer strategies in their management[7,10]. In this regard, *Ayurvedic* drugs not only have *Pramehaghna* ie.- anti-diabetic property but also have *Rasayana* effect *i.e.* improve nutritional pool, *Ojovardhaka* effect *i.e.* immune enhancer, *Jivaneeya* effect *i.e.* longevity enhancer and *Balya* effect *i.e.* vitalizer. By these properties, Ayurvedic drugs alone or in combination with modern medicine, can reduce the insulin as well as oral hypoglycemic drug requirement, prevent or delay the long-term complications, and maintain overall health in elderly diabetics[12, 13].

The first and foremost principle of prevention, as well as the management of any disease, is to protect oneself from the causative factors i.e. – ***Sankshepatah kriya yoga nidanam parivarjanam*.** (S.U.1/25).

Charaka has divided the diabetics into two groups, i.e. *Sthulapramehi* (obese diabetics) and *Krishapramehi* (lean and thin diabetics) based on vitality, constitution and aetiology of the disease. This warrants different lines of management for the two types of diabetics[8, 15, 16]. ***Santarpana* measure**s are In *Krisha Madhumehi* i.e. - lean and thin diabetics., In *Vataja Madhumehi* i.e. - patients of type-I diabetes., In *Vataja Madhumehi* associated with complications ***Apatarpana* measures**, *Kaphaja* and *Pittaja Madhumehi* i.e. - patients of type-II diabetes.

Patients of type-II diabetes associated with complications. Besides these measures, *Charaka* has been advocated pacificatory measures such as decoctive preparations, powder of barley (*Yava*), and quantitative as well as qualitative light diet in the management of diabetic patients who are not suitable

to *Sodhana* measures. At present, the goal of diabetic treatment is not only to correct the hyperglycemia but also to improve the quality of life as well as the immune status of the patients besides attempts to prevent and manage the complications. At this juncture the proper management of diabetes and its related complications may be envisaged as below: The treatments of Diabetic Mellitus vis-à-vis *Madhumeha* as mentioned in *Ayurvedic* classics can be broadly divided into four groups-

1. ***Nidana Parivarjana-*** Avoidance of etiological factors, i.e.-faulty lifestyle, faulty dietary habits, mental stress, day sleep and awakening at night.
2. ***Ahara-*** Diet is an important regimen for the control of diabetes mellitus. It is an important measure for obese diabetics. The role of diet in the management of diabetes mellitus has the same importance as it was thousands of years back. *Katu, Tikta, Kashaya Rasa, Ushna, Laghu, Rooksha* properties of food are prescribed in diabetes. Dieting is an important measure for obese diabetics and a special dietary regimen is to be planned to lean and thin diabetics during management.

- The food which is enriched with alcohol, milk, oil, G*hee*, flour, syrup, and meat of the animals which are residing in water or near water should be avoided (S.S.Chi; 11: 5).
- Foods like ***Yava*** (barley), bitter, pungent, and astringent vegetables, the meat of animals residing in hot climates and pulses/cereals like-*Shyamaka. Kodrava, Uddalaka, Godhooma,* and *Kulattha*are to be taken by all patients of diabetes mellitus (*Shodhala* K.C. *Khanda*; 30: 41-42).

3. ***Vihara-*** The role of exercise has been emphasized by *Acharya Sushruta* in the management of poor and rich diabetic patients.

- For poor patients- there is an indication of light exercise and earn his living by begging.
- For rich patients – there is an indication of heavy exercise and earn their living by begging.

Recent evidence shows that exercise, meditative *Asanas* & lifestyle management not only improve hyperglycemia but are also believed to improve pancreatic and liver functions.

4. *Aushadha*/*Ayurvedic* formulations- In Ayurvedic classics several herbal and herbo- mineral drugs are advocated for the treatment of *Prameha* in general. Drugs having *Katu* (pungent), *Tikta* (bitter) and *Kashaya* (astringent) *Rasa* are indicated in all types of *Prameha*, i.e. diabetes and its related complications.

- Herbal drugs:viz-*Vijayasara, Nisha, Amalaki, Mamajjaka, Jamboo, Bilvapatra, Tejapatra, Nimba, Karvellaka, Pippali. Guduchi, Khadira, Kramuka, Bhoomyamalaki, etc*
- Mineral drugs: viz-*Shilajatu, Svarnamaksheeka, Shivagutika, Trivanga Bhasma, Naga Bhasma etc.*
- Herbo-mineral preparation:

* Classical: *Basantkusamakararasa, Pramehantaka Vati, Chandraprabha Vati* etc.

* Neo-formulations. Hayponid, Amaree plus granules and tablet, Diabecon etc.

5. Promotion of *Ojas or* immune status- drugs having *Rasayana, Jivaniya* and *Pramehaghna* properties e.g.- *Nisha, Amalaki, Shilajatu, Svarnamakshika etc.*
6. Promotion *Agni*, i.e. bio fire- drugs which act at the level of *Agni e.g.- Pippali, Maricha, Chitraka, Shunthi, Bhallatak etc.*
7. Avoidance of mental stress by practicing meditative *Asanas* and *Pranayam* under trained Yoga experts.

In the Ayurvedic classics, various preparations have been advocated for the treatment of diabetes mellitus and its related complications. Based on the physical strength of the patient and strength of the disease following drugs are commonly prescribed as a single drug or in combinations or with compound drugs in Ayurvedic practice for the treatment of diabetes mellitus and diabetic neuropathy.

Single drugs preparations

Amalia Churna- 8 gms in two divided doses., *Haridra Churna-* 8 gms in two divided doses., *Mamajjaka Churna-* 6 gms in two divided doses., *Shuddha Shilajit-* 1 gm in two divided doses, *Vijayasara Churna-* 4-6 gms in two divided doses., *Karvellaka Svarasa-* 20-40 ml in two divided doses., *Jamboobeeja Churna* - 6-12 gms in two divided

doses., *Guduchi Svarasa*- 10 to 20 ml twice a day.

Compound drug preparations

Basantakusamakara rasa-250 mg in two divided doses., *Pramehantaka vati*- 500 mg in two divided doses., *Chandraprabhavati*-1 gm in two divided doses., *Trivanga Bhasma*- 500 mg in two divided doses. *Madhookasava*- 40 ml in two divided doses with an equal quantity of water.

In the case of diabetic neuropathy

The following drugs are found very effective in the management of all types of diabetic neuropathies. *Ashvagandha Choorna*/Tab- 6 gms/4 Tab in two divided doses. *Dashamooladi taila* and *Prasarani taila* – for local application. *Dashmula Ghana Vati*- 600 mg in two divided doses. *Vasanta Kusumakar Rasa*- 250 mg in two divided doses. *Yogendra Rasa*- 200 mg in two divided doses. *Shilajithvadi Louha* – 500 mg in two divided doses. *Prava, Mukta,* and *Shukti Bhasma*- 500 mg in two divided doses. *Shiva Gutika*- 500 mg in two divided doses [7,10, 8, 15,16].

CONCLUSION

We finally conclude that *Prameha/ Madhumeha* of Ayurveda is a metabolic disorder and resembles greatly the known contemporary concept of diabetes mellitus. As per Ayurveda, it is presumed that the disease diabetes itself and its complications emerge as simultaneously. Further, the duration of diabetes and its uncontrolled condition may lead to developing diabetic complications including neuropathies. The exact pathogenesis and management of diabetes and diabetic neuropathy is not clearly understood to date. Hence the above said Ayurvedic concepts of diabetic neuropathy can be taken as leads to the understanding of pathogenesis as well as the management of diabetes for contemporary use today.

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