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 21st century. It is caused by absolute or a relative lack of insulin. Its manifestations include hyperglycemia, other metabolic derangements, and long term damage to blood vessels, eyes, nerves, kidney, 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 habit as an important causative factors of *Apathyanittaja Prameha* and genetic/hereditary factors described as *Sahaja Prameha*. Beside this, propounders of 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 aetio-pathogenesis, 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 an well as management of Diabetic neuropathy.
Kewords: Ayurveda, *Preameha*, *Madhumeha*, Diabetes mellitus, diabetic neuropathy

Introduction

Diabetes mellitus is a multifactoral 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 million of people suffer from diabetes mellitus all over the world. By 2025 this figures could be expected to be 380 millions. 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 which 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 considered to be alone to the development of spontaneous antibodies directed against insulin receptor, thereby preventing 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 considered to be multifactoral. 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), sorbital and diacyl glycerol are the core factors for most of the diabetic complications including diabetic neuropathy. These factors appear as tissue toxins implicated in the pathogenesis of neuropathy, retinopathy, nephropathy etc.

Recent researches in conventional system of medicine have 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 still 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 of better understanding of the aetio-pathogenesis, disease diathesis and its management[5].

It is amazing to note that the knowledge of diabetes mellitus was equally advanced in ancient time of *Ayurvedic* classics. The *Ayurvedic* texts describe high carbohydrate diet and sedentary habit 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 categorises in two groups in terms of constitution and body weight viz- I. *Krisha Pramehee* or thin diabetics II. and *Sthoola Pramehee* or obese diabetics. These two types of diabetics have been described to be treated on two different lines of management. Obviously 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 clinically known disease entity since antiquity. The first recognized written text of human civilization i.e. Rig-Veda(C 1500, BC) contains hymns which include detailed description of various medical conditions including diabetes. In classical texts of Ayurveda diabetes mellitus is mentioned as a sub types of *Prameha*, *Mootratipravriittaja Vikara* and as a complication of *Prameha.* While Shusruta has been described *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 cure. The ancient *Acharayas* 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 details 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 describe 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 younger age group from 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 life style): 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 which are to be kept in mind while describing the genetic involvement. Beside this Charaka has also included the psychological factors (worry, anger, anxiety and stress) in the etiology of diabetes mellitus in susceptible individuals[7,8].

Vagbhata seems to have paid much attention in 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*- 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 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 later one is to urinary tract pathology which occurs in variety of urinary as well as extra urinary tract pathology. The following features are specific to diabetes mellitus;-

i. Urine is astringent, sweet, pale and ununctuous (C.Ci.4/44)
ii. Urine is just like *Ksaudra* (honey) in taste and color- *Madhviva mehati* (S.Ni.6/14).
iii. Whole body becomes sweetened- *Madhuryacha tanoratah* (A.H.Ni.10/18-27).
iv. *Ojas* (immune strength) is diminished, the person becomes timid, week, worried, having disordered of senses, loss of luster, neurasthenic, dry and emaciated (C.Su.17/43).
v. Diabetic patients prefer sedentary life style. (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 complication will be provide a new outlook about the understanding of etiopathogenesis an well as management[8, 14,15, 16.]

Apart from various etiological factors responsible for causation of *Prameha,* the *Ayurvedic* texts include *Agni* (biofire), *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 a strong evidence of immune disorder and immuno deficiency 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 digestion of food and metabolism of essence of food at different levels. When the *Agn*i, i.e. -*Jatharagn*i (gastrointestinal biofires), *Dhatvagni* and *Bhootagni* (cellular biofires**)** become weak, it leads to formation of *Ama,* a unwanted byproduct at respective levels. This form of *Ama* has physical similarity to *Medas*. It impairs the function of *Medoagni,* resulting qualitative and quantitative defects of *Medas.* This impaired form of *Medas* is known as ***Abadha medas***, i.e.-FFAs (liquid form of *Medas*). Due to increased FFAs level in serum, the glucose entry to the cells is hampered, resulting into insulin resistance and finally hyperglycemia (diabetes mellitus).thus involvement of *Agni* appears to be the initial pathological event in diabetes, which is clearly pointed out by Vagbhata in *Sutrasthana* i.e.- **"*Rogah sarveapi mandeagnau"***[10]**.**

Increased FFAs and sugar level in the serum (away from normal range) are also considered as *Ama* state. It has tendency to block the micro channels, create 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* (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 neuro-degeneration. 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 the *Dhatukshaya*, *Ojokshaya* and *Vyadhisvabhava*, it can lead to vitiate the *Vyana vayu*. It has directly or indirectly deleterious effect on *Tarpaka kapha* i.e. neuroprotective factor. *Tarpaka kapha* is mainly responsible for the performance of neural function. It not only provides the nutritional supplement to the functioning neuron but also act as protective barriers against 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 general or nervous system as a whole. 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 biofire
(Formation of unwanted, antigenic & auto-toxic products)
↓
Disturbance of *Dhatus parinama &*
Disturbance of activities of *Dhatus*
↓
Dhatukshaya + *Ojokshaya* + *Vyadhisvabhava* itself
Resulting impairment of *Vyadhikshamatva*
↓
Vataprakopa
(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 Pradesha.*
- *Vyadhi Svabhava-* *Chirakari.*
- *Sadhyasadhyata-*

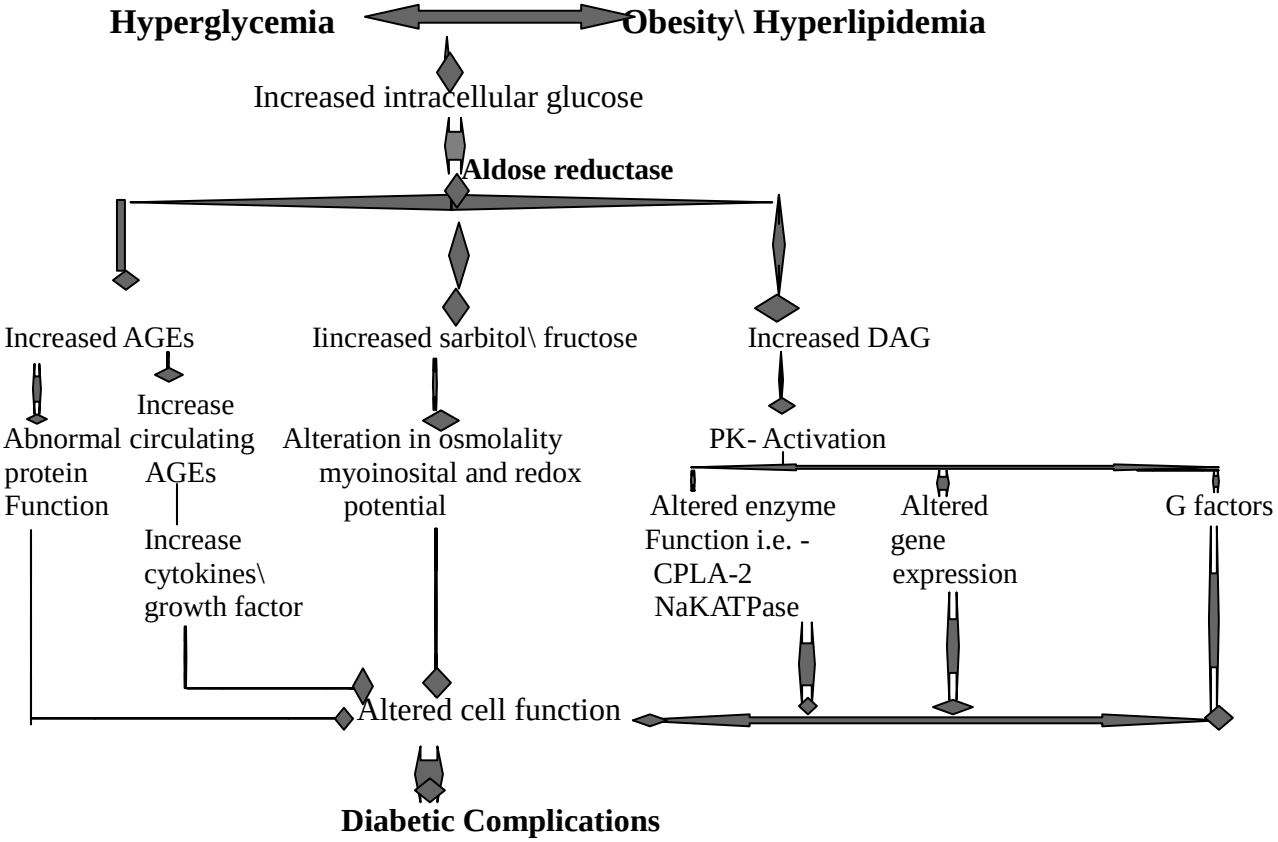
1. *Kaphaja-Sadhya*
2. *Pittaja-Yapya*
3. *Vataja-Asadhya*[7, 10]

Aetiopathogenesis of diabetic neuropathy

Conventional Approach

Diabetic micro-angiopathy is dysfunctional changes in micro-vascular beds in which endothelium

and associated mural cells are progressively damaged, resulting in capillary occlusion, ischemia, and organ failure. In fact, 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 fibers. 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 sorbital 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 have tendency to interrupt the nerve blood flow, impaired neurotrophic support, altered protein\ cell function\gene expressions and enhance the process of neural cell apoptosis. The whole process is summarized as follows-



Clinical presentation

1. Patients have 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 occurs 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 leads 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 with diabetic neuropathy such as Polyuria, polydepsia, 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 by three ways and each must be confirmed on 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 on OGTT

* The fasting plasma glucose test is preferred because of administration 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 last meal.

Category	Fasting plasma Glucose in mg/dl	2-hour plasma Glucose in mg/dl	Casual plasma Glucose in mg/dl

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

3. **Glycosylated hemoglobin (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 % is given in table.

Category	Expected values in %
Non diabetic	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 of 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 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 can not be considered as final. It is because of 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.* immuno enhancer, *Jívaneeya* effect *i.e.* longevity enhancer and *Balya* effect *i.e.* vitalizer. By virtue of these properties Ayurvedic drugs alone or in combination with modern medicine, have capacity to 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 kriyayogo nidanam parivarjanam*.** (C.Ci.6/53, S.U.1/25).

Charaka has divided the diabetics into two groups, i.e. *Sthula pramehi* (obese diabetics) and *Krisha pramehi* (lean and thin diabetics) on the basis of vitality, constitution and etiology of the disease. This warrants different lines of management for the two types of diabetics[8,15,16]. viz-

Sthulah pramehi balavanihaikah krishastathaikah paridurbalashcha.I
Sambrimhanam tatra krishasya karyam samshodhanam dosha baladhikasya.II (C.SCi.6/15)

1. ***Santarpana* measure**s: 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
2. ***Apatarpana* measures**: In *Kaphaja* and *Pittaja Madhumehi* i.e- patients of type-II diabetes.
   Patients of type-II diabetes associated with complications.

Beside 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 *Sa¿Ðodhana* measures.

Samshodhanam narhati yah pramehi tasya kriya samshamani prayojya I.

Manthaah kashaya yavacoorna lehaah pramehashantye laghavashcha bhakshyaah II. (C.S.Ci.-6/18)

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 beside 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 habit, mental stress, day sleep and awakening in night.
2. *Ahara*- Diet is an important regimen for the control of diabetes mellitus. It is an important measure for the obese diabetics. The role of diet in the management of diabetes mellitus has same importance as it was thousands years back. *Katu, Tikta, Kashaya Rasa, Ushna, Laghu, Rooksha* properties of food are prescribed in diabetes. Dieting is an important measure for the 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, meat of animals residing in hot climate 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 indication of light exercise and earn his living by begging.
   - For rich patient – there is indication of heavy exercise and earn his living by begging.

Recent evidences show that exercise, meditative *Asanas* & life style management not only improve hyperglycemia but are also believed to improve the pancreatic and liver functions.

4. *Aushadha*/*Ayurvedic* formulations- In Ayurvedic classics a number of 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 complicatins.
   - 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: *Basantkusamakara rasa, 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. biofire- 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 expert.

In the Ayurvedic classics various preparations have been advocated for the treatment of diabetes mellitus and its related complications. On the basis of physical strength of the patient and strength of 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

- *Amalai Churna*- 8 gms in two divided doses.
- *Haridra Churna*- 8 gms in two divided doses.
- *Mamajjaka Churna*- 6 gms in two divided doses.
- *Shuddha Shilajita*- 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.
- *Gudoochi 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.
- *Chandraprabha vati*-1 gm in two divided doses.
- *Trivanga Bhasma*- 500 mg in two divided doses.
- *Madhookasava*- 40 ml in two divided doses with equal quantity of water.

In 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 of Ayurveda is a metabolic disorder and resembles greatly with the known contemporary concept of diabetes mellitus. As per Ayurveda it is presumed that disease diabetes itself and its complications are emerged as simultaneously. Further, the duration of diabetes and its uncontrolled conditioned may lead to develop diabetic complications including neuropathies. The exact pathogenesis and management of diabetes and diabetic neuropathy is not clearly understood till 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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