



DIETARY MANAGEMENT IN DIABETES MELLITUS W.S.R. TO MADHUMEHA

Ayurveda

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ABSTRACT

Diabetes mellitus is a silent metabolic disorder which arises slowly in the beginning and often undiagnosed for many years. It is characterized by abnormalities in the metabolism of carbohydrates, lipids including cholesterol and protein. In *Ayurveda* it correlates with *Madhumeha* in which there is loss of *Ojas* due to negligence of every type of *Prameha*. *Ojas* is responsible for proper development of body, govern the action of mind and provides immunity. The predisposing factor for diabetes are poor dietary pattern and sedentary lifestyle. Diet and ideal lifestyle play an important role in diabetes. According to *Ayurveda* the diet and life style improves the quality of *ojas* and play the prime role in *Madhumeha*. The goal of dietary management is to maintain and prolong a healthy, productive and a satisfying life in diabetic patient. It focuses on to improve health through optimum nutrition with maintain glycaemic control and to minimise nutrition related chronic degenerative complications.

KEYWORDS

Pathya ahara & vihara, Fibres diet, Exercise, *Yoga*, *Sadvrita*, Myths & Facts, Education & Counselling.

INTRODUCTION:

Ayurveda is the science of longevity emphasizing not only to cure the disease but also promotes health prevention. Due to sedentary lifestyle, improper and imbalanced diet are leading to the emergence of several health problems, among that diabetes mellitus is a giant disease, which is considered as one of the arch enemy of mankind. Diabetes is derived from the Greek word, *Diabainein*, which means "to siphon through", while mellitus is a Latin word which means "honey"¹. It is chronic metabolic disorder that prevents the body to utilise glucose completely or partially and high level of sugar in urine (glycosuria)². It is accompanied in many cases by secondary alternations of fat and protein metabolism. This is due to failure in the formation of insulin or action. It is secreted by the beta cells of islets of Langerhans which are endocrine in nature and small amount of insulin is secreted by the muscular tissue for its own use. If the sugar level of diabetic patient is not regulates it arises complications and affect in feet, eyes, heart, and kidney.³

Basically its is classified into:-

- Type 1 diabetes :- Which has an immune pathogenesis and is characterized by severe insulin deficiency. It is mostly occur in youngsters (usually <30) with lean appearance in weight.
- Type 2 diabetes :- Which results from a combination of insulin resistance and less severe insulin deficiency. It is mostly occur in older (usually >30) with overweight appearance.⁴

The ancient reference of this disease is mentioned in '*Devik yuga*' that lord *shiva* has dictated a formulation for the treatment of *Prameha* to his son Lord Ganesha. In vedic period the word "*Ashravam*" is mentioned in *Atharvana veda* which means that excessive micturition of urine.⁵ In our classical literature of *Ayurveda* i.e. in *Vrihata Triya* the separate chapter is mentioned in it. *Acharya charak* explained about *Madhumeha* in which there is roughness character of *vata dosha* is aggravated change the sweet taste (of *ojas*) into astringent taste and excrete out the urine in sweet and turbid nature.⁶ In the view of *Acharya vagbhaat* *Madhumeha* is occur due to the neglected and not treated of all the cases of *Prameha*.⁷

NEED OF STUDY:

Diabetes is projected to become one of the world main disablers and killer within the next twenty-five years. The multicentre ICMR study showed a prevalence of 2.5 per cent in the urban and 1.8 percent in the rural population above the age of 15 years. This data shows that it also affected children. Demographic and nutrition transition have brought drastic changes in the dietary pattern and life style of the people, with one of the consequences being diabetes. With such large numbers being affected by this serious and chronic disorder, the country and its national economy face tremendous challenges. The prevalence is 2.8 percent among those who are still engaged in strenuous physical activity compared to 48.3 percent living a near sedentary life. Infection, atmospheric pollution, psychological stress and sedentary lifestyle are the four major accompaniments of urbanisation. These

could have an important role to play in this epidemic, through release of pro inflammatory cytokines from adipose tissue. One in every eight individual in India is a diabetic. The revised WHO figures for the year 2025 is 57.2 million diabetics in India. The average age for the onset of diabetes is around 40 years while its around 55 years in other countries. Western data suggest that Indian are more centrally obese at a given level of BMI compared to white Caucasians and that Indians are more insulin resistant even at lower level of BMI.⁸ The preventive measures of diabetes in *Ayurveda* is described in wide range like follows the *Dincharya*, *Sadvrita*, *Rasayana*, *Yoga*, Exercise managing the diet regimen which prevent from complication occurs from diabetes.

AIM AND OBJECTIVE:

- To improve the health through optimum nutrition mention in *samhita* and modern science.
- To maintain glycaemic control through various regimen mention in *samhita* and modern science.

MATERIAL:

The data for study is collected from various *Ayurveda* texts, modern literature, authentic published journals, research updates and information available on internet.

METHOD:

Type of study :- Cconceptual study

MANAGEMENT:

Basically the management of *Madhumeha* is based upon the nature of individuals in obese (*sthoola*) and lean (*krisha*) The management protocol for the obese patient, firstly to do purification therapy (*samshodana*) and afterward tissue rejuvenation i.e. *santarpana* is carried out. The disease is manage by dietary regimen and modify the lifestyle pattern and the protocol for the management of lean patient, *brimhana* therapy (tissue nourishment or rejuvenation) is carried by selective medicines and dietary regimen.⁹

Therefore the management of *Madhumeha* is divided into 4 pillars i.e.

- Ahara* (diet)
- Vihara* (exercise, *yoga asanas*, *nidra* and *sadvrita*.)
- Aushadha* (Herbal medicine)
- Education and counselling.

1. **Ahara (Diet):** *Ahara* that is *pathyam* which includes specific foods and drugs from natural resources which is profitable in the prevention of diabetes. In *vrihata triya* various dietary are mention as follows:

Charaka Samhita ¹⁰	Sushruta Samhita ¹¹	Ashtanga Hridaya ¹²
- Soup prepare out of green gram along with rice (more than one year old). - Including bitter	- Decoction of <i>areca catechu</i>. - The juice of <i>kapittha</i> added with pepper can be consumed.	<i>Kashaya</i> of <i>guduchi</i> along with honey in the early morning. <i>Yava</i> and <i>godhuma</i>

tasting vegetables in the diet along with rice which is more than a year old.	• <i>Loharista</i> help in preventing complications of diabetes.	preparation are said to be <i>pathya</i> .
• Barley is said to be the best food for a diabetic patient. Any form of consumption of barley like soup, steamed barely, linctus etc.	• When the patient has excessive burning sensation all of his body then prescribed a thick gruel prepared from the <i>kashayas</i> of tuber plant.	• Juice of <i>kapitha</i> seasoned and to be used internally.
• <i>Kashya</i> preparation with turmeric and <i>amalaki</i> mixed with honey.		• Meat of animals that live in desert region can be consume after and drying in sunlight.
		• Drinking water should be prepared from the drugs of <i>asanadigana</i> , <i>darbha</i> or honey water.

Diet recommended in diabetic¹³:-

Types of Diet	Names
Cereals	<i>Purana shali</i> (old rice), <i>Shastic Shali</i> (rice which crops within 60 days), <i>Yava</i> (Barley) (Hordeum vulgare), <i>Godhuma</i> (wheat), <i>Kodrava</i> (grain variety - <i>Paspolum scrobiculatum</i>)
Pulse	<i>Adhaki</i> (red gram- <i>Cajanus cajan</i>), <i>Kulaththa</i> (horse gram), <i>Mudga</i> (green gram), should be taken with bitter and astringent leafy vegetables.
Vegetables	<i>Navapatola</i> (young <i>Tricosanthus dioica</i>), young vegetables variety of banana, <i>Tanduleyaka</i> (Amaranthus spinosus), <i>Vastukam</i> (Bathuva), <i>Matsyakhshi</i> (Alternanthera sessilis) all bitter vegetables (tiktasakam) like <i>Methica</i> (Fenugreek leaves), <i>Karavellaka</i> (Bitter gourd)
Fruits	Orange, watermelon, apple and guava, <i>Jambu</i> (<i>Syzigium cumini</i>), <i>Kapitha</i> (<i>Feronia limonia</i>), <i>Amalaki</i> (<i>Phyllanthus embilica</i>) etc fruits.
Flesh	<i>Harina</i> (deer), Birds like <i>Kapota</i> (pigeon), <i>Titira</i> (Grey Francolin)
Oils	<i>Nikumba</i> (<i>Danti-Baliospermum montanum</i>), <i>Ingudi</i> (<i>Balanitis egyptica</i>), <i>Atasi</i> (<i>Linum usitatisimum</i>), <i>Sarsapa</i> (mustard).

Dietary management of diabetes according to Modern science^{14,15}:

Some of the principles of managing diabetes and preventing its complications:

1. Daily energy intake must be estimated after considering such factors as age, sex, actual weight in relation to desirable weight, activity and occupation.
2. Regularly monitor blood sugar level.
3. Maintain regular timing for meals and eat small serving at a time including wide range of food.
4. The total intake of calorie is more important for a diabetic than the exact proportion of protein, fat, and carbohydrate in the diet.
5. Total intake of carbohydrate in a day should be 50-55% of total calories, protein should contribute 15- 20% of the calories (unless kidney function is impaired) and 25-30% should be supplied from fat.
6. Use the concept of glycemic index and glycemic load in selection of carbohydrate containing foods.
7. Patient should avoid fasting and feasting.
8. Follow the instruction rigidly especially for those on insulin therapy.
9. Follows the prescription given by dietician and doctor (for diet and drug).
10. Maintain blood profile, kidney profile with in expected range.

RASAYANA: *Shilajatu* as a *namittika rasayan* for diabetes which has *ojovardhaka* property and its capacity to drain out excess of fat from the body and helps the curing obesity.¹⁶ It has fulvic acid which eradicates the free radical causing harm to the beta cells of pancreas¹⁷. *Dalhana's* commentary on *sushruta* narrated *Shilajatu* as the best *namittika rasayana* for *Madhumeha*,¹⁸ *Nisha amalaki* also use for diabetes mellitus.¹⁹

ROLE OF FIBERS: The WHO recommendation for fiber intake for those persons which suffer coronary artery disease and diabetes are same recommendation for the general public approximately 27 - 40g/day of dietary fiber from a variety of food sources. Some selected soluble fibers are capable of delaying glucose absorption and effect on glycemic control²⁰.

2. Vihara: It is cost effective methods which help the mind and body to make in equilibrium stage to follows the daily regimens of life like *Brahma muhurta jaagarana*, *Udvartana*, *utsadana*, *snaana*, *Vyayama*, *yoga*, *sadvritta* etc help in preventing the complications of diabetes and maintain glycaemic control.

EXERCISE: In *Ayurveda* its term as “*vyayama*” should be done in certain limit by each individual mentioned as *ardhashakti*.²¹ Basically there is *dhatushaithilyata* in *Madhumeha*, *samhanana* of body is reduced so one should not go for vigorous exercise. By practising the exercise, sweating is occurred which expelled out the vitiated *dosha*, *kapha*, *Kleda* and *mala* from *srotas*.²² Therefore it helps to maintain glucose level in body and responsible for causation of *Madhumeha*. Aerobic exercise such as jogging, swimming taking long walks are recommended which lowering HbA_{1c} value.

Some are the additional benefits of exercise for person with diabetes²³:

- A. Exercise adds to the blood glucose – lowering effect of injected insulin, so regular physical activity can permit a reduction in insulin dosages.
- B. Physical training can help reverse the resistance to insulin that occurs as a result of obesity.
- C. Reduction of risk factors for atherosclerosis, which occurs with increased frequency in the diabetic population. Regular exercise affects a lowering in triglycerides and very-low-density lipoprotein (VLDL), a decrease in total cholesterol and low-density lipoprotein (LDL) and an increase in high density lipoprotein (HDL).
- D. Lower blood pressure. High blood pressure can increase the overall chronic problems that occur with diabetes. The reduction of blood pressure with exercise occurs even without weight loss or decrease in body fat.

YOGA: Yoga is based on the principle that mind and body are mutually interlinked related. It exhibits many health benefits, such as improving physical fitness by providing flexibility and strength to muscles, enhances blood circulation and increase oxygen uptake, relaxation and awareness of self. Different various poses of *Yoga* specially action on abdominal muscles increase blood circulation to stomach and alimentary canal which improves the digestive power of body this can be regulate the secretion of pancreatic hormone.

Practising of yoga is done on an empty stomach, but who suffer from diabetes may take light meal to prevent hypoglycaemia.²⁴

Some of the recommended asanas and Yoga for diabetes are:

A. Aum/Om chanting:

Scientific analyses have shown that chanting “*Aum*” is based on the physics of sound, vibrations, and resonance, and has a positive influence on health. Chanting the “*Aum*” mantra results in stabilization of the brain, removal of negative thoughts, and increase of energy, and mental improvements and relaxation of the body take place within minutes of practice²⁵. *Pranava pranayama* (chanting “*Aum*”) in the supine posture produces an integrated relaxation response, which may have clinical significance in the management of hypertension and diabetes²⁶.

B. Yoga nidra (Yogic sleep):

Yoga nidra (conscious, dynamic, psychic sleep) is a comprehensive, profound relaxation technique for removing physical, mental, and emotional tensions. *Yoga nidra* practice in middle-age diabetes patients on oral medications led to improved symptom scores and reductions of fasting blood glucose and postprandial blood glucose levels.²⁷

C. Dhyana (Meditation) :

Visualization and concentration on the pancreas during meditation has positive effects on sugar levels and is recommended in the management of diabetes. Mindfulness practice is advocated for better sleep, greater relaxation, and more accepting approaches to illness and the illness experience in people with diabetes and coronary heart disease.²⁸

D. Pranayama (Yogic breathing):

It is a controlled balancing breathing activity. By practising *pranayama*. It improves the various neurological activity of brain centres like limbic area, hypothalamus and medulla as well as improving sympathetic-vagal out flow. In stress condition there is increased level of cortisol and adrenaline which enhancing overeating and causes obesity result in increases insulin resistance. Doing yogic breathing its works on adrenaline and cortisol which help in lower in blood glucose level.²⁹

E. Supta vajrasana (Sitting pose of firmness):

This pose help in lowering the high blood sugar level in the body stimulates the function of pancreas.

F. Dhanurasana (Bowe pose):

This *asana* is known for improving the works of intestines and pancreas, therefore becoming an effective *Yoga* pose for controlling diabetes. The regular practise of it fully energies the pancreas thus controlling the blood sugar level inside the body.

G. Bhujangasana (Cobra pose):

This pose is the best beginning *Yoga* for diabetes patients, which is specially designed to focus the stimulation of the pancreases. This *asana* improves the flow of blood in pancreas and helps in overhauling the cell of the organ.

H. Sarvangasana (Shoulder stand):

It helps in stimulating thyroid and parathyroid gland which is solely responsible for fat, carbohydrates, and protein metabolism. This *Yogic* pose is good for mild depression and help in calming down the mind and beneficial for diabetic patients.³⁰

I. Mandukasana (Frog pose):

It helps to stimulate the pancreas to secrete more natural insulin in the patient of inadequate secretion defects.³¹

SADVIRTA AND NIDRA (Behavioural modification and Adequate sleep): It play a prime role in maintenance of health and prevention of the disease. By practicing these principles gives balance and peace to the mind. The two aims of *sadvirta* are to achieve *arogya* (health) and *indriya vijaya* (control over sense organs).³² Avoidance of *sadvirta* disturbs the daily activity of life it arises stress this will be cause unbalancing equilibrium of body, mind and sense organ. Therefore, the metabolism of body disturb it cause imbalance of hormone and initiate change in immune system activity.

Nidra is a important factor in balancing various metabolic activity of body. Adequate and proper sleep reduces the mental stress and restores energy in the body. Individual should strictly avoid day sleep as it's vitiated the *kapha* and *pitta dosha*.³³ Day sleep decrease the power of *agni* and causes alter the various metabolic activity of body it may cause increase the body weight and disturb the metabolism of sugar.

3. AUSHADHA (Plant origin medicine): Many plants origin medicine which is easily available to prevent from diabetes. Some of the herbal medicine as follows:

A. Jambu (Syzygium cumini) - It is found naturally in India and is also widely cultivated in India for its delicious fruits. In *Ayurveda* it's recognized that decoction of the dry leaves of the *jamun* exhibit hypoglycaemic effect. The fruits bark, and seeds have also been found to possess antidiabetic properties. Some studies have also shown that the seeds have hypolipidemic properties.

B. Fenugreek (Trigonella foenum graecum Linn) - Fenugreek seed extract has been shows to exhibit hypoglycaemic effects. The seed contain alkaloids, fat, fibres, saponins and proteins. Defatted fenugreek improves oral glucose tolerance and modifies pancreatic hormone levels. Blood glucose lowering effect have been reported in diabetes on consumption of 15 gram of fenugreek powder daily.

C. Karvellaka / Bitter gourd (Momordica charantia Linn) - The juice of the unripe fruit is taken once or twice a day as anti- diabetic. It helps improve glucose tolerance.

D. Amruthaballi (Tinospora cordifolia) - It is divine herb which is used to improve the immunity and act as antioxidant because of its *ojhavardhka* property. It can be daily used in the form, soak it in water overnight, or boil it in water.

E. Madhunashini (Gymnema sylvestre) - It contains gymnemic acid which is responsible for the anti-diabetic effect chewing leaves of *madhunashini* whenever there is sugar craving. It immediately blocks the sweet taste of sugar and the effect last for about an hour.³⁵

F. Bilwa (Aegle marmelos) - Oral administration of aqueous extract of *Aegle marmelos* (*Bilwa*) seeds (250 mg/kg) was found to decrease blood glucose level by 35.1% in normal healthy rats 6h after administration, by 41.2% in subnormal and by 33.2% in mild diabetic rats in glucose tolerance test after 2h. Treatment of severely diabetic rats for 14 days with a dose of 250 mg/kg reduced the fasting blood glucose level by 60.84%. It also brought about a fall in the level of total cholesterol with an increase in HDL-Cholesterol and a decrease in LDL Cholesterol and triglycerides.

G. Tejapata (Cinnamomum tamala) - Oral Administration of an ethanol (50%) extract of *Cinnamomum tamala* (*Tejapata*) leaves significantly lowered the plasma glucose levels in normoglycemic and streptozotocin-induced hyperglycaemic rats. The extract also showed anti-hypercholesterolaemic and anti-hypertriglyceridemic activity in streptozotocin-induced diabetic rats (Sharma, Dwivedi, Swarup, 1996).

H. Tvaka (Cinnamomum zeylanicum) - Water extract of *Cinnamomum zeylanicum* (*Tvaka*) bark significantly reduced blood glucose value at 1h during glucose tolerance test. When diabetic animals with fasting blood glucose were treated with cinnamon extract (200mg/kg of body weight) once daily for 2 weeks, the fasting blood glucose level came down (Prachi, Murali, Murthy, Tandon, Chandra, 2004).

I. Bimba (Coccinia indica) - The juice and decoction of leaves and stems of *Coccinia indica* (*Bimba*) (20ml/kg) showed significant hypoglycaemic response in fasting rabbits. The decoction of the fruits of the plant also showed similar activity.³⁵ (Pillai, Ghosh, Uma, Kumar, 1980).

PROHIBITIONS:

- Diabetic patient should avoid holding the urge of urine, smoking, fomentation and *raktmokshana*.
- Day time sleep and long-time sitting on soft cushion should be avoid.
- Diet which increases body weight and lipid cholesterol like *guru, madhur, snigdha* and *abhisandhi Ahara* should be restrict.
- Fruit contains high simple sugar like banana, cheeku, grapes and mango etc should be avoided.
- Excessive vigorous exercise and indulging in intercourse should be avoided.
- Person should not take excessive amount of curd and milk product, flesh of domestic/adequate animal, newly fresh cereals, date fruits, incompatible food items such as ash gourd, sugarcane product, oily pastries, water of rains and floods and consumption of *Ahara, Vihara* which aggravates the *kaphadosha, medha dhatu* and increase the quantity of *mutra*.³⁶

MYTHS AND FACTS RELATED TO DIABETES³⁷:

MYTHS	FACTS
Diabetes can eat wheat but not rice.	Both have similar glycaemic index and raise the blood sugar to a similar extent. Many diabetes feels it convenient to count and limit the number of <i>chapathis</i> and chew count is more and satiety is better. Wheat is more nutritious as it is richer in protein, fibre and B- vitamins.
Any amount of wheat can be consumed.	Large quantities of wheat increase glycaemic index.
Feasting can be done by fasting the next meal	This result in hyperglycaemia.

Fruits can be eaten in unlimited quantities.	Citrus fruits and apples can be taken. Banana and mango are high in fructose when eaten in unlimited quantities cholesterol level may increase.
Vegetables be eaten in unlimited quantities	If eaten raw or with little fat or no coconut.
Fruit juice/cola drink can be taken	It is better to avoid empty calories like cola drink. It is better to eat the fruit as such as glycaemic index and nutritive value better.
Avoid carbohydrate and fats	Take good carbohydrate and good fat. Decrease saturated fats and trans fatty acid. Increase unsaturated fatty acid. Increase complex carbohydrates.

4. EDUCATION AND COUNSELLINGS³⁸: The key successful control and management of diabetes is sound and realistic patient education. It involves making the patient aware of his disease, its various control measure which knowledge of hypoglycaemic agents as well as the important diet.

Education of the diabetic, in brief involves the following.

- I. Knowledge about the disease- its nature, symptoms and cure.
- II. The diet – a basic idea about the food values and individual diet plan as well as exchange list.
- III. Hypoglycemic agents involved in the control and dietary management in relation to these agents.
- IV. Skin care and personal hygiene is important for good hygiene and circulation of blood.
- V. Personal identification – the need to always carry a personal tag or identity card to identify, his name, address, and his emergency needs especially if he receiving insulin therapy emphasize the need to always carry a candy or sugar product at hand.
- VI. Educational resource books and reading material concerning the disease should be made available in the community library.
- VII. Guideline for alcohol users:
 - A. Drinking along should be discouraged.
 - B. Drink only with food.
 - C. Do not cut back on food.
 - D. Abstain if there is a history of alcohol abuse, during pregnancy and lactation.
- VIII. Avoid injuries and immediately consult in case its happens to doctor.³⁹
- IX. Regular medical checkup and monitoring of blood glucose level.
 - a) Glycosylated hemoglobin (HbA1c) test at least twice in a year
 - b) Eye examination annually, especially fundus examination
 - c) Foot examination at least twice in year
 - d) Renal function screening at least yearly
 - e) Blood pressure assessment at least monthly
 - f) Lipid profile at least annually
 - g) Cardiac check-up at least annually

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