

2.5 ENDOCRINE DISORDERS

2.5.1 Diabetes mellitus (*Madhumeha*)

Introduction

The metabolic deregulation in terms of increased plasma glucose levels (hyperglycemia) is called Diabetes mellitus. Reduced insulin production and decreased insulin sensitivity are the contributing factors for hyperglycemia. The term diabetes is derived from two greek words meaning 'to go through' in urine / honey like urine, similarly in *Ayurveda* a condition in which a person passes honey like (sweet) urine is called *Madhumeha*. It is one among 20 types of *Prameha* (urological disorder) described in various *Ayurvedic* classics i.e. *Caraka samhita*, *Suśruta samhita*, *Aṣṭāṅga saṅgraha*, *Mādhava nidāna*, *Yōga ratnākara* etc.

Ācāryās have narrated that excess use of *guru* (heavy to digest), *snigdha* (unctuous), *amla* and *lavaṇa rasa*, *navānna* (food prepared from newly harvested grains), new wine, *āsyā sukha* (sedentary life style), *atinidrā* (excess sleep), *avyāyāma* (lack of exercise), *acintā* (lack of mental exercise), abstain from *saṃśodhana* (purification) therapy are the causes of *Madhumeha*²⁰.

Chronic hyperglycemia is associated with significant long term sequelae particularly damage or dysfunction of various organs especially the kidneys, eyes, nerves, heart and blood vessels. Diabetes is the seventh-leading cause of death, and is on the rise, both in developed and developing countries. It is the single most important metabolic disease that affects nearly every organ/ system in the body. Today diabetes affects more than 135 million people worldwide and that number is expected to increase to 300 million by 2025. India has the largest number of Diabetes patient in the world. The data published by the International Diabetes Federation in the year 2006, the number of people with type 2 diabetes in India is around 40.9 million and this is expected to rise to 69.9 million by 2025. In India, about 10% elderly people aged 65 or more have diabetes²¹.



The classification of diabetes is based on the etiology of diabetes

1. Type-I DM - Due to 'Beta' cell destruction, usually leading to absolute insulin deficiency.
2. Type-II DM - Due to variable degree of
 - i. Insulin resistance
 - ii. Impaired Insulin secretion
 - iii. Glucose intolerance and insulin resistance increases with age.
3. Other specific types of Diabetes due to
 - i. Impaired Beta cell function due to genetic defects
 - ii. Impaired Insulin action due to genetic defects
 - iii. Diseases of pancreas
 - iv. Endocrinopathies
 - v. Drugs (chemical induced)
 - vi. Infections- congenital rubella, cytomegalovirus etc.

Risk factors

1. Family history
2. Obesity ($\text{BMI} \geq 27\text{kg/ m}^2$)
3. Age ≥ 45 years
4. Hypertension (B.P. $\geq 140/ 90$ mm of Hg)
5. HDL $\leq 35\text{mg/ dl}$ and/ or triglycerides levels $\geq 250\text{mg/ dl}$
6. Habitual physical inactivity

Clinical features

1. Polyuria
2. Increased appetite (Polyphagia)
3. Excess thirst (polydypsia)
4. Turbidity in urine



5. Debility/ tiredness
6. Weight loss
7. Non-healing ulcer
8. Visual disturbances
9. Inflammation of glans penis

The presentation of symptoms in elderly patients with diabetes may be significantly different from the classic triad of polyuria, polydipsia, polyphagia and weight loss. They may present with fatigue, anorexia, failure to thrive, loss of motivation, difficulty in concentration and urinary incontinence.

Complications

In later stage of diabetes mellitus the following complications may appear

1. Burning sensation (neuropathy) over palmar and plantar region
2. Boils and carbuncles
3. Gangrene
4. General debility
5. Retinopathy
6. Renal tissue damage (nephropathy)
7. Cardiovascular diseases

Investigations

Disease Specific

- i. Measurement of the plasma glucose level
 - a. Random blood sugar (RBS)
 - b. Fasting blood sugar (FBS)
 - c. Post prandial blood sugar (PPBS)
- ii. Urine routine and microscopic
- iii. Glycosylated haemoglobin (HbA1c)
- iv. Lipid Profile



Other related Investigations

- i. Blood urea and serum creatinine
- ii. E.C.G.
- iii. Fundus examination
- iv. Serum electrolytes

Diagnosis²²

The diagnosis will be made by the symptoms and on the basis of plasma glucose levels

1. Fasting plasma glucose ≥ 126 mg/dl after an overnight fasting (or)
2. Random plasma glucose ≥ 200 mg/dl (or)
3. Two hours prandial glucose ≥ 200 mg/dl

Management approaches

a. Prevention

1. Use of various preparations made from *yava* (barley), *mudga* (green gram), old rice, bitter gourd, drum-stick, *methī*, *paṭola* (snake gourd), pumpkin, cucumber, *bimbī*, watermelon, buttermilk, *triphalā* etc. are beneficial in diabetic patients
2. *Dinacaryā* (daily regimen) and *ṛtucaryā* (seasonal regimen)
3. Practicing regular exercise/ increase calorie consuming activities (walking, swimming, etc.)
4. Regular use of *rasāyana* drugs (*āmalaki rasāyana* etc.)
5. Restrict sugar/ sugar products, fried food and dairy products
6. Restrict the use of different types of wine, excess use of oil, clarified butter, milk, sugarcane products, cakes and the flesh of domestic and aquatic animals
7. Avoid day sleep and laziness

b. Medical management

Line of treatment (Ca. Ci.6/ 15)

1. *Nidāna parivarjana* (avoidance of aetiological factors) - tubers, sweets, dairy



products, soft drinks, fried foods and sweet fruits like mango, banana, custard apple and date must be restricted for a diabetic patient.

2. If patient is obese then ***Samśōdhana cikitsā*** (bio-cleansing therapies) in the form of *vamana*, *virechana*, *vasti* are to be performed, but it should be decided by the physician that which procedure should be employed. If patient is lean and thin then only ***Śamana cikitsā*** (Palliative therapy) should be given.
3. **Drug therapy** - In *Ayurveda* most of the drugs indicated in diabetes mellitus may act on beta cell of pancreas thus improve insulin production/ increase the insulin sensitivity. The following drugs/ formulations are useful to control type II diabetes mellitus. In case of type I diabetes mellitus, these drugs/ formulations may be used as a supportive therapy in addition to conventional insulin therapy to prevent long term complications.

SINGLE DRUGS

Drug	Dosage (per dose)	MOA ^s / Vehicle	Duration*
<i>Āmalakī (Phyllanthus emblica Gartn.) cūrṇa</i>	3 - 6 gm	Warm water	90 days
<i>Haridrā (Curcuma longa Linn.) cūrṇa</i>	1 - 3 gm	Luke warm water	90 days
<i>Jambū (Syzygium cumini (Linn.) Skeels) bīja cūrṇa</i>	3 - 6 gm	Water	90 days
<i>Meṣaśṅgī (Gymnema sylvestre R.Br.) cūrṇa</i>	3 - 6 gm	Water	90 days
<i>Methikā (Trigonella foenum-graecum Linn.) cūrṇa</i>	3 - 6 gm	Water	90 days
<i>Vijayasāra (Pterocarpus marsupium Roxb.) cūrṇa</i>	3 - 6 gm	Water	90 days



COMPOUND FORMULATIONS

Drug	Dosage (per dose)	MOA ^s / Vehicle	Duration*
<i>Niśāmalakī cūrṇa</i>	3 - 6 gm	Honey	90 days
<i>Triphalā cūrṇa</i>	3 - 6 gm.	Luke warm water/ honey	90 days
<i>Śivā guṭīkā</i>	6 gm	Water/ milk	90 days
<i>Chandraprabhā vaṭī</i>	250- 500 mg	Water	90 days
* In case of associated complications			
<i>Dhānvantara ghr̥ta</i> (Diabetic carbuncles)	48 gm	Warm water	7 - 10 days
<i>Kṣīra balādi taila</i> (Neuropathy)	6 gm (orally) also used for <i>abhyaṅga</i>	Milk/ warm water	7 - 10 days
<i>Saptāmṛta lauha</i> (Retinopathy)	250 mg	Milk/ <i>ghr̥ta</i>	7 - 10 days
<i>Śilājatvādi vaṭi</i>	250-500 mg	<i>Asana kvātha</i>	7 - 10days

^s MOA - Mode of administration

*Initially 2 times in a day after meal for 15 days followed by condition of patient and physician's direction.

NOTE: Out of the drugs mentioned above any one of the drug or in the combination may be prescribed by the physician. The duration of the treatment may vary from patient to patient. Physician should decide the dosage (per dose) and duration of the therapy based on the clinical findings and response to therapy.

*Vijayasāra (Pterocarpus marsupium)*²³, *Ayush-82*²⁴, *Bimbī (Coccinia indica)*²⁵ have shown improvement in the diabetic patients.

c. Yogic practices: Lean diabetic patients may be advised to perform specific *yoga* positions that are believed to benefit them with the least physical stress. Certain postures are believed to stimulate the endocrine pancreas and improve its function. The following *yogic* practices are beneficial in diabetes mellitus; however, these should be performed only under the guidance of qualified *Yoga therapist*. Duration should be decided by the *Yoga therapist*.

1. *Kaṭīcakrāsana, Tāḍāsana, Pavanamuktāsana, Gomukhāsana, Śalabhāsana, Vagrāsana, Śasāngāsana, Dhanurāsana, Mayurāsana, Paścimottānāsana, Ūṣṭrāsana* etc



2. *Bhastrikā, Bhrāmarī, Sūryabhedana prāṇāyāma*
3. *Kunjala, Śaṅkha prakṣāḷana, Vastra dhauti*

Counselling - Advice the patient to

1. Do physical activity at least for 30 - 60 minutes daily
2. Increase the use of barley, wheat, *mudga* and roasted *chanā* (bengal gram) in diet
3. Limit the use of potato, rice, milk, milk products and oily foods
4. Take utmost care of personal hygiene especially of feet and hand
5. Avoid any injury and immediately consult in case of injuries/ skin infections
6. Avoid tobacco and liquor consumption in any form
7. Restrict or stop intake of sweets
8. Regular monitoring of blood glucose level and medical checkup
 - a. Glycosylated haemoglobin (HbA1c) test twice in a year
 - b. Eye examination annually
 - c. Foot examination twice in a year/ daily by the patient
 - d. Renal function screening yearly
 - e. Blood pressure quarterly
 - f. Lipid profile annually
 - g. Cardiac check up once annually

Indications for referral:

- a. Renal failure, severe infections
- b. Associated with complications (diabetic foot, coronary artery disease, diabetic nephropathy, diabetic neuropathy, diabetic retinopathy etc.) and not responding to the medication



COSTING DETAILS

Approx. costing of Diabetes mellitus

S.No.	Medicine	Requirement	Unit	Rate in Rs.	Cost in Rs.
1.	<i>Āmalakī cūrṇa</i>	540-1080	gm	0.25	135-270
2.	<i>Haridrā cūrṇa</i>	180-540	gm	0.30	54-162
3.	<i>Jambū bīja cūrṇa</i>	540-1080	gm	0.20	108-216
4.	<i>Meṣaśṛṅgī cūrṇa</i>	540-1080	gm	0.40	216-512
5.	<i>Methikā cūrṇa</i>	540-1080	gm	0.40	216-512
6.	<i>Vijayasāra cūrṇa</i>	540-1080	gm	0.4	216-512
7.	<i>Niśāmalakī cūrṇa</i>	540-1080	gm	0.45	243-486
8.	<i>Triphalā cūrṇa</i>	540-1080	gm	0.32	173-346
9.	<i>Śivā guṭikā</i>	1080	gm	4.4	4752
10.	<i>Candraprabhā vaṭī</i>	45-90	gm	2	90-180
11.	<i>Dhānvantara ghr̥ta</i>	680-960	ml	0.36	245-346
12.	<i>Kṣīra balādi taila</i>	85-120	ml	0.43	40-52
13.	<i>Saptāmṛta lauha</i>	3.5-5.0	gm	1.5	5.25-7.5

Approx. costing of *Pañcakarma* procedure in Diabetes mellitus **

S.No.	<i>Pañcakarma</i> procedure	Days	Rate in Rs./ day	Cost in Rs.
1.	<i>Vamana</i> Package (including preparatory and post therapeutic procedures)	11	1000	1000
2.	<i>Virecana</i> Package (including preparatory and post therapeutic procedures)	11	1000	1000

