

# Non-Pharmacological Management of Diabetes Mellitus

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**Abstract:** *Diabetes can be defined as a metabolic condition characterized by resistance to the action of insulin, inadequate secretion of insulin, or both. This article discusses about the non-pharmacological management of diabetes mellitus which includes diet and stress management programs such as pranayama, meditation, and exercises along with the lifestyle modifications. Regular usage of medications combined with these approaches can help one lead a healthy life with very less complications. Diabetes is a lifelong disease which can be controlled with proper education of patients and adherence to the instructions given by the healthcare team members. Patients should be educated on nutrition, physical activity, weight loss, smoking cessation and limiting alcohol intake.*

**Keywords:** Diabetes, Yoga, Meditation, Pranayama

## 1. Introduction

Diabetes can be defined as a metabolic disorder characterized by resistance to the action of insulin, inadequate secretion of insulin, or both. Insulin is a hormone produced by  $\beta$ -cells of islets of Langerhans of pancreas. This hormone regulates the blood glucose levels in the body by pumping glucose from blood into cells to produce energy. Sometimes body may not produce enough insulin or may not utilize the secreted insulin well. Thereby glucose does not reach cells and remains in blood that leads to elevated levels of blood glucose.

The most common types of diabetes are:

- **Type 1 diabetes:** Type 1 diabetes is a condition where body does not produce enough insulin. Immune system attacks and destroys the beta cells in pancreas which produce insulin. Type 1 diabetes is usually diagnosed in children and young adults
- **Type 2 diabetes:** Type 2 is the most common type of diabetes, where the body does not utilize insulin well. Type 2 diabetes can be developed at any age, even during childhood. However, this type of diabetes occurs most often in middle-aged and older people.
- **Gestational diabetes:** Gestational diabetes may develop in some women during their pregnancy. During pregnancy, the placenta produces hormones to sustain the pregnancy. These hormones make the cells resistant to insulin.

Factors such as age ( $\geq 45$  years), family history of diabetes, overweight, physical inactivity, race, and certain health-related problems such as high blood pressure add to chances of developing type 2 diabetes.

Type 1 and type 2 diabetes have similar symptoms but may vary in intensity. Symptoms of Type 1 diabetes are severe and have faster onset of action. It includes

- Polydipsia
- Polyphagia
- Weakness
- Weight loss

- Dry skin
- Ketoacidosis
- Hyperglycaemia associated with glycosuria, proteinaemia, blurred vision, tingling or numbness of the extremities, slow healing, skin infections, itching, drowsiness, and irritability

## Natural methods for Controlling Diabetes Mellitus

### Diet:

Diet has a great role to play in the management of diabetes. People in the pre-diabetic state can prevent or postpone diabetes in the future by following the right diet. Those who are already diabetic would not require huge doses of medicines if they follow a strict diet.

- Fruits like pomegranate, apple and pear are advisable.
- Green leafy vegetables, bitter melon and fenugreek should be included in the regular diet.
- Deep-fried and junk foods are to be strictly avoided.
- Sweet dishes can be occasionally consumed if the HbA1c is within the limits.
- Vitamin D is prescribed by doctors in type 2 diabetes to help improve the body's insulin sensitivity and thus reduce the risk of insulin resistance, which is often a precursor to type 2 diabetes. Vitamin D helps our body metabolise sugar in our blood as well as it regulates calcium, which also helps manage blood sugar. Low fat dairy food should be chosen.
- Carbohydrates and sweeteners: In the dietary management of type 2 diabetes, low carbohydrate intake, i.e., 30 g/day is advisable. Carbohydrate foods with lower glycemic index such as whole grains, pulses, brown rice, and brown bread are to be selected. White bread, oatmeal, and pastries are to be avoided. Vegetarian diet is more effective in case of type 2 diabetes and obesity. Foods with artificial sweeteners such as aspartame, acesulfame potassium, saccharine, and sucralose should be avoided in large quantities as they tend to accumulate fats in the body.
- Proteins: Proteins  $< 1$  g/kg of body weight are recommended in case of patients without nephropathy. In case of patients with nephropathy, protein intake is

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restricted as they cause increased progression of renal failure. Chicken and other animal based protein-rich foods are to be avoided in case of diabetic nephropathy instead plant-based proteins such as beans, whole grains, and millets are preferred.

- **Fats:** Fat consumption should be limited in the case of type 2 diabetic patients because obesity is a major complication in them. Out of the total energy consumption, the fat intake should be less than <35%. Research suggests that replacing saturated fats and trans-fatty acids with unsaturated (polyunsaturated and/or monounsaturated) fats has beneficial effects on insulin sensitivity and is likely to reduce risk of type 2 diabetes. In dietary practice, foods rich in vegetable oils, including non-hydrogenated margarines, nuts, and seeds should replace foods rich in saturated fats from meats and fat-rich dairy products. Saturated fat, butter, margarine, cheese should be cut down and low-fat dairy products such as low-fat yogurt, and skimmed milk should be preferred. Grilled, steamed or oven-baked food should be consumed instead of frying or cooking with oil or other fats.
- **Fibres:** About 50 g of soluble fiber produces improvement of 10% in fasting blood glucose, decrease slow-density lipo protein (LDL) and cholesterol incase of an average person with non-insulin dependent diabetes mellitus (NIDDM). The diet for diabetic patients should comprise of rich amount of soluble fiber. Yams, whole wheat products, whole grain bread and oats are rich sources of fiber. High-fiber vegetables such as peas, beans, broccoli and spinach /leafy vegetables should be included as food for diabetics. Also, pulses with husk and sprouts are a healthy option and should form a part of the diet.

Small, frequent meals are always better than large meals. Also timing of food intake plays a crucial role in the management of diabetics. To control diabetes in a better way, limited intake of calories in five diets is preferable such as breakfast, mid-meal, mid-day, evening, and dinner which comprises 3-hour gaps between each serving.

#### Remedies through diet modification:

One table spoon of bitter gourd juice daily is the best remedy for diabetics to reduce the blood sugar level. Bitter gourd can also be cooked with ghee which gives a better result. A table spoon of Indian gooseberry juice in combination with bitter gourd promotes the secretion of insulin from pancreas. Better results can be obtained on regular usage for 2 months. Drinking a glass of water with neem leaves, tulsi leaves, and belpetras leaves (bael) on empty stomach is suggested to control diabetes naturally. Fruits such as jambul fruit (black plum) and Indian gooseberry, grains such as black gram are advisable in case of diet modification. Mushroom helps in showing hypoglycemic effect due to alpha-glycosidase inhibition property which may be more beneficial in the management of diabetes.

#### Diabetic stress management:

Stress causes a drastic increase in the hormones which increases blood sugar levels. Hence it is of great importance to keep our mental and physical stress under

control. It is advisable to take the help of breathing exercises like pranayam to attain calmness. Having a good friends' circle and frequent outings can reduce depression and anxiety. Stress management training can also be done for type 2 Diabetes Mellitus patients.

#### Stress management programs include

- Educating the diabetic patients on the health consequences that may occur due to stress.
- Developing the cognitive and behavioral skills to minimize the stress levels that include recognizing the significant stresses in the individual and advising to minimize and prevent negative thoughts.
- Progressive muscle relaxation training includes consecutively tensing and relaxing a specific set of muscles in the body, which starts from feet and progresses to the head.
- To alleviate stress, yoga, exercises, listening to music and mindful meditation are the best techniques.

#### Yoga and Pranayam:

Certain asanas (postures) and pranayamas (breathing patterns) are of great help in promoting the function of the pancreas, thereby controlling sugars.

Pranayama is the best choice to enhance the oxygen levels and reduce the CO<sub>2</sub> levels in the blood. It includes rapid and forceful process of inhalation and exhalation powered by diaphragm. Different techniques of Pranayama produce positive emotions and also decrease the worries and tensions of our daily life. Apart from the insulin injection and medications available in the market Pranayama helps in the management of diabetes.

In diabetes there are yoga postures that rejuvenate the organ cells and also improve the organ ability to produce insulin by improving the blood flow to the pancreas. The best yoga asanas for diabetes cure are

- Dhanurasana (Bow Pose)
- Balasana (Child pose)
- Bhujangasana (Upward facing dog pose)
- Shavasana (Corpse pose)
- ViparitaKarani (Legs up the wall)
- Tadasana (Mountain pose)
- Mandukasana (Frog Pose)
- Chakarasna (Wheel Pose)
- Halasana (Plough pose)
- ArdhaMatsyendrasana (Half Lord of the fish pose)
- Paschimottanasana (Seated Forward Bend)
- Suptabaddhakonasana (Reclining bound angle pose)
- Sarvangasana (Supported shoulder stand)
- UrdhvaMukhaShvanasana (Upward-facing dog)
- SuptaMatsyendrasana (Supine spinal twist)
- Surya Namaskar (Sun Salutation)

#### Mindfulness meditation

Mindfulness meditation is the art of making oneself aware about the present situation that includes control of thoughts, emotions, and sensations which should be in a non-

judgmental and accepting manner. Studies have shown that mindfulness meditation maintains blood glucose at stable levels in diabetics. Mindfulness meditation helps to learn and live life peacefully. It can be performed both by sitting in a chair or on the floor using a cushion and keeping the back straight. It is best adopted when individual pays attention to their own breath. Increasing time of meditation day by day provides peaceful state of mind.

Lifestyle modifications in diabetes:

The quality of life can be increased by selecting suitable approach based on the patient and performing them regularly.

- Avoid consumption of junk food
- Maintain body weight properly according to the body mass index
- Habituate regular exercise and develop a regular pattern of sleep as sleep deprivation is also one of the causes of elevated glucose levels
- Regular exercise not only leads to the maintenance of ideal body weight but also improves insulin sensitivity
- Daytime sleep should be avoided
- Quit smoking and avoid alcohol
- Avoid bare foot walking to minimize the risk of foot infection
- Always wear well fitted and protective footwear
- A regular checkup by health care providers is very important to rule out complications
- Good personal hygiene is required as delay in the healing of the wound and the risk of infection is high

By following these approaches, besides regular usage of medications, one can lead healthy life with less complications. A steady mental, physical, and emotional state helps in regulating blood glucose levels. This steady state can be obtained by following these methods. Apart from regulation of blood glucose levels they also help in stress management, good body texture, and proper functioning of other vital organs of the body.

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**Ms. Priya Shaju** presently working at NCRD's Institute of Pharmacy Nerul has 24 years of experience in teaching various subjects of pharmacy. She completed her B. Pharm from C. U. Shah College of Pharmacy, S.N.D.T. University, Mumbai with distinction. Before joining the present institution in 2004, she has worked in Bharati Vidyapeeth Institute of Pharmacy, Belapur for 6 years. She is a life member of Association of Pharmaceutical Teachers of India(APTI). She has been the coordinator of MSBTE sponsored State Level Technical Paper Presentation Competition and Patient Counseling Course for working pharmacists. Apart from being the chairman of External Academic Monitoring Committee appointed by Maharashtra State Board of Technical Education, she has been actively involved in various admission and examination related activities such as paper setting and moderation and preparation of model answers for MSBTE. She has shouldered the responsibilities of almost all the committees in the institute. She later obtained her M. Pharm from Sri Sathya Sai. Institute of Pharmaceutical Sciences RKDF University. Bhopal, M.P. She has to her credit a couple of publications in scientific journals. She also has about two years of experience of working as a medical transcriptionist.

**Ms. Anshupa Patel Gupta**, a lecturer at NCRD's Institute of Pharmacy, Navi Mumbai since 2004, completed her graduation in Pharmacy from Sudhakarrao Naik Institute of Pharmacy, Pusad (Amravati University). She got selected in campus interview for Natco Pharma Ltd in the year 1996, and worked in marketing field for a year in Chhattisgarh. After this, she got an opportunity to teach in the Pharmacy department of Government Women's Polytechnic, Raipur. On shifting to Mumbai in 1999, she has worked as a lecturer in Premilila Vithaldas Polytechnic (SNDT University), NSS College of Pharmacy, Tardeo and Bharati Vidyapeeth Institute of Pharmacy. She has a couple of publications in scientific journals to her credit. Her post-graduation in Pharmacy is from CSVTU, Chhattisgarh. With a teaching experience of over 21 years, authoring this book is a way of giving back to society. She has a good academic track record having secured second position in B. Pharm in Amravati University. Anshupa has handled the administrative activities as the in-charge of the institute. She is a life member of the two professional bodies - APTI and IPA. She has helped organise the first MSBTE (Maharashtra State Board of Technical Education) State level paper presentation competition for diploma pharmacy students. She has worked as a resource person for preparing the MSBTE CD based practical examination for the subject Pharmacology and Toxicology. She has been a paper setter and resource person for preparing model answers for various subjects for MSBTE examinations over the years.

**Ms. Himani Tambde** is presently working as a Lecturer at N.C.R.D's Institute of Pharmacy, Navi Mumbai. She has more than 13 years of experience in academics and 2 years of industry experience. She completed her Bachelor in Pharmacy from Bharati Vidyapeeth's College of Pharmacy, CBD, Belapur affiliated to Mumbai University in 2005. She has completed PG Diploma in Hospital Management from MTES College of Hospital Management, Pune University. She got the opportunity to interact with doctors from different fields' while completing an internship

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in MGM Hospital, Belapur. She not only has an excellent academic track record but also has good administrative and dynamic qualities. She has worked in the Regulatory Affairs and Quality Assurance department in renowned industries such as Cipla Ltd., Elder Projects and M J Biopharm Ltd. After joining academics she is constantly contributing to the profession with passion and innovation by shaping the students into responsible pharmacists. She has published a couple of publications in scientific international Journals. She has participated in a number of seminars, conferences, FDPs and Industrial Training Programs organized by MSBTE and other organizations. She has worked as subject expert for different activities conducted by MSBTE.