

## REVIEW ARTICLE

# Diabetes Silent Killer: Medical focus on Food Replacement and Dietary Plans

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### ABSTRACT

*Diabetes mellitus (D.M.) is a chronic disease that occurs when blood glucose becomes too high. With every passing year, if glucose remains uncontrolled, the person may suffer from various health problems. It results in hyperglycemia, causing increased abnormal blood glucose levels manifested with signs and symptoms due to inadequate pancreatic insulin secretion or poor insulin-level associated directly with glucose mobilization target cells. Insulin is essential as it controls the metabolism of fats, proteins, and amino acids. Diabetes mellitus is related to metabolic complications that can subsequently lead to the premature death of a person. D.M. has no cure; certain adequate health measures help manage Diabetic patients' condition to stay healthy. Diabetes Mellitus is classified as two types as Type 1 and Type 2, out of which the most common is Type 2 majority of cases occurs. In Type 1 D.M., insulin is deficient, and in Type 2, insulin secretion becomes abnormal, accounting for 85-90% of diabetes cases. Diabetic medicines and insulin therapy for Diabetic patients, along with various health supplements, are recommended. Lack of physical exercise, sedentary lifestyle, oily or junk food, improper food habits, excess food intake, inadequate dietary plans, hereditary, un-healthy nutrition leads to an increasing number of cases. Proper and balanced diet plan, controlled habits, regular exercise, food replacement therapy, periodic reporting, and proper nutrition, maintaining body weight, monitoring the excess number of calories in the diet, detoxification of body fats, and medication to avoid complications can control and prolong the lifestyle of the majority of patients. This work aimed to control and manage D.M. by improving eating habits through proper diet chart, regular testing, and monitoring. Maintaining a healthy and balanced diet, adequate medication therapy, daily testing, monthly reporting, and prevention through the regular workout, exercise to promote health care, and improving D.M. patients' life span.*

**Keywords:** D.M. (Diabetes Mellitus), lifestyle diseases, health care, balanced dietary plans

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## INTRODUCTION

Diabetes mellitus (D.M.) common disorder known as non-communicable diseases (NCDs) results in significant health problem affecting humankind. It has become an epidemic and a leading cause of death in many economically developing and newly industrialized countries. [1] Ayurveda, allopathy, Siddha, the lack of physical inactivity, laziness, sleeping for long hours, and heavy to digests like dairy products, meat diets, sugar/jaggery preparations, and fresh grains increase body fats can lead to a widespread outbreak of Diabetes Mellitus. Common symptoms of Diabetes Mellitus includes increased urine output, weight loss, urination, increased appetite, excessive thirst, mental fatigue, nausea, retinopathy and perhaps vomiting, Blurred vision, causing vaginal infections, dryness of mouth, kidney failure, slow-healing of wounds and cuts, skin irritation and genitals Itching [1].

## EPIDEMIOLOGY

Diabetes Mellitus is a dire condition as per the WHO reports in 2016, crucial steps needed to prevent and treat diseases. Type I Diabetes is the most common type of Diabetes occurring in people with lower age groups. It is increasing rapidly around the world due to lifestyle changes and unhealthy diet plans. As per the International Diabetes Federation (IDF) estimate, the prevalence of Diabetes mellitus will likely increase with every passing year. Type 2 Diabetic cases are becoming more prominent in lower-age and developing countries in 85-95% of Diabetes mellitus patients. It occurs in the age group between 18-75

years; about 285 million people have Diabetes worldwide, according to the survey conducted in 2010. By 2025, 438 million people around developing countries expected to rise at a 60-75% rate and increase the death rate to about 60%, which could be fatal [2].

## **BACKGROUND AND HISTORY**

D.M. reciprocating with various early signs and symptoms of continuous urination and excess weight loss has developed a lot of interest in medical practitioners' scientific study. In the late 20 century, the root cause of Diabetes was diagnosed and found in every seventh patient in India, relatively low in the early twentieth century. Since the ancient physicians described almost exclusively every disease called type 1 D.M., the outcome proved to be somewhat fatal and sometimes life-threatening. Ebers Papyrus, written in 1500 BC, excavated in 1862 AD from an ancient grave in Thebes, Egypt, and published by Egyptologist Georg Ebers in 1874. It describes the ailments and remedies required to cure the infections, a condition of "too great emptying of the urine" – perhaps the most relevant reference for Diabetic patients. The ancient Egyptian physicians stress the usage of whole wheat grains, fruit, and sweet beer to treat Diabetic patients. At the same time, Physicians from various countries, with the help of various clinical tests performed in several labs, proposed that people with D.M. attracted to ants and flies in their urine. With excessive thirst and foul smell from their mouth due to ketone body formation in their urine and excessive urine output at multiple times in day and night. Aureolus Theophrastus Bombastus von Hohenheim, a Swiss physician, better known as Paracelsus (1494–1541), performed urine tests on D.M. Patients, urine evaporated forms white residue. It was misunderstood and reciprocated with loss of salts and electrolytes from the body as signs and symptoms of excessive thirst and correlated with kidney malfunction. Thomas Cawley, in 1788, was the first to develop and successfully linked the pancreas and Diabetes disorder after the observation of results showed, patients with pancreatic injury developed Diabetes Mellitus. British physiologist Matthew Dobson in 1776, conducted several lab experiments and made predictions about the quality of urine in D.M. patients. The results showed proved that the sweet substance detected in the urine was sugar. At the same time, he concluded serum sweet taste and which lead to the discovery of hyperglycemia. Then Dobson put forward his findings and concluded that D.M. was a systemic disease rather than a Kidney malfunction [3, 4, 5].

## **DIABETES MELLITUS: ROLE OF INSULIN**

The hormone insulin secreted from islets of Langerhans of beta cells present in the endocrine region. Insulin promotes the synthesis of carbohydrates, fats, protein, and nucleic responsible for energy utilization. It regulates glycogen synthesis and inhibits gluconeogenesis accountable for carbohydrate metabolism. The skeletal muscle and liver are responsible for regulating insulin by glucose transport. The pharmacotherapy is needed to control D.M, despite lifestyle modification. Blood glucose can control using oral hypoglycemics, having medical significance for the management of Diabetes mellitus patients. Lifestyle modification manifests to optimize the glycaemic index for better care of Diabetes patients [6, 7, 8, 9].

## **CLASSIFICATION OF D.M. (DIABETES MELLITUS)**

### **IDDM (Type 1)**

It is called juvenile Insulin-dependent Diabetes mellitus (IDDM) and destroys beta cells due to low insulin. The amount of insulin produced remains deficient during IDDM. In these cases, the Insulin therapy is needed regularly to maintain the blood glucose level of a diabetic patient. Several factors causing Type 1 DM; changes in environmental conditions aggravate the symptoms in patients. The patient suffers from various symptoms like frequent urination, loss of appetite, blurred vision, and mental fatigue. The sedentary lifestyle, lack of exercise, mental stress, and neuropathy can sometimes become fatal and even cause death[10].

### **NIDDM (Type 2)**

The amount of insulin resistance and utilization can cause Type II Diabetes. Insulin remains ineffective due to insulin resistance. It is more prominent in adult age, and sometimes children are also affected. It marked with changes in body weight, lack of exercise, poor nutritional and dietary habits in D.M. patients. Nowadays, Type II cases are more frequent in patients having a family history of cerebral vascular disease and Type 2 Diabetes[10, 11].

### **GDM (Gestational D.M.)**

The mechanisms of action of GDM is misunderstood and occur in pregnant female in the third trimester of pregnancy. Hyperglycemic women are more prone to GDM and suffer from elevated blood pressure and

difficult vaginal childbirth. The GDF may transfer from mother to infant and continue until their early childhood[10, 11, 12].

**Medication Therapy for DM**

- Oral hypoglycaemic
- Insulin therapy [13, 14]
- Dietary and life style modification
- Nutritional Therapy
- Herbal Ayurvedic extracts and Supplements [15] (Table 1)

**MEDICAL FOCUS ON CONTROLLED DIET PLAN**

A controlled diet plan can reduce the risk of Diabetic stress and minimize patient sufferings through blood glucose regulation. The medical focus allows patients to adopt alternative treatment approaches at affordable cost with improved health care. The Herbal products for diabetic care are explained in (Table 2). Diabetes Mellitus (D.M.) medical focus on the diet plan illustrated in Fig 1[26].

**Food Replacement Therapy, Diet Management of DM**

With the emergence of lifestyle, interventions can give long-term benefits to Type II diabetic patients by improving eating and dietary habits, and physical activities help in weight management. Only pharmaceutical interventions cannot help sustain the ongoing patient treatment with oral hypoglycemics or insulin therapy as they are associated with side effects. It is essential to trigger diabetic patients towards alternative approaches for disease management for better outcomes. Food replacement therapy is one way to control diabetic patients' glycemic index through changes in food items. The flow chart depicted in Figure 2 and Figure 3 illustrates the type of food items and Diet plans recommended for Diabetic patients for better healthcare. [27, 28, 29, 30]

**Table 1.** Medication therapy of DM vs Diet plan and herbal Ayurvedic extracts

S. No.	Type	Category	Drugs	Usefulness/ advice
1	Oral Hypo-glycaemics	Alpha glucosidase inhibitors	Acrabose, Miglitol	Break down starch foods and table sugar, thus lowers blood glucose levels. Advice: taken before food
		Biguanides	Metformin and combined therapy	Decreases sugar that is made by liver, muscle absorbs sugar, body become more sensitive to insulin
			Metformin-aogliptin (Kazone)	
			Met-pioglitazone (Actoplus)	
			Met-gliburide (Glucovance)	
			Met-saxagliptin (Kombiglyze)	
			Met-sitagliptin (Janumet)	
Met- dapagliflozin (Xigduon XR)				
Met- empagliflozin (Synjardy)				
2		Dopamine agonist	Bromocriptine	Exact cause is not known, breaks rhythms of body and prevent insulin resistance
3		DPP-4 Inhibitors	Alogliptin	Help body to produce continued insulin, reduces blood sugar without hypoglycaemia
	Sitagliptin-Met (Janumet & Janumet XR)			
	Simvastatin & sitagliptin (Juvissync)			
4		Glucagon like peptides (incretin mimetics)	Albiglutide	Similar to natural hormone increatin, Increase B cell growth, decrease appetite, glucagon levels, slow stomach emptying
	Semaglutide			
	Dulaglutide			
5		Meglitinides	Repaglinide (Prandin)	Help body to release insulin, lowers the sugar too much
	Nateglinide (Starlix)			
	Repa-Met (Prandimet)			
6		Sulphonyl ureas	Glimepride	Oldest , stimulate pancreatic B cells, helps body to produce more insulin
	Tolzamide			
	Tolbutamide			
	Glipizide-Met			
	Glicazide			

			Glimepride-rosiglitazone	
			Glimepride-pioglitazone	
7		Thiozolidinediones	Rosiglitazone	Decrease glucose in liver, reduce fat cells, but increased risk of heart attacks, proper monitoring done by doctors to maintain heart function during treatment [13- 16]
			Rosiglitazone-glimepride	
			Pioglitazone	
			Pioglitazone-Met	
			Pioglitazone-glimepride	
8	Insulin Therapy	Insulin Analogs	Regular, NPH	Work by directly targeting B cells, more predominant in later stage Diabetic patients with sugar level of above 250-300dl/100 ml blood [17, 18]
			Zinc insulin (Lente)	
			Extended zinc insulin (Ultra lente)	
			Lispro	
			Aspart	
			Glargine	
9	Herbal extracts and Dietary foods	Life style management through diet and Herbal Ayurvedic Extracts	Proper balance diet	Decrease blood glucose level through diet and dietary fibres, decrease risk of side effects of modern medicine, control, manage DM improve well being and increase life span [19-25]
			Low calorie food intake	
			Include oats, wheat, cereals, whole-grain, barley	
			Green leafy vegetable	
			Almonds, walnuts overnight soaked, roasted peanuts, bhuna chana	
			Herbal extracts Aloe-vera juice, gurmar stem extracts, amla juice, neem- bitter gourd Juice	

**Table 2.** Marketed herbal products for diabetic care.

Name of products	Action	Dose	Disease cured	Other effects	Company
Karela jamun juice	Control blood sugar level, regulate carbohydrate metabolism	30ml juice with 30ml water, consumed twice daily	Diabetes	Builds immunity, reduces acne, weight management, skin glow, improves digestion, menstrual problems	Kapiva Ayurveda
Diabex capsules	Improves insulin sensitivity and regulate blood glucose	Severe cases, 2 capsules thrice a day before meals, moderate case, 2 capsules twice a day before breakfast	Type 2 Diabetes	Boosts immunity	Dr. Vaidya's
Dia Free	Controls high blood sugar	2-3 capsules twice daily before meals	Type 2 Diabetes	Relieves diabetes stress, improves digestion	Kapiva Ayurveda
Cinnamon extract	Controls insulin	Take 1 veg, capsules once daily	Type 1 and Type 2	Antioxidant	Healthy hey nutrition
Ensure diabetes care	Maintain blood glucose	200g powder, sugar free	Type 1 and Type 2	Weight management	Abbott
Diabetic care pure extract	Maintain blood glucose and, helps insulin functions	2 capsules daily before meals	Diabetes	Provides nutritional support	Nuvomed
Quantu Diab Forte	Maintains blood sugar	1 capsules daily, 30 min before meals	Type 2 Diabetes	Reduces Hb1Ac levels, increases glucose uptake and glycogen synthesis	Quantum Naturals
Diabeta plus	Lowers blood glucose levels	1 capsules twice a day after meals	Type 1 and Type 2	Boosts immunity	Morpheme remedies
Gymnema	Lowers blood	1 capsules twice a	Type 1 and	Boosts immunity	Morpheme

plus	glucose levels	day after meals	Type 2		remedies
Sugar knocker	Regulate blood glucose levels	1-2 capsules, 3 times before breakfast	Type 1 and Type 2	Prevents microvascular damage and diabetic neuropathy, oxidative damage	Good health
Diastan	Regulate blood glucose	1 capsules after meals with water	Type 2 Diabetes	Boosts immunity	Inlife health care
Diajab	Control blood glucose	5g twice daily after meals	Type 1 and Type 2 Diabetes	Promotes healthy blood lipid, reduces palpitation, controls obesity, clear toxins, prevents indigestion, treat constipation	Shafali herbal care
Gudmar	Blocks insulin	1 capsules twice daily before insulin	Type 2 diabetes	Reduces sugar cravings, regulate systolic blood pressure, cure high cholesterol, control anaemia, treats constipation	Natural health care
Gudfit	Normalizes blood sugar	2 capsules twice daily	Type 2 diabetes	Reduces sugar cravings	Aditya healthcare
Diabeta plus	Causes hypoglycaemia	2 capsules for type 1 and 3 capsules for type 2 twice daily, with water	Gestational diabetes, type 1 and 2	Diabetic neuropathy	Planet Ayurveda

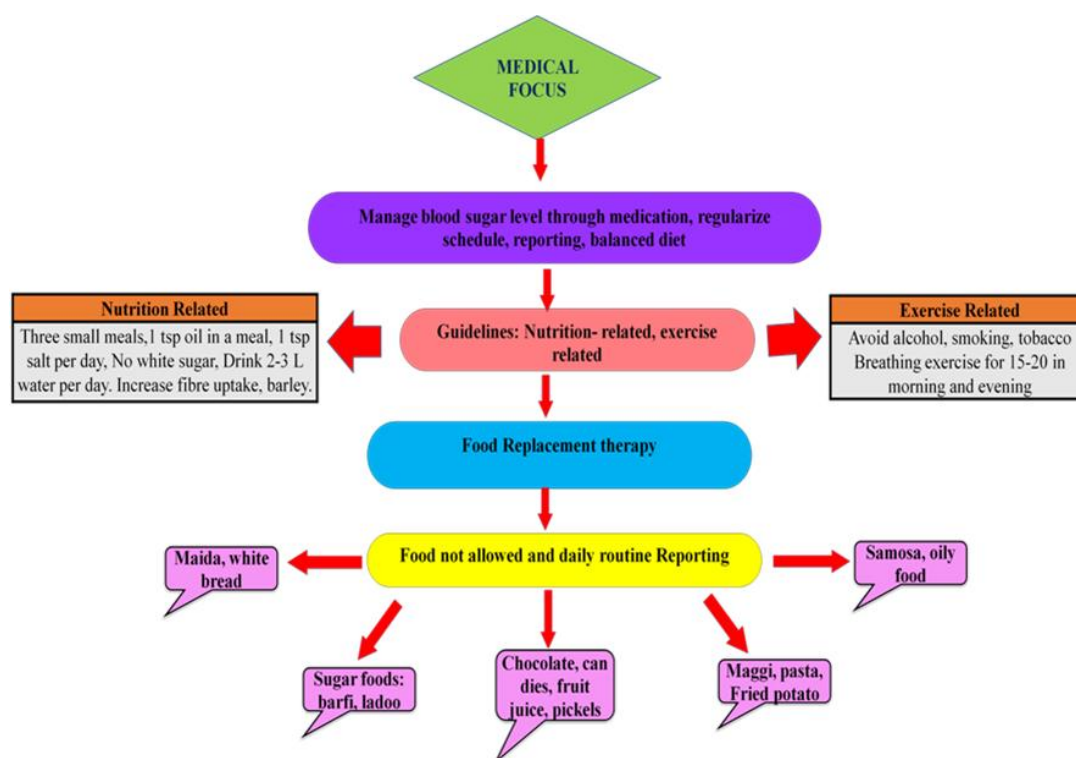


Figure 1. Medical focus of diabetes mellitus patients.

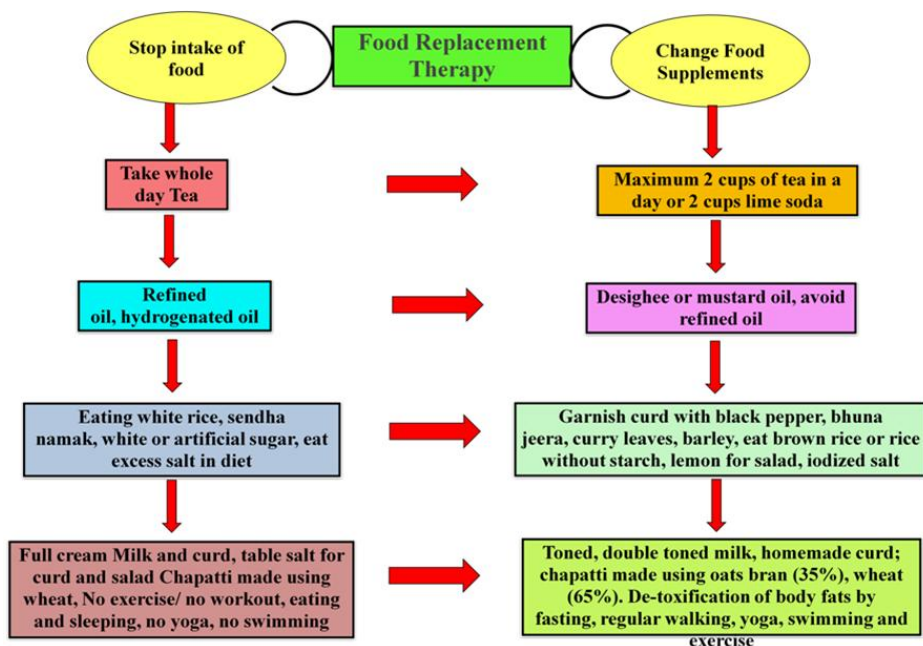


Figure 2. Flow chart showing food replacement therapy for D.M. patients.

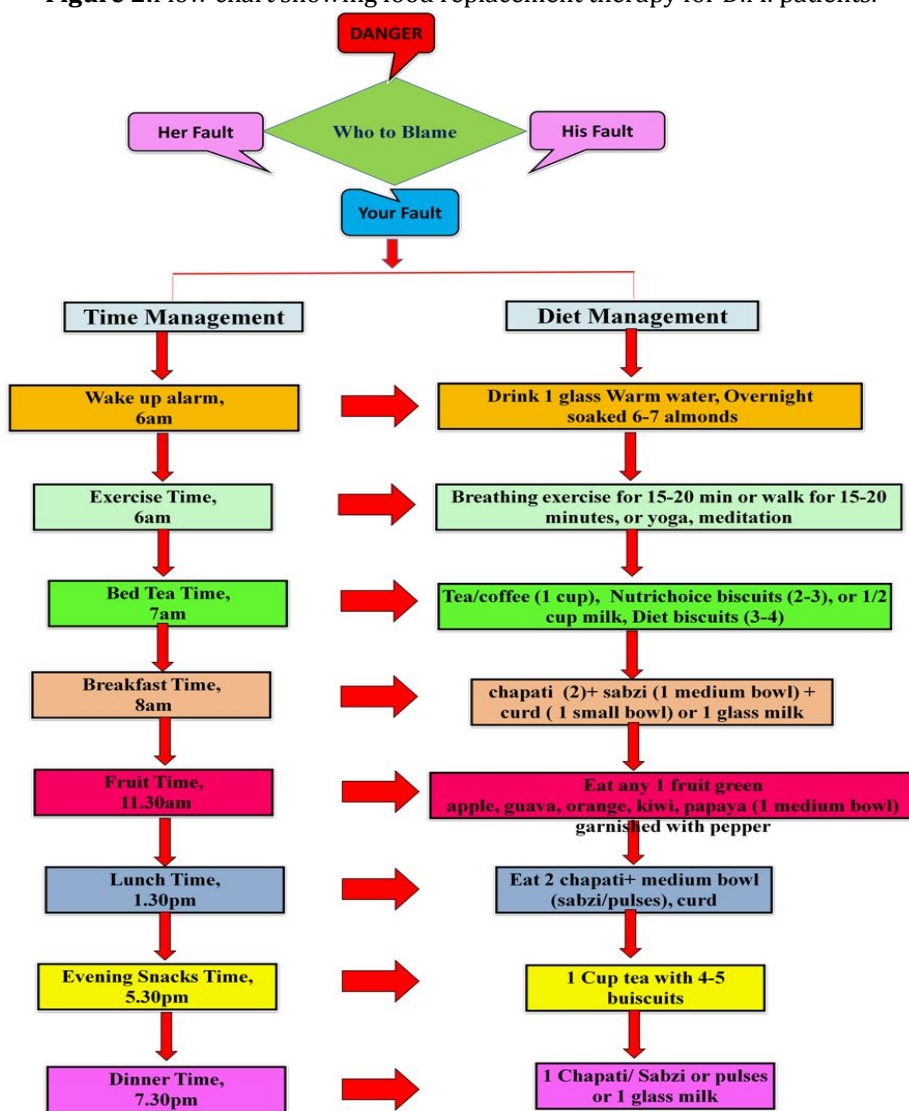


Figure 3. Flow chart depicting time and diet management for D.M. patients.

**CONCLUSION**

The drawbacks of modern medication therapy and increased on-toward side effects of D.M. patients intervene in modern medicines replacement with proper nutritional diet plan, regular reporting, and avoiding sedentary lifestyles. The changes in food habits, regular exercise, follow up, food replacement therapy, lack of mental stress, yoga, meditation, exercise, increased walking activities, swimming, restricting fats and fatty diets, control overeating, providing management solution and control of D.M. in the long run. It improves and increases the life span of a person, and minimizes patients' sufferings due to the prevalence of side effects of D.M. The D.M. is associated with increased chances of heart stroke, obesity, keto-acidosis, nephropathy, retinopathy accompanied by blurred vision, neuropathy, loss of body mass, and unhealthy life span. The medical focus for better diabetic control and regular monitoring reduces the number of increasing cases globally. The availability of adjuvant therapies combined with conventional medicines provides better patient compliance, and enhances humankind's life span.

**ETHICS COMMITTEE APPROVAL AND PATIENT CONSENT**

None

**CONFLICT OF INTEREST**

Author declared none conflict of interest

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