

REVIEW



HERBAL APPROACH FOR THE MANAGEMENT OF DIABETES MELLITUS: AN OVERVIEW

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ABSTRACT

Diabetes mellitus occurs all through the world, yet is more regular (particularly Type 2) in the developed nations. Present world situation all inclusive up to 2013 shows around 382 million individuals experiencing Type 2 diabetes making up around 90% of the cases. Antidiabetic herbal formulations are widely formulated because of their fewer side effects as compared to synthetic drugs. Antidiabetic herbal formulations (AHF) are thought to be more effective for the management of diabetes. In India there are around 600 herbal drug manufacturers of which almost all of them are developing AHF in addition to others. The aim of this review is to summarize role of herbal drugs, marketed formulation and patented formulation for the management of diabetes mellitus.

KEY WORDS: Diabetes mellitus, Herbal formulation, Patent

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INTRODUCTION

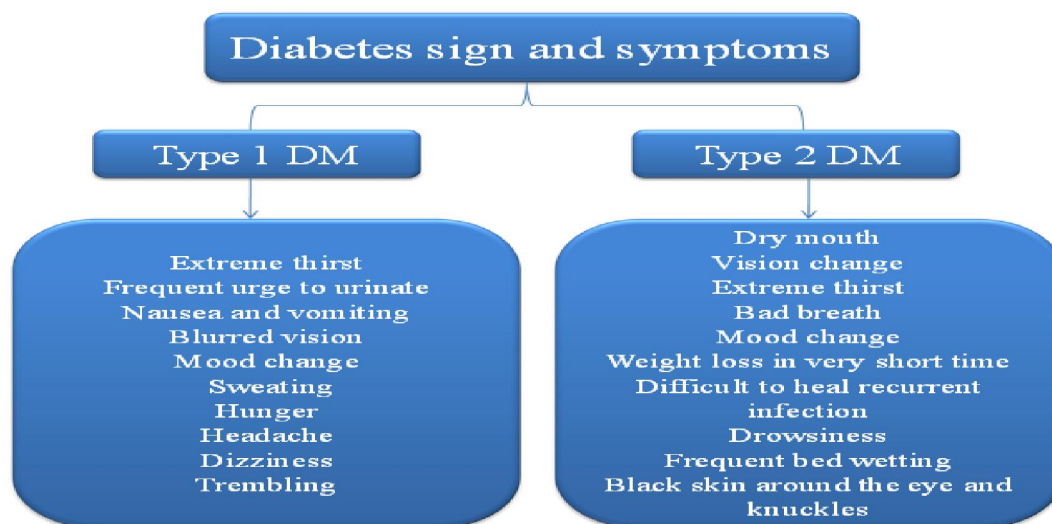
Diabetes mellitus is progressively common group metabolic disease which affects 100 millions of people globally. DM is a heterogeneous disorders that is characterized by hyperglycemia¹ due to defective insulin secretion, insulin deficiency and insulin resistance.² DM may leads to various complications: microvascular and macrovascular which includes stroke, nephropathy, neuropathy,

blindness, increased risk of cardiovascular disease etc.³

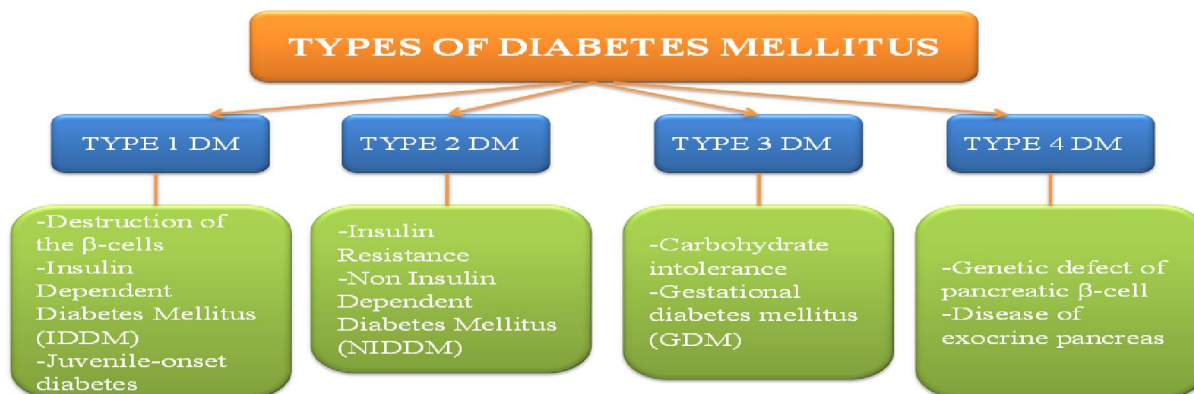
EPIDEMIOLOGY

International Diabetes Federation (IDF) defines that about 382 million patients were estimated with diabetes in 2013 which is probable increase to 592 million in 2035.⁴China is a leading country of diabetic patients i.e. 98.4 million,⁵ in India 87.0 million,⁶ and in brazil 11 million population having diabetes mellitus.⁷

SIGN AND SYMPTOMS OF DIABETES MELLITUS⁸



TYPES OF DIABETES MELLITUS⁹



Type 1 diabetes mellitus

Type 1 DM also known insulin dependent diabetes mellitus (IDDM). In this disease, absolute deficiency of insulin occurs. Destruction of beta cells is due to virus invasion, action of autoimmune antibodies or action of chemical toxins.¹⁰

Type-2 diabetes

Non- insulin dependent diabetes mellitus (NIDDM) or Type-2 diabetes is normally accompanied by insulin resistance that limits reaction to both exogenous and endogenous insulin.¹¹

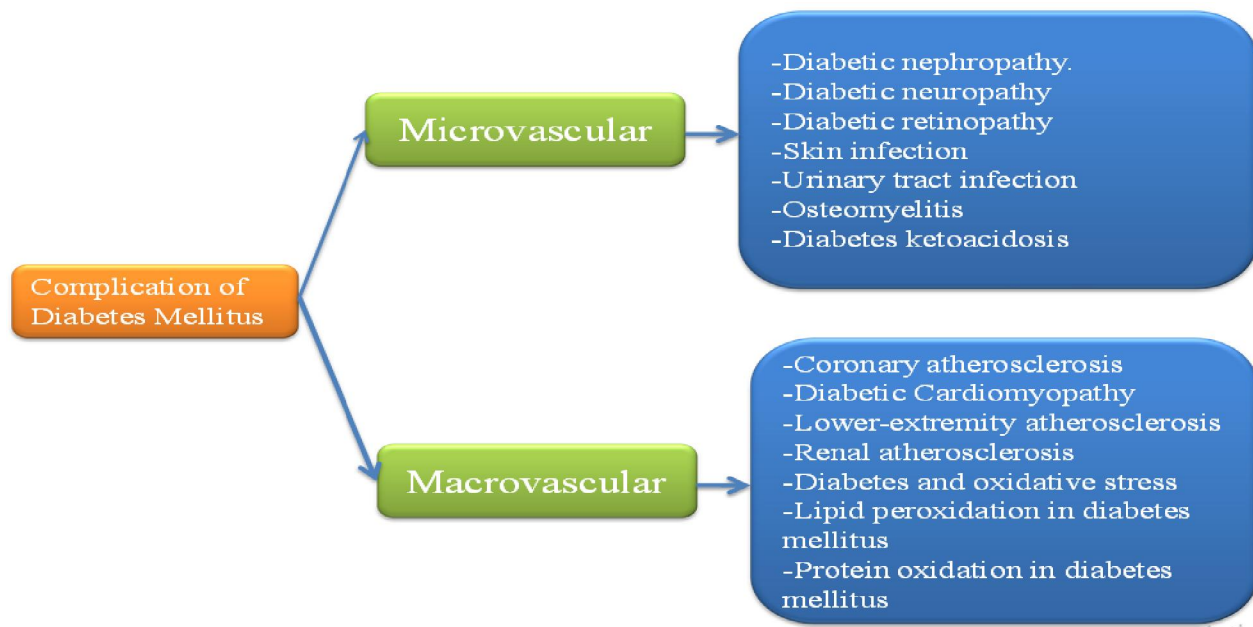
Type- 3 diabetes

Also known as gestational diabetes mellitus (GDM) observed in about 4-5% of all pregnancies, insulin resistance occurs in this type of diabetes because of placental hormones.¹²

Type- 4 diabetes

It is caused by chronic drug therapy: growth hormone glucocorticoids, diazoxide, thiazids diuretics or chronic pancreatitis and by protease inhibitors (e.g. saquinavir).¹²

COMPLICATIONS OF DIABETES MELLITUS¹³



DIABETIC MODELS

At current time greatest and quickest method to induce diabetes are chemicals such as alloxan, dithizone, streptozotocin, monosodium glutamates

etc., viruses, hormone and genetically diabetic rats. During and after the induction of diabetes, body changes are observed, this is the main advantage of such chemicals. Most commonly used diabetogenic agents are alloxan and streptozotocin.¹⁴

Table 1: List of Various Diabetic Models^{15, 16}

Sr. no.	Induction method	Model	Main feature
1	Chemical Induction	Alloxan	Simple model of hyperglycaemia.
		Streptozotocin (STZ)	
		Dithizone	
		Gold thioglucose	
		Monosodium glutamate	
2	Virus induced	D-Variant Encephalomyocarditis	Destruction of Beta cell byviral infection
		Coxsackie Viruses	
		Kilham rat virus	
3	Hormone induced	Growth hormone induced diabetes	Loss of pancreatic islets tissues and of beta cells produced permanent diabetes

		Corticosteroid induced diabetes	Oppose insulin action and stimulate gluconeogenesis. e.g.: prednisolone and dexamethasone
4	Spontaneous Autoimmune	Non- obese diabetic mice Bio-breeding rats	Destruction of Beta cell by autoimmune process
5	Genetically induced	Akita mice	

Table 2: Herbal Formulations for Management of Diabetes

Sr. No.	Plants (family)	Active constituents	Herbal formulation/ common name	Effect	Ref. No.
1	Artemisia pallens(Asteraceae)	Germacranolide	Davana	Hypoglycemic, inhibits glucose reabsorption	17
2	Areca catechu (Arecaceae)	Arecaine and arecoline	Supari	Hypoglycemic	18
3	Bombax ceiba (bombacaceae)	Anthocyanin A & B, kaempferol	Semul	Hypoglycemic	19
4	Coccinia indica (cucurbitaceae)	Alkaloid, Resin, Carbonic acid	Bimb or Kanturi	Hypoglycemic	20
5	Ficus bengalensis(Moraceae)	Leucodelphinidin and Leucopelargonin	Bur	Hypoglycemic, antioxidant	21
6	Murraya koenigii (Rutaceae)	Murrayanine,murrayazoline, murrayacine.	Curry patta	Hypoglycemic, increases glycogenesis and decreases glycogenolysis	22
7	Phaseolus vulgaris (Fabaceae)	Kaempferol-3-rutinoside, quercetin-3-rutinoside	white kidney bean, hulga	Hypoglycemic, hypolipidemic, inhibit alpha amylase activity,antioxidant.	23
8	Swertia chirayita (Gentianaceae)	Swertianin, swerchirin	Chirata	Stimulates insulin release from islets	24
9	Terminalia belerica (Combretaceae)	Beleric acid	Behada	Antibacterial, hypoglycemic	25
10	Terminalia chebula (Combretaceae)	Chebulinic acid, chebulic acid etc.	Hirda	Antibacterial, hypoglycemic	25
11	Withania somnifera (Solanaceae)	Somniferine,withananine and Cuscohygrine	Ashvagandha, winter cherry	Hypoglycemic, diuretic and hypocholesterolemic	26

Table 3: Commercially Marketed AHF: A Glimpse²⁷

Sr.No.	AHF Marketed in India	AHF Marketed Internationally
1	Cogent-db capsules	Pancrease formula
2	Diabyog capsules	Eleotin, Ayubes

3	Diabecon	Diabetes Hypoglycose Capsules
4	MadhuMaheri granules	Pearl Hypoglycemic Capsules
5	MadhuSunya	Tongyitang Diabetes Angle Hypoglycemic Capsules
6	MadhumehAmrit	Zhen-Qi Capsules

Table 4: Patented Anti-diabetic Herbal Formulations

Sr. No.	Patent No.	Field of Invention	Year of Publication	Inventor/Assignee	Ref No.
1	US7815946	Anti-diabetic and cholesterol lowering preparation from fenugreek seeds	2010	Murthy, P.S., Moorthy, R., Prabhu, K.M., Puri, D.	28
2	US7641925	Synergistic composition for the treatment of diabetes mellitus	2010	Bhaskaran, S., Mohan, V.	29
3	US7736676	Synergistic composition for the management of diabetes	2010	Bhaskaran, S., Mohan, V.	30
4	US7482030	Natural herb composition for the treatment of diabetes.	2009	Mansilla, A.	31
5	US20080206372	Herbal product to be administered to diabetic people and process	2008	Agreda, N.J., Martin, P.F., Belo, M.E.W.	32
6	US7014872	Herbal nutraceutical formulation for diabetics	2006	Pushpangadan, P., Prakash, D.	33
7	US20060177530	Method of treating diabetes type-2	2006	Crea, R.	34
8	US6893627	Method for treating type-2 diabetes with an extract of Artemisia	2005	Ribnicky, D.M., Raskin, I.	35
9	US20020197334	Pharmaceutical composition for the treatment of diabetes mellitus	2002	Seung, Y.L.	36
10	US6093403	Sugar imbalance and diabetes treating herbal formulation	2000	Huo, Y.S., Lo, S.J., Winters, W.D.	37

CONCLUSION

At present the occurrence of Diabetes mellitus has reached 200million worldwide. Despite the number of anti-diabetic herbal formulations for the treatment of diabetes, there search has taken an effort towards preparing AHF. Investigating the score of patent and literature it has been considered that the area of

antidiabetic treatment by herbal medications is investigating effectively at a greater pace. Antidiabetic herbal formulations (AHF) are being marketed domestically as well as internationally because of their less side effects and ease of affordability.

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