An Overview On Diabetes

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ABSTRACT

In India more than 62 million diabetic individuals currently diagnosed with the disease. The prevalence of diabetes is more in India and is increasing rapidly. Herbal formulations are preferred due to lesser side effects and low cost. A list of medicinal plants with proven antidiabetic and related beneficial effects of herbal drug used in treatment of diabetes is compiled.

Keywords: diabetic, India, Herbal formulations, Treatment

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INTRODUCTION: -

Diabetes is a chronic incurable condition with an estimated 2.6 million individual diagnosed in United Kingdom equivalent to 4% population. As estimated 2.3 million have type 2 diabetes and 0.3 million is having type 1 disease and another 5, 00,000 are probably undiagnosed.

Generally diabetes is of two types

I. DIABETES MELLITUS

II. DIABETES INSIPIDUS

DEFINITION OF DIABETES MELLITUS: -

Diabetes mellitus is defined as a heterogeneous metabolic disorder characterized by chronic features of chronic hypoglycemia with disturbance of fat and protein metabolism. It is a chronic condition due to impaired insulin secretion with or without insulin resistance.

Diabetes mellitus may be classified according to aetiology most commonly of two types. They are

➢ TYPE 1 DIABETES MELLITUS AND
➢ TYPE 2 DIABETES MELLITUS

TYPE 1 DIABETES MELLITUS: -

It constitutes about 10 % of cases of Diabetes Mellitus. It is also called as Insulin Dependant Diabetes Mellitus (IDDM) or Juvenile Onset Diabetes (JOD). IDDM is because it was known that these patients have absolute requirement for insulin replacement as therapy and JOD is known due to its occurrence in younger age.

In type Diabetes Mellitus beta cell destruction usually leading to absolute insulin deficiency.

Based on underlying etiology Type 1 Diabetes Mellitus is further divided into 2 subtypes.

SUB TYPE 1 A (Immune mediated Diabetes mellitus) :- It is characterized by Auto immune destruction of beta cells which usually leads to insulin deficiency.

SUB TYPE 1 B (Idiopathic Diabetes Mellitus) :- It is characterized by insulin deficiency with tendency to develop ketosis but these patients are negative for autoimmune markers.

TYPE 2 DIABETES MELLITUS :-

It comprises about 80 % cases of Diabetes Mellitus. It is also called Maturity onset diabetes or Non Insulin Dependant Diabetes Mellitus (NIDDM) of obese and non obese type. It predominantly affects older individuals, it is not known that it also occurs in obese adolescent and in children. More over many type 2 diabetic mellitus patients also require insulin therapy to control hyperglycemia or to prevent ketosis.

MAJOR RISK FACTORS FOR TYPE 2 DIABETES MELLITUS

➢ Family history of type 2 diabetes mellitus
➢ Obesity
➢ Habitual physical inactivity
➢ Race and Ethnicity (Blacks, Asians, Pacific Islanders)
➢ Previous identification of impaired fasting glucose or impaired glucose tolerance
➢ History of Gestational diabetes or delivery of baby higher than 4 kg
➢ Hypertension
➢ Dyslipidaemia (HDL level < 35 mg / dl or Triglycerides >250 mg /dl)
➢ Polycystic ovary disease and Acanthosis nigricans
➢ History of vascular disease

SYMPTOMS

Diabetes symptoms vary depending on how much your blood sugar is elevated. Some people especially those with pre diabetes or type 2 diabetes may not experience symptoms initially. In type 1 diabetes, symptoms tend to come on quickly and be more severe.

Some of the signs and symptoms of Type 1 and Type 2 diabetes are

➢ Increased thirst
➢ Frequent urination
➢ Extreme hunger
➢ Unexplained weight loss
➢ Presence of ketones in urine
PATHOGENESIS OF TYPE 1 DIABETES

Genetical susceptibility:
- Concordance in identical twins 50%
- Susceptibility gene on HLA region in chromosome 6

Environmental Factors
- Viral infections
- Experimental induction with chemicals
- Geographic and seasonal variations
- Bovine milk proteins

Autoimmune factors:
- Islet cell antibodies
- Insulitis
- CD8+ T Lymphocyte mediated selective destruction of beta cell

Type 1 Diabetes mellitus

OTHER SOME NON TYPICAL DIABETES MAY BE

Latent Auto immune Diabetes in Adults (LADA) :- Occurs in younger, leaner individuals who appear to have Type 2 diabetes as they do not become ketotic and may manage with out insulin for a time.

Anti glutamic acid Decarboxylase (GAD) antibodies may be present and the individual usually progresses to insulin more rapidly than those with other varieties of Type 2 Diabetes.

Maturity Onset Diabetes of the Young (MODY) :- It is noted over 30 years ago and described a subset of Type 2 diabetes of the young onset, often with a positive family history.

GESTATIONAL DIABETES MELLITUS :- It is a condition in which women first exhibit levels of elevated plasma glucose during pregnancy. Women previously diagnosed with diabetes prior to pregnancy are excluded from this classification.

After pregnancy, the diagnostic classification of Gestational diabetes may be changed based on post partum testing.

DIABETES INSIPIDUS :- It is an uncommon disorder characterized by intense thirst, despite the drinking of fluids (Polydipsia) and excretion of large amounts of urine (Polyuria).
In most cases, it is the result of the body not properly producing, storing or releasing a key hormone. But diabetes insipidus can also occur when kidney are un able to respond properly to that hormone.

Rarely diabetes insipidus can occur during pregnancy (Gestational Diabetes Insipidus).

**SYMPTOMS:**
The following common signs and symptoms of diabetes insipidus are
- Extreme thirst
- Excretion of an excessive amount of diluted urine
- Infants and Young children who have diabetes insipidus may also have following signs and symptoms
  - Un explained fussiness or inconsolable crying
  - Unusuallıy wet diapers
  - Fever, Vomiting and Diarrhea
  - Dry skin with cool extremities
  - Delayed growth
  - Weight loss

**PATHOGENESIS OF TYPE 2 DIABETES MELLITUS**

**GENETIC DISORDERS:**
- Concordance in identical twins 80%
- If both parents diabetic 50% risk to the children

**CONSTITUTIONAL FACTORS:**
- Obesity
- Hypertension
- Low physical activity

**DECREASED INSULIN SECRETION:**
- ? Amylin
- ? Glucose toxicity of islets
- ? Lipotoxicity

**INSULIN RESISTANCE**
- Receptor and post receptor defects
- Impaired glucose utilisation

Increased hepatic glucose synthesis

Hyperglycemia

**TYPE 2 DIABETES MELLITUS**

**TREATMENT FOR DIABETES**
Depending on what type of diabetes you are having blood sugar monitoring, insulin and oral medications may play a role in treatment.

Eating a healthy diet maintaining a healthy weight and participating in regular activity also are important factors in managing diabetes.
HEALTHY EATING: includes more Fruits, Vegetables, Whole grains should be present i.e., foods that are high in nutrition, and fiber and low in fats and calories and cut down of animal products, refined carbohydrates and sweets.

Fig: Showing healthy diet for diabetic patients

PHYSICAL ACTIVITY: People needs regular aerobic exercise. Exercise lowers the blood sugar level by moving sugar into the cells where it is used for energy. It also increases sensitivity to insulin, which means body needs less insulin to transport sugar to cells, and activities like swimming, Walking, or Biking also play important role.

Treatment for Type 1 Diabetes involves insulin injections or the use of an insulin pump, frequent blood sugar checks and carbohydrate count.

Treatment for Type 2 Diabetes involves primarily monitoring of blood sugar along with diabetic medications or insulin or both.

For type 1 Diabetes they need insulin therapy to survive. Many people with type 2 diabetes or Gestational diabetes also need insulin therapy.

Many types of insulin are available including Rapid acting insulin (Insulin Lispro, Aspart, Glulisine), Long acting insulin (Insulin glargine, detemir), Intermediate acting insulin (NPH or Isophane insulin, Insulin zinc suspension), Short acting insulin (regular soluble insulin).

MOSTLY USED ORAL HYPOGLYCAEMIC OR ANTIDIABETIC DRUGS
A number of generic and branded antidiabetic drugs are used like

AMYLINOMIMETIC DRUG: Pramlintide is an amylinomimetic drug. It is an injectable drug used before meals. It reduces glucagon secretion after meals. Lowers blood sugar and reduces appetite through a central mechanism.

Most commonly used medications for type 2 diabetes are oral drugs. However, some people with type 2 diabetes may also need to take insulin.

ALPHA GLUCOSIDASE INHIBITORS: These help in breaking down starchy foods and table sugar. This effect lowers blood sugar levels. For best results should be taken before meals. It includes drugs like Acarbose, Miglitol.

BIGUANIDES: Decrease how much sugar Liver is making and Intestine absorbing and make the body more sensitive to insulin and help muscles absorb glucose. Most common biguanide is Metformin.

DOPAMINE AGONIST: Bromocriptine (Parlodel) is a dopamine agonist. It is not
known exactly how this drug effectively treat Type 2 diabetes. It may affect rhythms in body and prevent insulin resistance.

**DPP-4 INHIBITORS** :- Help the body continue to make insulin. They work by reducing blood sugar without causing Hypoglycemia. These drugs also help pancreas to make more insulin. These drugs include drugs like Alogliptin.

**GLUCAGON LIKE PEPTIDES (INCRETIN MIMETCS)** :- These drugs are similar to natural hormone called incretin. They increase B – cell growth and insulin use in body and decrease appetite and glucagon use in body. They also slow stomach emptying. These are all important actions for people with diabetes. It include drugs like Albiglutide, Dulaglutide, Exenatide, Liraglutide.

**MEGLITINIDES** :- These help the body release insulin. However in some cases, they may lower blood sugar too much. So these should be given carefully. It include drugs like Nateglinide, Repaglinide.

**SODIUM GLUCOSE TRANSPORT 2 INHIBITORS (SGLT)**:- These drugs work by preventing the kidney from holding glucose and get rid of glucose through urine. These include drugs like Dapagliflozin, Canagliflozin, Empagliflozin.

**SULFONYL UREAS** :- These are the oldest diabetic drugs and used still today. They work by stimulating the pancreas with help of beta cells. This causes the body to make more insulin. It include drugs like Glimperide, Glipizide, Gliburide.

**THIAZOLIDINEDIONES** :- These medications work by decreasing glucose in liver. They also help fat cells use insulin better. These drugs come with an increased risk of Heart disease. So heart functioning should be monitored during this drug usage. These drugs include Rosiglitazone, Pioglitazone.

Other drugs to treat conditions common with diabetes are Aspirin for Heart health, Drugs for high cholesterol and high blood pressure medications.

**THE ROLE OF ANTIDIABETIC DRUGS IN TREATMENT**:-

These are not designed to cure diabetes but they help diabetes patients to keep their condition under control and lower the risk of diabetic complications. People with diabetes may need to take anti diabetic drugs for their whole lives in order to control their blood glucose levels and avoid hypoglycemia and hyperglycemia.

**HERBAL MEDICATIONS FOR TREATMENT OF DIABETES**

**ALOE (ALOEVERA)** :

**Biological source** :- Dried juice of leaves of Aloe vera, Aloe barbadensis, Aloe ferox

**Family** :- Liliaceae

**Active constituents** :- Barbaloin, Aloe Emotin, Anthrone c-10 glucoside, Aloe

**Uses** :- Aloe juice is a bitter yellow exudates from per cyclic tubules just beneath the outer skin of leaves extracts of aloe gum effectively increases glucose tolerance. It helps in treatment of chronic but not single dose of exudates of Aloebarbadensis leaves.

**ALLIUM SATIVUM (GARLIC)** :-

![Fig :- Aloe](Fig:-Aloe.png)
**Allium sativum**

**Biological source:** Bulbs of plant *Allium sativum*

**Family:** Liliaceae

**Active constituents:** Allicin, Alliin, Allyl propyl disulphide, Diallyl disulphide.

**Uses:** It shows significant hypoglycemic activity. It is due to increased hepatic metabolism, increased insulin release from pancreatic beta cells or insulin sparing effect.

**CINNAMON:**

**Biological source:** Dried inner bark of the shoots of coppiced trees of *Cinnamomum zeylanicum*, *cinnamomum verum*

**Family:** Lauraceae

**Active constituents:** Cinnamaldehyde, Eugenol, Benzaldenyde, Cuminaldehyde, Phellandrene, Pinene, Cymene, Caryophyllene.

**Uses:** It is responsible for ant diabetic effects. Active components of cinnamon may have insulin mimetic effects.

**GINGKO:**

**Biological source:** Dried leaves of *Gingko biloba*

**Family:** Gingkoaceae

**Active constituents:** Flavon glycosides, Triglycosides of kaempferol, Quercetin, Iisorhamnetin, Biflavonoids like Ginkgetin, Iso Ginkgetin, Gingkolic acid, Bilobetin

**USES:** It acts as an Antidiabetic and also helps in lowering blood pressure.

**MILK-THISTLE (SILYMARIN):**
**Biological source**  
Ripe seeds of milk thistle  
*Silybum marianum*

**Family**  
Asteraceae (composite)

**Chemical constituents:**  
- Silybin
- Silycrystin
- Silydianin
- Flavonalignans like Dehydrosilybin
- Silyhermin
- Neosilyhermin
- silybionome
- Betaine
- Apigenin and silybonol

**Uses:**  
- It helps to control the blood sugar level.
- It is used for treating type 2 diabetes.
- It also helps in decreasing in LDL cholesterol, Triglycerides, Glycosylated hemoglobin

**NEEM:**

**Biological source**  
It consists of all aerial parts of plant known as *Azadirachta indica*.

**Family**  
Meliaceae

**Active constituents:**  
- Diterpenes like (Sugiol, Nimbiol)
- Triterpenes like Beta-sitosterol
- Limonoids like Maliantriol, Nimbidinine, Azadiriaactin, Nimbendiol

**Uses:**  
- It shows anti-hyperglycemic activity.
- It helps increase in glucose uptake and glycogen deposition. Apart from anti-diabetic activity it also having Antibacterial, Anti malarial and antioxidant effects.

**MOMORDICA:**

**Biological source**  
Fresh fruits of Bitter guard

**Uses:**  
- It is used for treating type 2 diabetes.
- It also helps in decreasing in LDL cholesterol, Triglycerides, Glycosylated hemoglobin
**Biological source** :- It consists of fresh green fruits of the plant known as Momordica charantia (Bitter Ground)

**Family** :- Cucurbitaceae

**Active constituents** :- Charantin, Saponin, Glucoside, Alkaloids, Ascorbic acid.

**Uses** :- Juice of fresh fruits reduce the blood sugar level and hence used for treatment of diabetes mellitus. It also used for treatment of rheumatism, gout and disorders of spleen and liver

**LIQUORICE:-**

![Liquorice](image)

**Synonyms** : Glycyrrhiza radix, Glycyrrhiza, Mulethi.

**Biological source** :- Glycyrrhiza glabra

**Family** :- Leguminosae

**Active constituents** :- Glycyrrhizin, Glycyrhrinic acid, Glycyrrhetinic acid, Asparagin

**Uses** :- It contains antidiabetic substances known as amorfrutins which are capable of reducing blood sugar levels and preventing inflammation associated with diabetics.

**MANGO:-**

![Mango](image)

**Synonyms** :- Amra, Aam

**Biological source** :- Mangifera indica

**Family** :- Anacardiaceae

**Chemical constituents** :- Mangiferin, Alanine, Glycine, Aminobutyric acid, Kinic acid and shikimic acid

**Uses** :- The leaves of this plant are used as an antidiabetic agent in Nigerian folk medicine. Its aqueous extract when given orally did not alter blood glucose level is normoglycemic condition.

**TULSI :-**

![Tulsi](image)
Synonym:
Sacred basil, Holybasil

Biological source:
Fresh and dried leaves of Ocimum sanctum or Ocimum tenuiflorum

Family:
Lamiaceae

Chemical constituents:
Eugenol, Methyleugenol, Eugenol methylether, Caryophyllin, Carvacrol.

Uses:
Its aqueous extract of leaves shows significant reduction in blood sugar level, and also significant reduction in fasting blood glucose, uronic acid, total cholesterol. It also shows antiasthmatic, antistress, antibacterial and antifungal, antiviral, gastric anti ulcer activity, antioxidant and immune stimulant activities.

GUGGUL:

Synonyms:
Scented Bdellium, Gum guggul, Commiphora.

Biological source:
Commiphora weightii

Family:
Burseraceae

Active constituents:
Guggul sterones, Ethaphon, Steroids, Diterpinoids, Pentosan and Furfural.

Uses:
It is used as herbal medicine for treating diabetes.

FENUGREEK:

Biological source:
Trigonella Foenumgraecum.

Family:
Fabaceae

Active constituents:
4-hydroxyleucine

Uses:
Seeds contain Hypoglycemic properties. It is used in preparing herbal medicines for treating diabetes.

Conclusion:
Herbal medicine is without side effect long term easily usable. Crude drugs are potent activity in the treatment of diabetes. Here mentioned the valuable crude drugs are used for further research doing persons.

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