

**ANTI-DIABETIC ACTIVITY OF PLANTS: OVERVIEW****Dipti Kute* and Kundan Tiwari**

Student, S.M.B.T. Institute of D. Pharmacy, Dhamangaon, Tal. Igatpuri, Nashik, India.

Article Received on
13 Feb. 2019,Revised on 07 March 2019,
Accepted on 27 March 2019

DOI: 10.20959/wjpps20194-13512

Corresponding Author*Dipti Kute**Student, S.M.B.T. Institute
of D. Pharmacy,
Dhamangaon, Tal. Igatpuri,
Nashik, India.**ABSTRACT**

The present study reviews of plants having antidiabetic property. Medicinal plants have been proposed as rich yet unexploited potential sources for antidiabetic drugs, even though used since ancient times for the treatment of diabetes mellitus. Many of the synthetic drugs were discovered either directly or indirectly from the plant source. Diabetes mellitus is one of the most common non-communicable diseases globally. It is the fourth leading causes of death in the most developed countries and there in substantial even diced that it in epidemic in many developing and newly industrialized nations.

KEYWORDS: Antidiabetic agents, Diabetes mellitus, hyperglycemia.**INTRODUCTION**

The substance used in treatment of diabetes (i.e. Diabetes mellitus) is known as antidiabetics. (Greek: Dia: through and bainein: to go). Thus diabetes is the inability of the body to utilize glucose, due to failure of pancreas to secret insulin in sufficient quantity. Diabetes mellitus is a group of metabolic alterations characterized by hyperglycemia resulting from defects in insulin secretion, action or both. It is made up of two types: Type I and Type II. Type I diabetes often referred to as juvenile diabetes, is insulin dependent and known to affect only 5% of the diabetic population. The Type II, which is non-insulin dependent, usually develops in adults over the age of 40. It has already been established that chronic hyperglycemia of diabetes is associated with long term damage, dysfunction and eventually the failure of organs, especially the eyes, kidneys, nerves, heart and blood vessels.^[4] It has an adverse effect on carbohydrate, lipid and protein metabolism resulting in chronic hyperglycemia and abnormality of lipid profile. These lead to series of secondary complications including polyurea, polyphasia, ketosis, retinopathy as well as cardiovascular disorder.

- **Anti-Diabetic Agent**

Substances that help a person with diabetes control their level of glucose (sugar) in the blood. Antidiabetic agents include insulin and the oral hypoglycemic agent.

- **Meaning of Diabetes^[2,4]**

A disease in which the body's ability to produce or respond to the hormone insulin is impaired, resulting in abnormal metabolism of carbohydrate and elevated levels of glucose in the blood.

The normal blood glucose level ranges from 70-9 mg per 100ml but if the fasting blood sugar increases more than 120 mg per 100 ml then diabetes mellitus should be suspected. If the blood sugar is more than the normal concentrations then it is known as hyperglycemia but when the blood sugar level is less than the normal concentration then it is known as hypoglycemia. Hyperglycemia is characterized by high concentration of sugar in blood and the presence of sugar in the urine (glycosuria).

Diabetes mellitus is a disease that occurs throughout the world and about 30 million diabetics are there in the world. The incidence of diabetes is increasing because female diabetics are able to have children. The incidence of diabetes is higher in persons above 40 years of age. Females especially the married ones are more prone to get this disease. Obesity, dietary factors and heredity are the other contributory factors for diabetes. Alcoholic beverages increase appetite, encourage weight gain and when taken in excess damage the pancreas and thereby increase the risk of diabetes.

Diabetes could be caused not only by deficiency of insulin but also due to disturbances in the level of certain other substances like-adrenaline pituitary hormones, thyroid hormones, estrogens, corticosteroids, glucagon etc. All these substances produce their effect on blood sugar level so glucose tolerance curve should be determined which will be most useful test for diabetes.

- **Types of Diabetes**^[2]

Clinically diabetes is of two types:

- 1) **The juvenile onset type or insulin dependent diabetes (IDDM)**

This type of diabetes usually develops at a young age during first 40 years of life and has a very rapid onset. In this type of diabetes the pancreas produces very little or no insulin so administration of insulin is required hence it is called insulin dependent diabetes.

- 2) **The adult or maturity onset type or non-insulin dependent diabetes (NIDDM)**

This type of diabetes usually develops after 40 years of age or elderly persons who are obese and progresses slowly. In this type of diabetes, the pancreas produces inadequate amount of insulin. This type of diabetes can be controlled by dietary control alone and light exercise or along with oral hypoglycemic drugs.

- **SIGNS AND SYMPTOMS**^[2]

- Frequent urination and passing large volume of urine.
- Increased thirst
- Increased hunger
- Loss of weight.
- General weakness and fatigue.
- Pain in the legs.
- Irritability.
- Lack of concentration.
- Prone to infection.
- Delayed wound healing.

- **TREATMENT**

- a) Healthy diet
- b) Physical exercise

- **Classification**

- 1) Type 1

Diabetes due to β -cell destruction, usually leading to absolute insulin deficiency.

- 2) Type 2

Diabetes due to progressive insulin secretory defect on the background of insulin resistance.

- 3) Type 3

Gestational diabetes mellitus (GDM) diabetes diagnosed in the second or third trimester of pregnancy that is not clearly overt diabetes.

4) Type 4

Specific types of diabetes due to other causes, e.g. monogenic diabetes syndrome.

Possible Complications of Diabetes

Slow blood circulation in legs, heart disease, kidney failure, poor vision, numbness, parasthesia, feeling of pins and needles, loss of sensation are some of the common complications of diabetes but if the blood sugar is controlled to normal range i.e. 120-150 mg per 100ml then most of the above mention complication can be prevented.

As a result of long term complications like heart disease, kidney damage and even blindness may occur. As compared to a non-diabetic, the risk diabetic getting a heart attack is 2 times more, 4 times for gangrene 17 times for kidney failure and 25 times for blindness.

Medicinal plants used to treat diabetes

Plants have always been a very good source of drugs and many of the currently available drugs have been derived directly or indirectly from them. The ethnobotanical information suggests that about 800 plants may possess anti-diabetic potential, among all of them *Gymnema*, *Pterocarpus* have been reported to be beneficial for treatment of Diabetes.^[3,5]

Aims of treatment^[12]

- To control symptoms adequately with diet, exercise, drugs.
- To maintain optimum body weight
- To correct metabolic disturbances.
- To prevent or delay degenerative vascular complications.

Ideal Properties of Anti-Diabetic Agents^[12]

- Should be effective by mouth.
- Should be non-toxic.
- Should correct basis metabolic defect in Diabetic.

GYMNEMA^[1,6]

Synonym: Gudmar, Madhu nashini

Family : Asclepiadaceae

Plant part: leaves

Morphology:

Colour : Green

Odour : Pleasant and aromatic odour

Taste : Tasteless

Size : 3-5 X 1-2 cm.

Shape : Elliptic or ovate with acute or acuminate apex

Extra Feature

The leaves when chewed, have remarkable property of paralyzing the taste glands for few hours against sweet and bitter taste. Lower surface of leaf is more pubescent and base is rounded or chordate.

Chemical Constituent

The leaves contain hentriacontane, pentriacontane, phytin, α and β -chlorophylls, resin, tartaric acid, formic acid butyric acid, mucilage inositol, d-quircitol, gymnemic acid and anthraquinone derivatives.

Gymnemic acid is antisaccharin principle occurring as potassium salt. Gymnemic acid is a mixture of atleast nine closely related acidic glycosides fractionated by successive extraction with different organic solvents. Ethyl acetate fraction of gymnemic acid has paralysing effect on taste – glands.

Identification

- 1) Dilute solution anaesthetizes sweets taste buds.
- 2) Leaves shaken with water gives copious foam on addition of dil. hydrochloride acid forms voluminous precipitate.

Standards

Ash	: Not more than 11.5% (w/w)
Organic acids	: Not less than 5.5 % (w/w)
Alcohol soluble extractives	: Not more than 12.0(w/w)

Uses

- 1) It is used as antidiabetic, stomachia, stimulant, laxative and diuretic.
- 2) The antidiabetic formulation of this drug are commercially available.
- 3) Hypoglycemic effect is due to indirect stimulation of insulin secretion by pancreas.

Pterocarps^[1]

Synonym: Bijasal, Indian kino tree, Malbar kino, Asana, Rakta – chandan

Family : Leguminosae

Plant part : dried juice of plant

Morphology:

Colour : Ruby – red

Odour : odourless

Taste : Astringent

Size : 3 to 5 to 10mm granules

Shape : Angular grains

Extra Feature

The pieces of kino are angular, glistening, transparent, breaking with vitreous fracture. It is partly soluble in water (about 80-90 %) and completely soluble in alcohol (90%).

Chemical Constitute

Kino contains about 70–80% of kinotannic acid; kino–red, kinoin,; pyrocatechin (catechol), resin and gallic acid. Kinotannic acid is non- glucocidal tannin, while kino red is unhydried of kinoin. Kinoin is an insoluble phlobaphene and is produced by the action of oxydase enzyme. It is darker in colour than kinotannic acid.

If the juice is boiled during drying, enzyme gets destroyed and thus, insolubilisation and darkening is prevented.

Identification

- 1) When the solution of drug is treated with ferrous sulphate, green colour is produced.
- 2) With alkali (like potassium hydroxide) violet colour is produced.
- 3) With mineral acid, a precipitate is obtained.

Uses

- 1) Kino is used as powerful astringent and also in the treatment of diarrhea and dysentery, passive haemorrhage and toothache.
- 2) It is used in dyeing, tanning and printing.
- 3) The aqueous infusion of the wood is said to be of much use in diabetes.

- 4) The alcoholic as well as, aqueous extract of heartwood has reported to possess hypoglycemic action.
- 5) The cups made up of wood are available with Khadi and Gramodyog industries for cure of diabetes.

REFERENCES

1. S.B. Gokhale, C.K. Kokate, & A.P. Purohit, "Pharmacognosy", Nirali Prakashan, Thirty eighth edition, 2016; 9.97-9.100.
2. Ashok K. Gupta, "Health Education & Community Pharmacy", CBS Publishers & Distributers PVT. LTD., First Edition, 2016; 259-262.
3. DK Patel, SK Prasad, R Kumar, and S Hemalatha, "An overview on antidiabetic medicinal plants having insulin mimetic property, Asian Pac J Trop Biomed, 2012; 2(4): 1-9.
4. S.R. Kale, R. R. kale, "Pharmacology",
5. Chung-Hung Chan, Gek-Cheng Ngoh, and Rozita Yusoff, "A brief review on anti diabetic plants: Global distribution, active ingredients, extraction techniques and acting mechanisms", Pharmacogn Rev., 2012; 6(11): 22-28.
6. Saminathan Kayarohanam, S Kavimani, "Current Trends of Plants Having Antidiabetic Activity: A Review", Journal of Bioanalysis & Biomedicine, 2015; 1-16.
7. Suganthi A, "Anti Diabetic Plants-Overview", Current Research in Diabetes Obesity Journal, 2018; 7(4): 1-2.
8. **G Arumugam** Journal of Acute Disease, 2013; 2(3): 196-200.
9. DKPatel, SKPrasad, RKumar, SHemalatha, An overview on antidiabetic medicinal plants having insulin mimetic property. Asian Pacific Journal of Tropical Biomedicine, April 2012; 2(4): 320-330.
10. ANM Mamun-or-Rashid, Md. Shamim Hossain, Naim Hassan, Biplab Kumar Dash, Md. Ashrafuzzaman Sapon, Monokesh Kumer Sen, A review on medicinal plants with antidiabetic activity. Journal of Pharmacognosy and Phytochemistry, 2014; 3(4).
11. Chauhan*, P. K. Sharma, P. Srivastava, N. Kumar, R. Dudh, Plants Having Potential Antidiabetic Activity: A Review, **November, 2009; 1: 389.**
12. Shradha R. Kale & Rajendra R. Kale, "Pharmacology", Nirali Prakashan, Thirteenth edition, 2008; 122-127.