

Short Communication

Diabetes Mellitus - Prospect Of Natural Products As Novel Drug For DM.

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Abstract: Diabetes mellitus is heterogeneous primary disorder of carbohydrate metabolism with multiple etiological factors. It generally involves absolute or relative deficiency in insulin secretion or action. Whatever the cause, diabetes ultimately leads to hyperglycemia which is the landmark of this disease syndrome. The objective of this study is to document the herbs that are generally used for the treatment of diabetes.

Keywords: Postprandial hyperglycemia, α -amylase, α -glucosidase, Medicinal plants

Introduction

The term diabetes mellitus describes a metabolic disorder of multiple etiologies characterized by high blood glucose level with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both (Kumar *et al.*, 2012). Several pathogenic processes are involved in the development and severity of diabetes. These include processes which destroy the beta cells of the pancreas with consequent insulin deficiency, and others that result in resistance to insulin action. The abnormalities of carbohydrate, fat and protein metabolism are due to deficient action of insulin on target tissues resulting from insensitivity or lack of insulin (Kumar *et al.*, 2005)

Postprandial hyperglycemia is a prominent and early defect in diabetes, which can in turn lead to various secondary complications including risk factor for cardiovascular diseases (Jaiswal *et al.*, 2012). One therapeutic approach for treating type 2 diabetes mellitus is to decrease the post-prandial glucose level. This could be done by retarding absorption of glucose through inhibition of the carbohydrates-hydrolysing enzymes, α -glucosidase and α -amylase (Paloma *et al.*, 2012) Pancreatic alpha amylase and intestinal alpha glucosidase enzymes (including lactase, maltase and sucrose) complete the

breakdown to monosaccharide units. It is only the monosaccharide units that are absorbed into the body. Thus, the inhibitions of this enzyme can delay the digestion of carbohydrate and reduce the rate of glucose absorption. Consequently, postprandial rise in blood glucose is decreased (Nickavar *et al.*, 2008). Oral hypoglycemic agents/drugs may be effective for glycemic control, but they come with their attendant side effects such as liver disorders, flatulence, abdominal pain, renal tumours, hepatic injury, acute hepatitis, abdominal fullness and diarrhea. Therefore, there is an increasing need for the development of natural safe products without side effects (Adeniyi *et al.*, 2012). Ethno botanical studies of traditional herbal remedies used for diabetes have identified many plants with hypoglycemic activity (Grover *et al.*, 2002; Shukia *et al.*, 2000).

Plant extract or different plant preparations are being prescribed by the traditional healers and for curing diabetes and other diseases in many countries especially in third world countries. (Modak *et al.*, 2007).

One of the great advantages of medicinal plants is that these are readily available and have low side effects (Arumugam *et al.*, 2013). Plants have always been an

exemplary source of drugs and many of the currently available drugs have been derived directly or indirectly from them. India is known for its valuable heritage for herbal medicinal knowledge. Its ethnic peoples living in the remote village area still depend to a great extent on the indigenous system of medicine. Till today metformin is the only effective drug approved for the treatment of non-insulin dependent diabetes mellitus patients, which is derived from a medicinal plant *Galega officinalis* and historically used in medieval Europe.

The ethno botanical information suggests many plants such as *Momordica charantia* (bitter gourd), *pterocarpus marsupium* (Indian Kinoo tree), *Trigonelle forenum greacum* (Fenugreek), *Acacia Arabica* (Whistling throne), *Aegle marmelos* (Golden apple), *Allium sativum* (Onion) *Aleo vera*, *Ficus bengalensis* (Indian banyan tree) *Swertia chirayita* (Swertia), *Zingiber officinale* (Ginger) possess antidiabetic potential, and have been reported to be beneficial for treatment of type 2 diabetes.

Plants like *Allium cepa L.* (Onion), *Azadirachta indica A. Juss.* (Neem), *Catharanthus roseus*, (Madagascar periwinkle), *Dillenia indica Linn* (Elephant apple), *Clerodendrum infortunatum L* (Hill glory blower), *Mangifera, indica L* (Mango). *Mirabilis jalapa L.* (4'O clock flower), and *Cinnamomum tamala* (Indian bay leaf), ranked highest in showing antidiabetic activity (Dutta *et al.*, 2013; Patel *et al.*, 2012)

Materials and methods

Plant material – Plants material (*Leucas aspera Linn.*, *Enhydra fluctuans Lour.*, *Dillenia indica Linn.*, *Carica papaya Linn.*, *Citrus aurantium Linn.*, *Citrus aurantifolia Linn.*) were collected (Fig. 1) from nearby areas of Gauhati University.

The collected plant parts were washed under running tap water to remove all foliar contaminants, shade dried and pulverized to fine powder using a mixture. This powdered sample (35 g) was extracted successively from non polar to polar using petroleum ether, acetone and methanol respectively in a Soxhlet apparatus. The resulting extracts were filtered and concentrated using rotary evaporator, under reduced

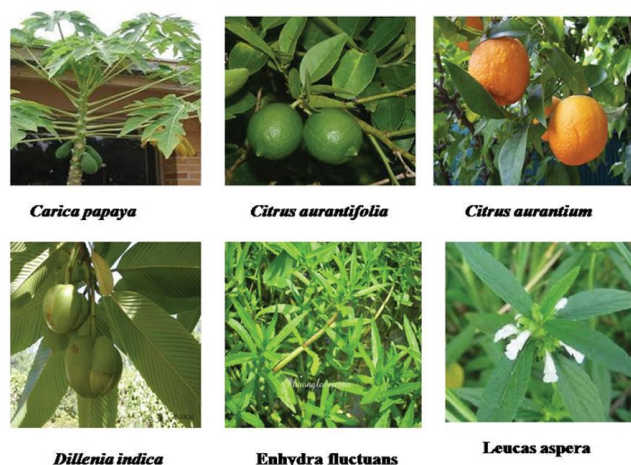


Fig. 1. Plant materials collected for the study.

pressure. The semisolid plant extracts were then stored at 4°C until enzyme inhibitory assay. Dose dependent alpha amylase and alpha glucosidase inhibitory activity was measured for each plant extract using standard protocol. (Bernfield 1955; Artani *et al.*, 2012)

Results and discussion

Few extracts from the collected plants showed remarkable inhibition of the carbohydrate metabolizing enzyme. The hypoglycemic potentiality of these plant extracts on alloxan induced diabetic animal model is currently going on in Department of biotechnology, Gauhati University.

Reduction of blood glucose levels by a plant extract may occur by different mechanisms. The extract may potentiate the pancreatic secretion of insulin, or the extract may increase glucose uptake or by enhancing gluconeogenesis in liver. A further possibility is that the extract may inhibit glucose absorption in gut, which in turn will reduce the presence of glucose in serum. The exact mechanism through which the various extracts caused anti hyperglycemic activity, as well as identification of responsible phytochemical constituents is presently being undertaken in our laboratory. It is expected that these plants have potential for further scientific studies towards discovery of novel anti diabetic drugs

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