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A Comprehensive Review on Anti-Diabetic Activity

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ABSTRACT:
Diabetes mellitus is chronic disorder which is caused by the elevation of glucose level in blood, leading to macro and micro complication. This disease spread widely between individuals all around the world with two major type diabetes. The first type is called as auto immune disease, which is caused by the destruction of pancreas cells ending up with no insulin secretion. On other hand second type is caused by glucose level high in blood. In the addition of medicine, diet and lifestyle changing Essential for diabetic mellitus. Extraction of plants To identify the anti-diabetic activity The present review has prevented comprehensive details of anti-diabetic plant used in the treatment of diabetes mellitus. It shows that the highlighted above have potent hyperglycemic effects. Many new bioactive drugs isolated from the plant having hyperglycemic effects showed anti-diabetic activity equivalent to these plant. However, many active agents obtained from been well characterized. More investigation must be carried out to evaluate the mechanism of action of medicinal plants with anti-diabetic effect. The toxic effects of these, plant also elucidated.

I. INTRODUCTION:

Diabetes mellitus (DM) is a chronic disease which is caused by the elevation of glucose level in blood, leading to macro and micro-complications. This disease spread widely between individuals all around the world with two major type diabetes. The first type is caused as auto immune disease which is caused by the destruction of pancreas cells ending up with no insulin secretion. On other hand, the second type is caused by glucose level high in blood. In addition to medicine diet and lifestyle changing Essential for diabetic mellitus, that estimated number of adults living with diabetes has soared to 366 million and this number projected to increase to 552 million people by 2030. With estimated 50.8 million people living with diabetes, India has world's largest diabetic population, China with 43.2 million. Many oral anti-diabetic drugs used today for diabetic control but it's doesn't give long term hyperglycemic control, metformin remains the first line of therapy for patient with type 2 diabetic The need of new therapy for glycemic control is that fact existing treatments have limitations because their side effects. Herbal extracts which are more effective and less side effects, it's Decrease the glucose level in the blood. recently the natural products have become vital are research, many Indian plants have been scientifically explored for anti-diabetic activity. The study that showed, Asian and African continents 56% and 17% shares of the World Wide distribution of therapeutic herbal plants, respectively. In Asian, India and China are leading countries of herbal plant research, and there has been increased the medicinal plants research on plant extract for treatment of diabetic since1995 in this region. The information collected shows that plants leaves are more favorable forstoring active ingredients, as compared to other parts of herbal plants. There are some medicinal plants for treatment of diabetes mellitus,

- Ammi visnaga
- Azardirachta indica
- Boswellia serrata
- Bixa orellana
- Borassus flabellifer
- Coscinium fenestratum
- Eugenia caryophyllus
- Quercus coccifere

Ammi visnaga:

Ammi visnaga plant is coming from Apiaceae family,It is widely using morocco folk medicine against diabetes mellitus. It is also help treatment of many pathological disorder like antimicrobial, antioxidant agents. In vitro anti-

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diabetic activity was assessed or method using amylase and glucosidase enzymes.

Method: In vitro inhibition of pancreatic amylase The inhibition of MSEO, AVEO and LSEO against pancreatic amylase analyzed previously described. with some modification. In brief total 0.2 mL of phosphate buffer (0.2 PH=6.9)containing 0.2 mL of amylase enzymatic solution (131U), 0.1mL of tested oils at various concentration (0.062,0.12,0.25 0.5 and 1mg/mL) temperature was maintained 37°C for 10 min. remaining 0.2mL of 1% starch previously dissolved in phosphate buffer (0.2) to the reactive mixture. Temperature was maintained 37^{o} C for 20 min and DNSA were added and all test tubes were incubated in water bath in 100°C for 10 min. Finally 1mL of distilled water was added to the reactive mixture prior to the measurement of optical density at 540nm In vitro Inhibition of intestinal glucosidaseVolatile components determined by measuring the release of the glucose from sucrose degradation according to method.volumes0.02mL of tested oils in different concentrations (0.062,0.12,0.25,0.5and 1mg/mL) and the pH is=7.5 its incubated in 37°C for 25 mins .Then enzymatic reactions were stopped by heating test tubes in boiling water bath for 5mins, then glucose is established by glucose oxidase technique and the optical density was processed at 500n Repot: MSEO, AVEO, LSEO are exhibited significant inhibition against amylase ,with Ic50 values of 3.51 ±0.04 mg/mL,3.37±0.04 mg/mL and 4.00 ±0.04 mg/mL respectively. As for the glucosidase inhibition significant effect was recorded for three tested Eos with IC50 values of 2.58±0.04 mg/mL,2.74±0.01 mg/mL and 3.02 ±0.01 mg/mL of MSEO, ASEO, LSEOrespectively.

Azardirachta indica:

Azardirachta indica (neem) is a medicinal plant, using various disease, one of which is diabetesmellitus, it is obtained from Asian countries. It is have the various biological activity like anti-inflammatory, antipyretic, antimicrobial, anti-diabetic and other pharmacological activity. It is mainly used for the type 1 diabetes, its process on insulin transduction and glucose homeostasis is obscure. Leaf extract on expression of insulin signaling molecules. In the medication was used in high fat male rat

Method: The oral effective dose of A. indica leaf extract (400mg/kg body weight) was given once daily for 30 days to high fat diet induced diabetic rat. In the experimental period blood glucose level during fasting, insulin signaling molecules, glycogen was assessed.

Result: Diabetic rats showed impaired glucose tolerance and impairment in insulin signaling molecules. the treatment of A. Indica leaf extract normalized the altered levels of blood glucose, serum insulin, lipid profile and insulin signaling molecules as well as GLUT4 protein at 400 mg/kg b.wt dose.

Boswellia serrata:

Boswellia serrata is coming from Burseraceae family, Boswellia serrata is used in widely in various of disease, including Diabetes mellitus and inflammatory disease. It is a aqueous extract blood glucose level and the complication of diabetes in the liver , kidney and examined the impact of plant on reproduction in diabetic rats. Method: The administration of boswellia serrata aqueous extract in diabetic rats significantly decrease the blood glucose and HbA1c after the 17 days (p±0.01). In the diabetic group they received the treatment , the abortion fetus spontaneous was 19.14% the percentage of abortion significantly elevated in vehicle treated diabetic rats , in comparison with vehicle treated healthy rats. In the diabetic group.necrosis of hepatocytes, anarchism of liver plates and lymphocyte were improved, inflammation were not seen and the severity of damage was reduced.

Bixa orellana:

Bixa orellana is a medicinal plant that coming from Bixaceae family. It is mostly obtained from Colombia. its frequently utilizes plants that as grown in significance in pharmaceutical applications. Its also treat the antifungal and antibacterial activity. Leaves extract mostly used in the experiment. A number of therapeutic applications for the extract were observed, including anti-diabetic activity of 98.34 % inhibition at 100 µg/mL . leave extract of Bixa orellana was used in the current study for preliminary phytochemical analysis term of both quantitative and qualitative analysis .

Borassus flabellifer:

Borassus flabellifer is a Arecaceae family, nutrition contents sugar palms fruit pulp (SPFP) cultivated in Bangladesh. It is also treat the hiccough and gastric reflux anthelmintic agent.

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Popularly consumed edible portions of sugar palm fruit, i.e., immature endosperm(IE), germinated endosperm (GE) are studied yet. The current study showed that SPFP, IE, GE were rich in carbohydrate, fiber, sodium, potassium and zinc IE contain the highest amount of fiber,while SPFP containedhighest amount of copper. Twenty five phytochemicals having known anti-diabetic effects were investigated for their presence in pulp, immature and germinated endosperm. GE contained the highest number of phytochemicals (23) followed by (19) and SPFP (14). Diabetic patients usually avoid the edible portions of sugar Palm, these may further deteriorate existing hyperglycemia. IE GE regular addition of the diet for nine consecutive weeks. It is clearly reduce the fasting blood glucose (FBG) levels of experimental rats. GE showed maximum anti-diabetic effects followed by IE and SPFP, respectively.

Coscinium fenestratum:

Coscinium fenestratum (Gaertn) colebr .(CF) is generally recalled as 'tree turmeric' (F:Menispermaceae), The wood of CF is present in the conventional staining of cloths with a yellowish brown cylindrical stem and yellowish one the inside, Recently the CF plant species has not been cultivated. However most of its population has been heavily exploited in their natural habitats. Method: the soxhlet method used for the extraction preparation of the ethanol solvent,and also phytochemical screening ,TLC were performed detect the anti-diabetic activity. The suitable structure from the plant extract was used in an in-silicco docking investigation. For the diabetic docking investigation, the alpha amylase protein with PDB ID:4X9Y was chosen.After that alpha amylase alpha glucosidase inhibition assay technique also used in Vitro anti-diabetic activity.

Result:

Berberine was detected by TLC and was found to be responsible for the anti-diabetic activity

Eugenia caryophyllus:

Eugenia caryophyllus is a mytraceae family, type 2 Diabetes mellitus is pandemic and contributes significantly increase incidence of condition such as cardiovascular disease. We evaluated the effect of PCE supplementation (200mg once daily for 30 days) pre-prandial glucose level and 2-h postprandial glucose level in 13 otherwise healthy volunteers who were stratified in two groups according to their pre-prandial glucose level. We tested in vitro effects of PCE on glucose uptake hepatocytes glucose protection, carbohydrate hydrolyzing enzymes.

Result: At day 12 supplementation, we observed statistically significant reduction in mean postprandial glucose level in both groups. (Group1:Day 12 PPG 13.28mg/dL95% C :3.339-23.24)(Group 2:initial 30 PCE supplementation decreased mean pre-prandial glucose level only in group 2 at days 24 initial day 24 (13.00 mg/dL 95% c:1.407-24.59p= 0.0345) and initial day 30 13.67mg/ dL95% (5.766 C:21.54 p=0.0067) In cell based analysis, PCE enhance the glucose uptake and inhibit the hepatocyte glucose production HepG2,in free assays PCE inhibit the alpha amylase activity and alpha glucosidase activity.

Quercus coccifera:

Quercuscoccifera are group of plants known as oak which represent important genus of (fagaceae) family. These species are widely distributed in Mediterranean countries . Many of these species used to the traditional medicine to treat and prevent various human disorder like diabetes. Extraction of Quercus coccifera leaves were carried out using n-hexane, chloroform, methanol, boiled and microwaved water. It is subjected to screening and acute toxicity, in vitro and in vivo to evaluate the anti-diabetic of the product . It have the highest in vitro activity against amylase and glucosidase enzymes from methanolic extract with IC 50 better than acarbose. Methanolic extract with a concentration of 200 mg/kg day was able to reduce the blood glucose level for the diabetic mice to 146.8mg/ dL with normal weight and biochemical sign when compared to the normal mice group. While the rest of extracts were either with moderate or low ability to maintain blood glucose level for diabetic mice with few signs of hepatic and toxicity and weight loss .p value of Less than 0.002 at confidense interval of 95% with high variance homogenecity, Q.coccifera can possibly be used alone to evaluation of blood glucose level with renal and hepatic productivity property.

II. CONCLUSION:

The present review has prevented comprehensive details of anti-diabetic plant used in the treatment of diabetes mellitus. It shows that the highlighted above have potent hyperglycemic effects. Many new bioactive drugs isolated from plant having hyperglycemic effects showed anti-diabetic activity equivalent to these plant.

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