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Herbal and Traditional Drugs for Diabetic Retinopathy: A Review

Priyanka Joshi^{1*} and B.Mukhopadhyay²

^{1,2}Department of Shalakya Tantra, IMS, BHU, UP, India

ABSTRACT

The herbal drugs are effective in the treatment of diseases like diabetes and complications like Diabetic Retinopathy. Many medicinal plants have been used traditionally for their therapeutic role in the treatment of metabolic disorders like diabetic retinopathy. Research is done to understand the efficacy and action of these plants and obtain novel products which are potent and effective in managing disease like diabetic retinopathy. Some of the medicinal herbs that are used for diabetes and diabetic retinopathy are evaluated in the present paper.

KEYWORDS

Diabetes, Diabetic Retinopathy



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INTRODUCTION

Herbal and traditional medicines are beneficial and are used for diabetes and diabetic complications management. The herbal drugs are used to prevent and check the progression of Diabetes and Diabetic retinopathy. However, the bioactivity of many of these herbal medicines is still unknown. Thus to understand the mode of action of these herbal medicines and obtain new products that are better for management of diabetes and its complications researches are conducted. Some of these herbal drugs which are effective in the management of Diabetic Retinopathy are as follows:

Madhuyasti (Glycyrrhiza glabra)

Madhuyasti from ancient time is used for many ailments. In ancient texts its use is indicated for respiratory, cardiac, gastrointestinal, skin disorders. The pharmacological activities of Glycyrrhiza glabra has antioxidant, anticancer, anti-inflammatory, cardioprotective effect which is proved by previous researches. Some of the important constituents isolated from its root are amino acids asparagines flavonoids, polysaccharides, triterpene, simple sugars, pectin's, tannins, volatile oils, glycosides etc. Glycyrrhizin is found in Madhuyasti roots. The sweet taste of Madhuyasti root is due to Glycyrrhizin. It is

a triterpenoid compound. Glycyrrhiza glabra ethyl acetate extract exhibit PPAR- γ binding activity. The thiazolidinediones are the anti-diabetic drugs these are the synthetic PPAR- γ ligands which improve insulin resistance in diabetic patients. Some of the phenolic compounds isolated from madhuyasti root which show PPAR- γ binding activity are glycoumarin, glycol, glycyrin, isoglycyrol¹.Glycyrin is effective in reducing blood glucose level in diabetic mice. Madhuyasti due to its antiinflammatory, antioxidative and anti-proliferative effects can be used for diabetes complications like diabetic retinopathy.

Guggulu (Commiphora mukul):

Commiphora mukul is used for its hypolipidemic, antidiabetic and antioxidant activity.

According to different studies C. mukul is effective in reducing oxidative stress induced disorders like diabetes.C.mukul has two important constituents E and Z guggulsterone. The fibrinolytic activity of constituents of C. mukul is seen. It also decreases platelet adhesiveness. E and Z guggulsterone show antioxidant action against free radicals thus reduces the cellular damages ² In the pathogenesis of diabetes polyol pathway is the major source of diabetes induced oxidative stress. Excessive activation of polyol pathway



increases intracellular and extracellular sorbitol concentration. The sorbitol cannot cross the cell membrane and when it accumulates it produces osmotic stress on cells by drawing water. C. mukul is effective in decreasing polyol pathway towards preventing oxidative stress induced diabetic complications. C. mukul possess inhibitory activity towards intestinal disaccharidase this may contribute to its antidiabetic property. In one of study Commiphora mukul showed improved blood glucose level by delaying absorption of glucose as a disaccharidase inhibitor like activity³.

Shigru (*Moringa oleifera*)

Shigru is a rich source of nutritious ingredients, its leaves are found to be good source of β -carotene, flavanoids etc. *Moringa oleifera* possess anti-inflammatory, anti-oxidant, hypoglycemic, hypolipidemic properties. Polyphenolic compounds of *Moringa oleifera* have α -glucosidase inhibitory activity and increase uptake of glucose in peripheral tissues by stimulation of GLUT-4 gene expression. It has been observed that retinal vessels in diabetic patients are dilated and those patients who were treated with *Moringa oleifera* have comparatively less vascular dilation in retina. In condition of hyperglycemia there is increase production of free radicals. The free radicals causes' retinal oxidative stress. According to

different studies retina has antioxidant enzymes which neutralize free radicals. *Moringa oleifera* constitutes of a number of such polyphenolic compounds which have positive modulation on retinal anti-oxidant status. In different grades of Diabetic retinopathy raised serum levels of cytokines is seen, cytokines are polypeptides like TNF- α , IL-1 β , IL-6. In studies it is seen that diabetic retina has high level of TNF- α and IL-1 β . However, *Moringa oleifera* treated retinae shows marked reduction in the expression of proinflammatory markers (TNF- α and IL-1 β)⁴.

Increase level of angiogenic factors are responsible for the pathogenesis of diabetic retinopathy these findings are inconsistent with fact that polyphenolic compounds present in *Moringa oleifera* have anti-angiogenic activity. One of the main pathogenesis involved in diabetic retinopathy is basement membrane thickening. The constituents found in *M.oleifera* prevent thickening of basement membrane thus effective in prevention and management of Diabetic Retinopathy.

Kachnar (*Bauhinia variegata*) This is an ancient medicine which is used for diabetes, pain, inflammation, bronchitis, leprosy, tumour etc. The constituents which are found in Kachnar are β -sitosterol, quercetin, rutin, tannins,



calcium, and phosphorus. Kachnar different parts like bark, leaves, flowers possess antioxidant activity hence effective in disorders like diabetes, atherosclerosis etc. Polyphenols which is the constituent of *Bauhinia variegata* has antioxidant potential and prevents the oxidative damage of cells. The flavonoids, are the polyphenols which have antioxidant activity. The leaves bark flowers and other parts of *Bauhinia variegata* have antioxidant property against free radicals and therefore can be used in diseases such as diabetes, atherosclerosis etc⁵. In a study in rats *Bauhinia variegata* show antiobesity effect⁶. The antioxidative activity of *B. variegata* is due to phenolic flavanoid constituents. In a study when ethanolic, aqueous extract of *B. variegata* was given to alloxan induced diabetic rats it showed reduction in blood glucose level⁵. *B. variegata* has medicinal properties for which it used in disorders like Diabetic retinopathy.

Triphala

Triphala includes fruits of *Emblica officinalis* (Amla), *Terminalia chebula* (Haritaki) and *Terminalia belerica* (Bibhitaki). Triphala is used as medicine since ancient time. Triphala is found to reduce the blood glucose levels. Chronic hyperglycemia causes altered retinal metabolism and hypoxia leading to

endothelium dysfunction and over-expression of vasorelaxants leading to autoregulatory dilatation of the blood vessel of retina. The diabetic rats in a study show subnormal levels of glutathione and also reduced antioxidant activity of enzymes such as α -tocopherol, glutathione, ascorbic acid, glutathione peroxidase. In studies it is seen that the proinflammatory cytokines expressions are more in diabetic group than normal group and Triphala treated group show lower levels of cytokines than diabetic group⁷. A strong anti-inflammatory effect of triphala in animal studies has been found. Triphala beneficial properties can be attributed to its anti-inflammatory, antioxidant, antiangiogenic properties.

Shallaki (*Boswellia serrata*)

Boswellia serrata is used in Ayurveda because of its medicinal properties. The antiangiogenic properties of Acetyl-11-keto- β -boswellic acid (AKBA) using the mouse model has been studied⁸. AKBA is effective in reducing the neovascularisation of retina⁸. Also AKBA is found to have antiangiogenic property by reducing the proliferation of human retinal microvascular endothelial cells (HRMECs). Further studies on AKBA as a therapeutic agent for proliferative retinopathy can be conducted⁸. *Boswellia serrata* extract is able to reduce the rate and extent of angiogenesis in mesenteric



window model, which may be because of its anti-inflammatory potential also it, is able to reduce the new blood vessel formation in inflammation mediated angiogenesis to about 60 %⁸. Shallaki can therefore be used in microvascular disorders like diabetic retinopathy.

Shilajit (*Asphaltum punjabinum*)

Shilajit is used for promoting wellness. Shilajit is dark brown or black in colour and contains different minerals which help to regulate natural processes of body. The important constituent of Shilajit is fulvic acid which reduces oxidative stress in diabetic patients and maintains homeostasis of body. Shilajit regulates blood glucose levels. It is very effective in preventing diabetes complications. Shilajit shows immunomodulatory activity and reduce activation of macrophage and lymphocyte. Shilajit has antioxidant property and prevent the free radical induced damage to the pancreatic islet cell⁹. It has been found that shilajit increases pancreatic cells increasing the amount of insulin production and thus reducing blood glucose level in hyperglycaemic state⁹. Shilajit is effective in reducing cholesterol, triglycerides and increases HDL level. Shilajit has a role in balancing lipid profile level⁹.

CONCLUSION

Many herbal traditional plants are found to have preventive and therapeutic effect on diseases like diabetes, diabetic retinopathy etc. This has prompted researchers to understand the action of the herbal compounds and thus to obtain new efficient products for better management of Diabetic Retinopathy.



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