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Review Article

Unani Herbal Drugs: A Ray of Hope for the Management of Diabetes Mellitus

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I N F O

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A B S T R A C T

Diabetes Mellitus is a major challenge of 21st century in health care system. This chronic and incurable Non-Communicable Disease (NCD) is largely preventable but remains responsible for millions of deaths annually and many life-threatening complications across the globe. No country, rich or poor, is immune to this disease prevailing epidemically.

In Unani System of Medicine it is commonly described as *Ziabetus Shakari* which is caused mainly by the derangement of temperament of kidneys. As the people are becoming aware of the potency and side effects of synthetic antidiabetic drugs available globally, there is an increasing curiosity in the natural product therapies with a basic approach towards the nature. Unani Medicine also possesses many single as well as polyherbal formulations that have long been using to manage diabetes mellitus. Keeping in view of the significant effects of antidiabetic drugs mentioned in Unani classical literatures, it was aimed to present an overview on some of the Unani herbal drugs namely *Gurmarbooti, Hulba*, *Tukhm-e-Hayat* and *Jamun* which are mentioned in classical literatures as antidiabetic agents and are still in the practice effectively.

Keywords: Diabetes Mellitus, Ziabetus Shakari, Gurmarbooti, Hulba, Tukhm-e-Hayat, Jamun

Introduction

Diabetes Mellitus is a major challenge of 21st century in the health care system. It is a heterogeneous group of metabolic syndromes characterized by alteration in carbohydrate, lipid and protein metabolism which causes hyperglycemia subsequent to insufficient insulin secretion, insulin action or more commonly both.[1] It is one of the intractable ailments recognized by Indian Council of Medical Research for which an alternative remedy is a need of the hour for the treatment. Diabetes mellitus has been becoming a growing problem in the present days. India has today become the diabetic capital of the world with over 69.2 million diabetics.[2] In Unani System of Medicine, diabetes mellitus has been described by various names e.g. *Dulabiah, Burkariah, Istisqa-e-Anmas, Zalqul kulya, Zalqul-Majari, Salsul Baul, Baul-e-Shireen, Shahdiya, Madhuprameha, Muattesha, Ziasqumas* and *Qaramis* and most commonly it is known as *Ziabetus Shakari*, a disease in which patient feels excessive thirst without fever and dryness and consumed water is passed out through the kidneys immediately after intake by the patient without any metabolic change and patient still feels thirsty.[3] Rhazi says in his famous book *Kitab-ul-Hawi fit-Tib* that the patient of diabetes mellitus gives the complaints of polydipsia, whereas the consumed water is passed out as such. He further mentions that patients may also present polyuria,

polydipsia, even nocturia and dribbling or incontinence of urine. It resembles with *Zalqul Meda wal Ama'a* (irritable bowel syndrome) in which the food passes rapidly through the stomach and intestine without proper digestion.[4,5] As far as the treatment of diabetes mellitus is concerned, the disease is mainly controlled either from two groups of oral hypoglycaemic agents (Sulfonylureas & Biguanides) or from insulin injection, but simultaneously these drugs produce some hazardous effects also in many ways. As the people are becoming aware of the potency and side effects of synthetic drugs globally, there is an increasing curiosity in the natural product therapies with a basic approach towards the nature. Herbs have frolicked a substantial role in maintaining human health and improving the quality of human life for centuries and have served humans well as valuable components of medicines, flavors, drinks, cosmetics and the most important is that the herbal drugs are a great choice because they have more or less no side effects & adverse reactions.[6] Nature has donated India with a vast wealth of medicinal plants; therefore, India has often been referred to as the Medicinal Garden of the world.

In the present milieu, the Traditional System of Medicine is widely accepted and practiced by physicians and healers globally. India has a unique position in the world wherein a number of Traditional Systems of Medicine e.g. Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy are patronized by Indian government. These medicines are flourishing under the Ministry of AYUSH. Keeping in view of treating ailments with natural products, India is moving forward in promoting the AYUSH medicines in health care sector through global networks. Therefore, government of India has set up a National Level Policy for the growth, promotion and development of the Traditional System of Indian Medicine. The World Health Organization (WHO) has listed 21,000 plants, which are used for medicinal purposes around the world.[7]

In this paper four medicinal herbs which are claimed to be effective in controlling diabetes mellitus have been selected to present a detailed overview on these drugs and describe their possible mechanisms of action in the light of phytochemicals present in the drugs.

Gurmar Booti

In Unani Medicine, *Gurmar booti* scientifically known as *Gymnema sylvestre* of family Apocynaceae is reported to have hypoglycemic effect. In Ayurveda, it is known as *Meshashring* which means sugar destroyer and has been used to regulate blood sugar level.[8,9] Gurmar booti exerts anti-diabetic property due to the presence of Gymnemic acids I-IX. Gymnemic acid VIII was the major component of an extract shown to stimulate insulin release from the pancreas. Possible mechanisms of action by which gymnemic acid exerts its hypoglycemic effects could be involved one or more mechanisms such as; it increases secretion of insulin, indorses regeneration of beta islet cells of pancreas, surges utilization of glucose and inhibits glucose absorption from intestine. Other principle components are *Gymnema* saponins I-IV. Tritepenoid saponins, gymnemasins, sapogenin, flavonol glycosides, kaempferol, quercetin and gymnemic acids-A, B, C and D.[10-16] Gurmar booti also regulates blood glucose level by reducing body weight because it complements exercise and dietary reform by promoting blood glucose balance.[17] The extract of *G. sylvestre* (GS) has been used for the treatment of Type 2 Diabetes Mellitus (T2DM) in India for centuries about 2000 years. Many workers had evaluated the effects of *G. sylvestre* on blood sugar in animals as well as humans. In an in-vitro study by Romaiyan *et al*., (2010) significant increase in circulating insulin and C-peptide was exhibited which was related with significant reduction in fasting and post-prandial blood glucose.[18] Gupta and Variyar (1964) noted that parenteral administration of extract of *Gymnema sylvestre* exhibited more dramatic effects.[19] Shanmugasundaram *et al.,* (1990) conducted a clinical trial of patients with type 1 diabetes. Gymnema powder was given 200 mg twice daily in addition to their usual doses of insulin, mean HbA 1c was decreased significantly from baseline (12.8 to 9.5%) at the end of study that was lasted for 6 months.[20] In other study, 22 patients were given *G. sylvestre* extract along with their oral hypoglycemic drugs. Observation demonstrated an improvement in blood sugar control. 21 out of the 22 patients were able to reduce their oral hypoglycemic drug dosage considerably and five patients were able to discontinue their oral medications and maintained blood sugar with the extract alon.[21]

Hulba/ Methi

Hulba commonly acknowledged as Fenugreek (*Trigonella foenum-gracum* of family Fabaceae) is one of the most promising medicinal herbs which is known from ancient times to be used for antidiabetic purposes from its leaves and seeds. The active principles of fenugreek which exert medicinal properties are soluble fibers, saponins, trigonelline, diosgenin and 4-hydroxyisoleucine. Hypoglycemic activities have mainly been attributed to dietary fiber, saponin, testa and endosperm of the seeds of fenugreek.[22-31] A novel amino acid 4-hydroxyleucine, from fenugreek seeds have reported increased glucose stimulated insulin release by isolated islet cells in rats as well as humans.[32] Neelakantan *et al*., (2014) meta-analyzed 10 clinical trials and found that intake of fenugreek seeds resulted in a significant reduction in fasting blood glucose, 2 hour post prandial glucose and glycated hemoglobin, however, he observed considerable heterogeneity in study results.[33] The exact mechanisms by which *Hulba* may lower blood glucose levels have not been well established in humans, however, data suggest that acute effects of fenugreek seeds are mainly due to the

gum fraction, but other animal studies also indicate that the soluble fiber fraction of fenugreek seeds reduces the rate of enzymatic digestion and the absorption of glucose from the gastrointestinal tract.[27] Data from other studies suggest in diabetic rats, trigonelline ingestion increased insulin sensitivity and reduced blood glucose levels.[34] In a trial of acute effects in healthy volunteers, trigonelline reduced the early glucose response during an Oral Glucose Tolerance Test.[35] The extract of fenugreek also exhibits antioxidant activity. This property could be associated with the polyphenolic components present in the extract. Antioxidant has beneficial effect on liver and pancreas.[36,37] A clinical trial on humans suffering from Type 2 diabetes using 15 g of powdered fenugreek seeds with meals reported a reduced rise in blood glucose after the meal. Another similar controlled trial found that taking 2.5 g of fenugreek seed twice a day for 3 months reduced blood glucose levels in people with mild Type 2 diabetes. A double blind clinical study in Type 2 diabetic subjects used 1 g of fenugreek seed extract/ day over a period of 2 months was found improved blood sugar and insulin function.[38,39] Sharma *et al.,* (1990) demonstrated significant reduction in fasting blood sugar and improved OGTT along with 54% reduction in glycosuria in a clinical trial in which fenugreek seeds powder was administered (50 mg each with lunch and dinner) in insulin dependent diabetic patients for 10 days.[40]

Tukhm-e-Hayat

Tukhm-e-Hayat (*Withania coagulans Dunal* of family Solanaceae) is commonly known as Indian cheese maker.[41,42] In Northern India, traditional healers use dry fruits for the treatment of Diabetes mellitus.[43,44] The berries contain two esterases, free amino acids, fatty oil, an essential oil and alkaloids.[45] As far as the mechanism of *Withania coagulans* is concerned, the exact mechanism of action of the *W. coagulans* is not studied so far, however few studies have been carried out in this regard showing its antihyperglycemic activity. Shukla, *et al*., (2012) stated that it might be due to enhanced secretion of insulin from existing β cells.[46] Jaiswal, et al., (2009) identified the role of trace minerals like Mg & Ca responsible for antidiabetic potential of this potent indigenous shrub.[47] Akhtar *et al*., (2016) has already reported that the higher concentration of Mg and lower concentration of K plays a vital role in diabetes management.[48] Maurya *et al.*, (2008) isolated an alkaloid *coagulanolide* from *W. coagulans* fruits that has been shown to possess antihyperglycemic property in experimental diabetes mellitus. This alkaloid may attribute antihyperglycemic action because it also has antidyslipidemic effect on mice.[49]

Jamun

Jamun is obtained from *Eugenia jambolana* (synonymously known as *Eugenia cumini* and *Syzygium cumini*) of family Myrtaceae.[50-52] Jamun has been reported to be used in numerous Complementary and Alternative Medicines and different medical systems of India. Before the discovery of insulin, it was a frontline antidiabetic medication even in Europe.[53] The bark, fruits and leaves of *Eugenia jambolana* are reported to have hypoglycemic activity due to numerous phytochemicals present into them. Jamun fruit possess antidiabetic property. A study shows that Jamun fruit has curative function chiefly against diabetes because of its effect on pancreas.[54] Seed is also good for diabetes. Aqueous extract of the seeds causes marked and prolonged decrease in blood-sugar when injected in to dogs; oral administration has no such effect. Experiment carried out at the Central Drug Research Institute, Lucknow, showed that oral administration of dried alcoholic extracts of the seeds to diabetic patients reduced the level of blood-sugar and glycosuria whereas the fresh seeds were superior to dried ones in this respect.[51] The blood glucose lowering effect of *Eugenia jambolana* may be due to increased secretion of insulin from the pancreas or by inhibition of insulin degradation. According to Panda *et al*. (2009) stigmasterol has significant effect on lowering serum glucose concentration with a concomitant increase in insulin level indicating its hypoglycaemic and insulin stimulatory activity. Lupeol, a phytoconstituent is known to suppress the progression of diabetes. Serum insulin level is elevated with lupeol treatment. Concomitantly it causes reduction of glycated haemoglobin, serum glucose and nitric oxide, thus lupeol works as a potential antidiabetic constituent (Gupta *et al*., 2012). Li *et al.* (2004) and Gupta *et al*., (2011) reported that beta-sitosterol has antidiabetic activity though there was no evidence about the exact mechanism.[55] Antihyperglycaemic action may be due to the glycoside *Jamboline* in the seed of *Eugenia jambolana* or due to *ellagitannins* (ETs), including *corilagin, 3, 6-hexa hydroxyl diphenoyl glucose* and its isomer *4, 6-hexahydroxy diphenoyl glucose, 1- galloylglucose, 3-galloylglucose, gallic acid,* and *ellagic acid* (EA) as these marker compounds have anti-diabetic properties. Second probable attribution of glycaemic control is due to glucosides *Jamboline* and *Ellagic acid* as they are reported to have the ability to check the conversion of starch into sugar in case of excess production of glucose.[51,56] According to Singh *et al*., (2012) *Eugenia jambolana* possibly acts as a hypoglycemic agent by increasing insulin levels rather than just as an antihyperglycemic agent.[57] According to Akhtar *et al.,* (2016) the possible mechanism by which seed brings about a decrease in blood sugar level may be due to potentiation of the insulin effect of plasma either by increasing the pancreatic secretion of insulin from β-cells of the islets of Langerhans or its release from the bound form.[49]

Conclusion

Diabetes mellitus has become a growing problem in the

present days across the world. It is one of the intractable ailments recognized by Indian Council of Medical Research for which an alternative remedy is a need of the hour for the treatment. Unani System of Medicine possess treasure of such herbal drugs that helps in controlling several lifestyle diseases such as diabetes, cardiovascular diseases, age related macular degeneration and others in India for many decades. The above mentioned herbal drugs have promising wonderful results in lowering blood glucose levels by different mechanisms as shown by the scientific studies of many workers during their experimental screening as well as clinical trials. Keeping in view of the said statement it is also suggested that to strengthen the claims of Unani physicians, various controlled randomized double blind clinical trials of different parts of these drugs should be carried out on large sample sizes to reach the final conclusion. These studies should also correlated with their chemical profile and the temperament of Unani drugs to find out the exact mechanism of action.

Conflicts of Interest: None

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