



A STUDY ON ANTIDIABETIC POTENTIAL OF AYURVEDIC FORMULATION TRIPHALA

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ABSTRACT

Fruits of Terminalia chebula, Terminalia bellerica, Embelica officinalis and their combination name 'Triphala' (equal proportion of above three plant fruits powder) are being used extensively in Indian system of medicine. Triphala, which is rich in gallic acid, vitamin C and flavonoid content, is a highly effective antioxidant and able to reduce oxidative stress in various pathological conditions. Diabetes mellitus is a group of diseases characterized by an elevated blood glucose level with disturbances of carbohydrate, fat and protein metabolism. In order to elucidate the antidiabetic effects of Triphala, we investigated the effects of 8 weeks treatment of Triphala on glycemic status, in patients with type 2 diabetes mellitus. Diabetic patients were treated with Triphala therapy (5gm/day). Following eight weeks of treatment, Triphala significantly improved fasting blood glucose. This suggested that Triphala has the potential in improving glycemic status and can be used effectively in the treatment of diabetes.

KEY WORDS : Triphala, Indian system of medicine, antioxidant, oxidative stress

INTRODUCTION

Diabetes Mellitus, also known as Madhumeha is a group of diseases characterized by an elevated blood glucose level with disturbances of carbohydrate, fat and protein metabolism. It is a condition, caused by inherited and/or acquired deficiency of insulin, in which the beta cells of the pancreas no longer produces enough insulin or stop responding to the insulin so that glucose in the blood can not be absorbed by the cells of the body. Such a deficiency results in increased concentration of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves (Elavarasi et al, 2013). Diabetes is one of the oldest disease all over the world and major cause of morbidity and mortality in human population. The incidence of diabetes mellitus is rising all over the world especially in Asia and is now developing into one of the main public health challenge for the 21st century. According to world health organization the diabetic population is likely to increase up to 300 million or more by the year 2025. (Patel et al, 2012). It has been estimated that the number of diabetes in India is expected to increase

57 million by the year 2025 (Joseph et al, 2011).

Diabetes mellitus is one of the disease for which a satisfactory treatment is not available in modern allopathic system of medicine. (Shah et al, 2008). The allopathy drugs such as Sulphonylurea, biguanides, Thiazolidinediones and α - glycosidase inhibitors are used for the treatment of hyperglycemia in diabetes mellitus since last decades. Use of these therapies is restricted by their pharmacokinetics properties and accompanying side effects (Santosh et al, 2008; Kavishankar et al, 2011). Therefore the search for an ideal drug for the treatment of diabetes has been extended to herbs.

There is an increasing demand of natural and synthetic products with high antidiabetic potential and lesser side effects. The researches conducted over the last several decades have shown that plant and plant-based therapies have high potential to treat and control diabetes and its complications (Kavishankar et al, 2011). In Ayurvedic or indigenous folk medicines, plants have been used generally in their natural form (fresh juices, paste and dry powder). Herbal plants not only can improve glucose metabolism of individuals with diabetes, but also improves lipid metabolism and antioxidant status (Patel et al, 2012).

There are more than 400 plant species showing antidiabetic activity.

This study was carried out on Triphala. 'Triphala' is one of the well known powdered preparation (churna) in Indian system of medicine (ISM), being used in Ayurveda since ancient time for the treatment of chronic disorders. The word 'Triphala' is translated as 'three (tri) fruits (phala). These fruits, also known as 'myrobalan plums' are Terminalia chebula (haritaki), Emblica officinalis (amlaki), and Terminalia bellerica (bibhitaki). Tri-phala consists of equal parts of these fruits (Sharma et al, 2009; Bali et al, 2013). Treatment with Triphala reduces the blood sugar in diabetes improve digestion and assimilation, reduce serum cholesterol exert cardio protective effect as well as improve liver function and has anti-inflammatory and antiviral properties (Kumar et al, 2008). Triphala is reported to have anti-diabetic, and antioxidant activities (Bali et al, 2013).

METHODOLOGY

The present study was conducted in the department of biotechnology, Jiwaji University, Gwalior. All participants in the study provided informed consent. A total no. of 40 subjects, were divided into 10 subjects in each group. Group I subjects were served as healthy untreated control. Group II subjects were Normal Treated with Triphala. Group III subjects were type 2 Diabetic patients Treated with Triphala and Group IV subjects were type 2 Diabetic patients Treated with standard herbal drug Diabegon for comparison. Diagnosis of Type 2 diabetes was done according to WHO (ADA) criteria. The selected subjects, who were diagnosed with Type 2 diabetes, were then asked to start the Triphala therapy (5 gm Triphala/day).

BIOCHEMICAL ANALYSIS

The selected subjects were fasted overnight for 12 hours and their blood was withdrawn, the serum was separated and kept at -200C for the analysis of blood glucose concentration. Glucose concentration is estimated to assess antihyperglycemic potential of Triphala (Trinder et al, 1969). The estimation was carried out at 20 days interval up to 60 days of therapy. Glycosylated haemoglobin is estimated in Whole Blood to assess the efficacy of anti-diabetic preparations (Abhrum et al, 1987).

STATISTICAL ANALYSIS

The Values are expressed as Mean \pm SE. statistical analysis were performed by One -way analysis of variance (ANOVA) followed by bonferroni t-test. The Values were considered statistically significant if $p < 0.05$ (*) and Values are statistically Significant at both $P < 0.05$ and $P < 0.01$ (**).

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RESULT AND DISCUSSION

The basal level of blood glucose in group-I were maintained at constant level throughout the experimental period. Triphala therapy shows no significant change in group-II, after 60 days of therapy. The diabetic subject exhibited a significant increase in blood glucose level when compared with normal control group, whereas a significant decrease in blood glucose level was recorded after Triphala therapy.

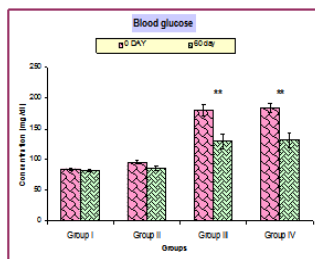


Figure-1. Effect of Triphala therapy on blood glucose levels.

A significant decrease in fasting state and p.p. state i.e. 28.0 % and 21.94 % ($p < 0.05$) respectively, was observed in blood glucose level of diabetic subjects treated with Triphala (5gm/day) which was comparable to decrease i.e. 28.72 % and 28.20 % in fasting and p.p. blood glucose level of diabetic subjects treated with diabegon as shown in figure-1.

There was marginal effect of Triphala on glycosylated haemoglobin (GHb) of the normal and diabetic subjects. No significant changes were observed in normal and diabetic subjects treated with Triphala or diabegon after 60 days of therapy as shown in figure-2.

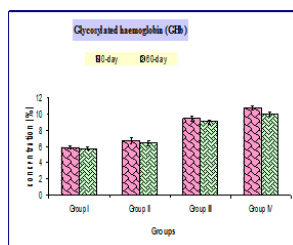


Figure-2. Effect of Triphala therapy on Glycosylated Haemoglobin (GHb).

The present study indicated a strong antioxidant activity of Terminalia bellerica, Terminalia chebula, Embellica officinalis and their combination 'Triphala', which may be partially responsible for many of the biological properties manifested by this drug. Although all three fruits are known for their antidiabetic properties, the whole powder of dried ripe fruits is also being widely used for the control of diabetes (Kumar et al, 2008). Triphala has been reported to be a rich source of vitamin C, ellagic acid, gallic acid, chebulinic acid, bellericanin, β - sitosterol and flavanoids. Most of these compounds have been reported to be a potent inhibitor of lipid peroxide formation, a scavenger of hydroxyl and superoxide radicals and to increase the antioxidant enzymes activities (Bali et al, 2013). The protective role of Triphala may be due to the compound itself may scavenge the free radicals and/or prevent the antioxidants from ROS and additionally the compound can act by upregulating endogenous antioxidant defenses. Therefore further studies are needed to characterize the bioactive antioxidants principles of Triphala and its constituents.

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CONFLICT OF INTERESTS - None

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