

# GLOBAL ACADEMIC RESEARCH INSTITUTE

COLOMBO, SRI LANKA



## GARI International Journal of Multidisciplinary Research

ISSN 2659-2193

**Volume: 03 | Issue: 01**

On 31<sup>st</sup> March 2017

<http://www.research.lk>

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GARI Publisher | Ayurveda | Volume: 03 | Issue: 01

Article ID: IN/GARI/ICATMMP/2016/102 | Pages: 147-152 (06)

ISSN 2659-2193 | Edit: GARI Editorial Team

Received: 16.08.2017 | Publish: 31.03.2017

ISSN 2659-2193

# EVALUATION OF THE EFFECTIVENESS AND EFFICACY OF ACUPUNCTURE TREATMENT IN THE MANAGEMENT OF HYPERGLYCEMIA

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## **ABSTRACT**

Hyperglycemia or high blood sugar is a condition in which an excessive amount of glucose circulates in the blood plasma. This is generally a blood sugar level higher than 11.1 mmol/l (200 mg/dl), but symptoms may not start to become noticeable until even higher values such as 15–20 mmol/l (~250–300 mg/dl). Acupuncture, which has a history of 400 years, is a method of encouraging the body to promote its natural healing and improve functions. This is done by inserting sterilized, stainless-steel needles that are fine as human hair in to specific points located near or surface of the skin which have the ability to alter various biochemical and physiological conditions in order to treat a wide variety of diseases. Inserting needles at these points stimulates various sensory receptors that, in turn, stimulate nerves that transmit impulses to the hypothalamic-pituitary system at the base of the brain. The aim of this study was to find out the efficacy of Acupuncture treatment on the management of hyperglycemia and improve the attitudes of Acupuncture among the Sri Lankan population. This randomized prospective cohort clinical study was done to evaluate the effect of Acupuncture treatment in consisting of Du 20, Ex 1, SJ 20, L.I. 18, GB 21, L.I.11, L.I 4 managing Hyperglycemic conditions of patients with an Ayurvedic traditional formulation in comparison to the effect of same Ayurveda Decoction. After 3 months treatment, patients of the group A, which received Ayurveda Decoction and

Acupuncture treatment showed 54.05% decrease in serum glucose level in comparison to the level of same parameter before the treatment ( $p < 0.05$ ) and the patients of group B, which received Ayurveda Decoction only did show significant reduction in the serum levels of glucose 36.16% ( $p < 0.05$ ) compared to those of before treatment of same group. Considering the overall results of present study and comparing with the results of previous studies, it is evident that the short term administration of Acupuncture treatment has shown significant effect in decreasing the elevated serum glucose level.

Keywords: Hyperglycemia, Acupuncture Treatment, Ayurveda Decoction

## **INTRODUCTION**

The discrepancy between the two estimates is due to the fact that cardiovascular diseases are often the cause of death for individuals with diabetes; the IDF uses modeling to estimate the amount of deaths that could be attributed to diabetes. More than 80% of diabetic deaths occur in low and middle-income countries. (Mathers CD and Loncar D., 2006). South Asians in the United States have a higher Coronary Heart Disease (CHD) risk, which may be related in part to a higher prevalence of the metabolic syndrome, insulin resistance, and hyperlipidaemia. Hyperglycemia has long been associated with the development of

cardiovascular diseases (CVD) in industrialized nations (Michael PC and Silvia C.). There has been an increase in the prevalence of hyperglycemia in developing countries that can partly be attributed to urbanization (Pessin JE., Thurmond DC., et al 1999). Management of hyperglycemia includes Dietary management, regular exercise, mental relaxation and pharmacological treatments. Pharmacological therapy includes the different classes of synthetic and semi synthetic drugs. (Total health life, 2005). From ancient time, herbal medicines have gained significant importance as a main source of effective and safe medicines in primary healthcare worldwide. According to the WHO, 80 % of world population is still dependent on traditional medicines. Cost effective simple herbal preparations would be beneficial in long term management of hyperglycemia. (Vos. T., et al, 2010)

Acupuncture, which has a history of 400 years, is a method of encouraging the body to promote its natural healing and improve functions. This is done by inserting sterilized, stainless-steel needles that are fine as human hair in to specific points located near or surface of the skin which have the ability to alter various biochemical and physiological conditions

in order to treat a wide variety of diseases. According to the traditional Chinese medicines by inserting a needle in to the body it can maintain the free flow of energy or the vital “qi” within the body which is responsible for maintaining a healthy life of an individual. Acupuncture points are areas of designated electrical sensitivity. Inserting needles at these points stimulates various sensory receptors that, in turn, stimulate nerves that transmit impulses to the hypothalamic-pituitary system at the base of the brain. (Jayasooriya.A., 1976) Controlled studies in patients with Hyperglycemia have been lacking. The aim of this study was to find out the efficacy of Acupuncture treatment on the management of hyperglycemia and improve the attitudes of Acupuncture among the Sri Lankan population.

## **MATERIALS AND METHODS**

### **Plant Materials**

The Traditional herbal formulation consists of six plants materials given in the Table 1. All plant materials were collected by us from pharmacy and direct by trees.

Table 1: Plant materials used in this formulation

<b>Scientific Name</b>	<b>Sinhala Name</b>	<b>Sanskrit Name</b>	<b>Part of use</b>
<i>Cassia auriculata</i>	<i>Alu kesel Ala</i>	<i>Lipa Kadali</i>	Bark
<i>Salacia reticulata</i>	<i>Kothalahibutu</i>	<i>Kinjala</i>	Root
<i>Phyllanthus emblica</i>	<i>Nelli</i>	<i>Dhathri</i>	Fruit
<i>Tribulus terrestris</i>	<i>Heen Nerenchi</i>	<i>Gokshura</i>	Plant
<i>Santalum album</i>	<i>Sudu Hadun</i>	<i>Swetha Chandana</i>	Trunk
<i>Sida rhombifolia</i>	<i>Bebila</i>	<i>Bala</i>	Root

## Acupuncture Points

Seven Acupuncture points were selected.

Table 2: Acupuncture points used in this study.

Point's Name	Location	Indications
Baihui (Du 20)	On the vertex of the skull, 5 cun behind the anterior hair line and 7 cun above the posterior hair line, in the mid line.	The best tranquilizing and sedative point of the body and it treats for psychiatric and neurological disorders.
Yintang (Ex 1)	On the ridge of the nose, midway between the medial ends of the two eye brows.	Controls pituitary functions and improves extra-sensory perceptions, controls endocrine disorders.
Jiasun (SJ 20)	On the scalp at the apex of ear, when the ear is pulled forwards.	Endocrine disorders (Specially of pituitary origin)
Jianjing (GB 21)	Midway between Du 14 (Between C 7 and T 1 vertebrae) and LI 15 (At the anterior depression lateral to the tip of the acromion process.)	Endocrine Disorders
Neck-Futu (LI 18)	3 cun lateral to the prominence of the thyroid cartilage.	Endocrine disorders, specially diabetes mellitus and thyroid disorders.
Quchi (LI 11)	At the outer end of the elbow crease when the elbow is semi flexed.	Homeostatic point
Hegu (LI 4)	At the middle of the 2 <sup>nd</sup> metacarpal bone, on the radial aspect.	The best analgesic point

### Research design

This clinical study was a randomized prospective cohort study. 30 patients were randomly selected and divided into two groups. Group A patients were treated with Traditional Herbal Formulation and Acupuncture treatment, prescribed dietary management during the period of 90 days. Group B patients were treated with Traditional Herbal Formulation only, prescribed dietary management during the period of 90 days. All patients were selected from Hyperglycemic clinic of Isiwaree Weda Asapuwa, an Ayurvedic

and Acupuncture treatment center, Bandaragama. All selected cases had been treated with allopathic medicine previously by qualified practitioners and consultants at their medical clinics. Patients had voluntarily visited the Hyperglycemic clinic at Isiwaree Weda Asapuwa the intention of having medical advice for unsuccessful controlling of Hyperglycaemia.

Both male and female patients, aged between 30-60 years having evidence of elevated serum glucose level without serious medical conditions were selected

for this study. Patient showed the poor serum glucose level on allopathic medication and withdrawn from medication for more than three months were selected for this study. Pregnant females, lactating mothers and patients those who have evidence of any major illness like renal insufficiency, cerebrovascular accidents and ischemic heart diseases were excluded. Patients were diagnosed on the basis of criteria recommended by NCEP, (2001) in the diagnosis of hyperglycemia. Assessment was done on the basis of clinical observations including the estimation of blood pressure, pulse rate and body weight and biochemical investigations, which included the estimation of serum glucose level.

#### **Method of preparation, Dosage and Administration of Herbal Formulation**

#### **Method of preparation of this herbal formulation**

Identified correct herbals and measured required amounts. Cleaned well, dried and ground when it became a crude powder. All patients were treated from this Traditional Herbal Formulation for 90 days. Group A patients were treated from both acupuncture treatment and herbal preparation for 90 days.

#### **Dosage and administration**

Traditional Herbal Formulation - 60 grams boiled with 960ml water till it becomes 240 ml, and after that 120 ml -2 times / day, In addition to this preparation patients were instructed to follow the prescribed method of dietary management, which includes low glucose, high vegetable fiber diet. Group A patients were treated from both acupuncture treatment and herbal preparation.

#### **Dietary management**

Patients were instructed to choose unsaturated fats (olive oil or canola oil instead of coconut oil), whole grains

(whole brown rice) and vegetables, which are high in fiber and to limit carbohydrate rich diet including sugar, wheat flour and fruits. (Anderson and Davidson, 2000)

#### **Monitoring of patients**

All patients were monitored for clinical changes, adverse effects and proper use of prescribed preparation of Traditional herbal formulation. Acupuncture treatment and dietary management weekly interval for 12 weeks and after 90 days patients were advised to get a serum glucose level analysis from the recommended clinical laboratory.

#### **Data processing and analysis**

Student's T-Test (Paired t test) followed by Analysis of variance was done using the Minitab statistical software package. The results were considered as significantly different when the  $p < 0.05$ . The values glucose parameters were expressed as the mean  $\pm$  standard error of mean (SEM).

## **RESULTS AND DISCUSSION**

30 patients of having confirmed hyperglycemic conditions were selected for the present study and all patients were between 31 – 60 years of age. The majority of patients were between 41-60 years of age. 57.5% of patients selected for the study were male. The female: male ratio was 1:1.35

#### **Serum glucose concentrations of patients**

A sample of chronic cases of Hyperglycemia was selected for this respective study with the objective of evaluating the efficacy. We determined the efficacy of Traditional herbal Formula and acupuncture treatment. At the first visit to the clinic, almost all patients (n=15, age=31-60) of the sample of Group A had shown poor glucose control (222  $\pm$ 13.1) and Group B had shown poor glucose control (224  $\pm$ 10.1) on the first

visit to the clinic even though they had been treated with allopathic medicine. All patients had been investigated for their fasting blood sugar and blood pressure levels regularly. Before the commencement of study all patients showed highly elevated serum level of sugar. After 90 days treatment, patients of the group A showed significant decrease in serum sugar level in comparison to the level of same parameter before the treatment ( $100 \pm 3.4$ ) ( $p < 0.05$ ) patients of the group B also showed significant decrease in serum sugar level in

comparison to the level of same parameter before the treatment ( $143 \pm 2.4$ ) ( $p < 0.05$ ) The patients showed significant decrease in serum sugar level (Table 3, Figure 1). The Group A Patients showed 54.05% decrease in serum glucose level after 90 days treatment with Acupuncture treatment, Traditional herbal formulation and dietary management. The Group B Patients showed 36.16% decrease in serum glucose level after 90 days treatment with Traditional herbal formulation and dietary management.

Table 3: Fasting blood sugar level (mg/dl) (Before and after treatment)

	Before Treatment	After Treatment
Group A	$222 \pm 13.1^a$	$100 \pm 3.4^b$
Group B	$224 \pm 10.1^a$	$142 \pm 2.4^b$

(In a column, data are presented as Mean $\pm$ SEM of 30 patients per each group. In each column, data indicated by different superscript letters are significantly different from each other (Paired t test  $p < 0.05$ ))

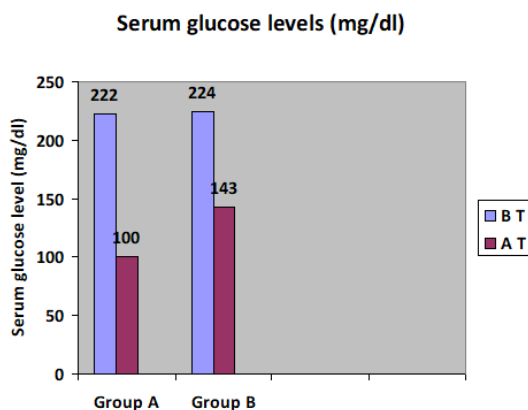


Figure 1- Serum glucose concentrations of patients

(Each bar represent the Mean $\pm$ SEM of 30 patients of each group. The bar indicated by different letters are significantly different from each other (Paired t test  $p < 0.05$ ))

But there was a significant difference between serum sugar levels of Group A and Group B patients after to the initiation of Acupuncture and Ayurveda Treatment. The fasting blood sugar levels were 222

$\pm 13.1$  and  $224 \pm 10.1$  at the start of this study of both groups. The fasting blood sugar levels were  $100 \pm 3.4$  of Group A and  $143 \pm 2.4$  mg/dl of Group B after 12 weeks ( $p < 0.05$ ). The fasting blood sugar level

had been lowered by 54.05% of Group A and

36.16% of Group B after 90 days. No any adverse reaction had been reported in short term administration of Traditional herbal formulation.

## **CONCLUSION AND RECOMMENDATIONS**

These results demonstrate favorable alteration in serum fasting sugar level in subjects with mild hyperglycemia during the period of oral administration of Acupuncture treatment, Traditional herbal formulation with dietary management. The glucose fraction alterations are a reflection of the summation and synergism of the individual effects of Acupuncture treatment, Traditional herbal formulation and dietary management in subjects who had an abnormal glucose and who continued their usual dietary habits during over a 12-week period in each regimen. When compare serum glucose level of patients, there was a significant difference among before and after treatments. The evidences revealed from this prospective study provide strong scientific background for the randomized clinical trial for further evaluation.

When the problems and limitations encountered during the research are taken in to consideration, it was conducted in a better controlled environment with a more expanded time frame. But researchers of this study found a limitation in monitoring the dietary pattern of patients in their usual environment. Since this research identified the major limitations and problems, this could be used as an initial step to carry out a well-organized randomized clinical trial in larger sample while taking steps to minimize the problems identified. The plant materials, which lacks descriptive information can be subjected to more analytical studies and can be directed to be explained in the term

of Ayurveda by the expertise in the field. As far as the conclusions of the above chapters are concerned, several suggestions can be introduced for further research.

1. Chemical analysis of the raw materials leading to study the effects of identified molecules on different metabolic pathways could be suggested as prime important for the determination of mechanisms of actions.

2. Replication of the study in involving a larger sample during a lengthier period of time for the determination of effects and efficacy of Acupuncture treatment and Traditional herbal formulation

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