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**APPLICATION OF ACUPUNCTURE THERAPY IN TYPE 2
DIABETES MELLITUS PATIENTS**

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ABSTRACT

This study was design to observe the effectiveness of acupuncture therapy in type 2 diabetes mellitus patients. In this study 20 patients were selected for follow up on the basis of inclusion & exclusion criteria. The main acupoints use were pishu (BL 20), shenshu (BL 23), zusanli (ST 36), sanyinjiao (SP 6), hegu (LI 4), jianjing (GB21), quchi (LI 11), waiguan (TW5), jixi (St.41), taibai (Sp.3), taichong (Liv3), dazhui (Du14). All the patients were punctured by using acupuncture needle with electric stimulation (Accu Stimulator Apparatus), by DD wave, and the needles were retained for 20-30 minutes. The treatment was given for 3 months time period. The parameter evaluated were fasting plasma glucose, postprandial plasma glucose, glycosylated hemoglobin (HbA_{1c}), lipid profile and body mass index (BMI). At the end of study period it was observed that acupuncture having overall good impact in most of the parameters. A significant decreased were observed in patients after acupuncture therapy. This study was suggesting that acupuncture therapy was effective in improving glycemic control, reducing HbA_{1c}, lipid profile and may helpful for reducing the complications in Indian patients with type 2 diabetes mellitus.

KEY WORDS: Diabetes Mellitus, acupuncture, glycosylated hemoglobin, lipid profile, body mass index

INTRODUCTION

Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia and abnormalities in carbohydrate, fat, and protein metabolism. Type 2 diabetes mellitus is chronic & progressive disorder characterized by impaired insulin secretion and insulin resistance in the liver, adipose tissue & skeletal muscle^[1]. It is the fourth leading cause of death in most developed countries^[2]. According to the World Health Organisation estimates, India had 32 million diabetic subjects in the year 2000 and

this number would increase to 80 million by the year 2030^[3,4]. The International Diabetes Federation (IDF) also reported that the total number of diabetic subjects in India is 41 million in 2006 and that this would rise to 70 million by the year 2025^[5]. It is quite evident from the above observations that diabetes has become a major health problem in India. Management of type 2 diabetes often necessitates changes in the patient's lifestyle^[6]. Management of type 2 includes diet, exercise and counseling regarding complementary and alternative medicine^[7] such as acupuncture, massage, hot tub therapy, biofeedback, yoga, herbal remedies also play important role in reducing blood glucose level^[8].

Acupuncture is the practice of inserting very fine needles into the skin to stimulate specific anatomic points in the body for therapeutic purposes^[9]. The probable mechanism by which acupuncture act in diabetes includes lower blood glucose content, lower the release of pancreatic glucagons, attenuate symptoms such as (polyphagia, polydipsia and polyuria), prevent slowing of motor nerve conduction, improve microcirculation, myocardial contractility, enhance blood outflow and regulate vascular peripheral resistance^[10].

So we design this study to assess the role of acupuncture therapy in type 2 diabetes patients in concerned with the glycemic & lipid control.

MATERIALS AND METHODS

Study Design

The study protocol of this present study was approved by Institutional Human Ethical Committee of R. C. Patel Institute of Pharmaceutical Education & Research, Shirpur. The informed consent was taken from each patient before enrolling in the study at the hospital site. In an open label study, we assess the effects of acupuncture therapy in type 2 diabetes patients with a follow up of up to 3 months. Men and Women were eligible to participate if they had uncontrolled type 2 diabetes, patients with HbA_{1c} \geq 7 % and fasting plasma glucose $>$ 140 mg/dl.

Additional exclusion criteria included were a clinically relevant medical and psychological condition, pregnant and lactating women, alcoholic patient, history of bleeding (G.I bleeding), chronic diabetes mellitus, patient who had known hypersensitivity to oral hypoglycemic agents, those who are on chronic medication

known to affect glucose metabolism (Systemic or inhaled corticosteroid), renal disease or renal dysfunction, renal transplant, congestive heart failure, hepatic insufficiency. Based on this inclusion and exclusion criteria a total of 20 patients were included in the study and taken follow up during the treatment.

There were 20 cases in this study out of which 13 males and 07 female, the average age was 52 ± 1.6 years old. The average duration of disease was 7.7 ± 1.4 years. The 14 patients found to have a family history of a diabetes mellitus and 6 patients with negative family history.

Treatment

1. Acupoints

After selecting the patients for this present study we have used the acupoints like : Pishu (BL 20), Shenshu (BL 23), Zusanli (ST 36), Sanyinjiao (SP 6), Hegu (LI 4), Jianjing (GB21), Quchi (LI 11), Waiguan (TW5), Jiexi (St.41), Taibai (Sp.3), Taichong (Liv3), Dazhui (Du14). The acupoints used in this study was selected based on various scientific studies of acupuncture therapy in diabetes mellitus and its complication.

2. Clinical Investigation

All the laboratory investigation such as fasting and post – prandial plasma glucose level, HbA_{1c}, and Lipid profile (serum cholesterol, serum triglyceride, HDL – Cholesterol, LDL – Cholesterol) determination was done at the baseline. Body mass index (BMI) was calculated based on the height and weight of the patients; because obesity is one of the major risk factor in diabetes.

After taking the entire baseline readings of the various parameters, selected acupoints were use constantly for patients those enrolled in the study. All the patients were punctured by using acupuncture needle after arrival of the needling sensation, the above acupoints were added with electric stimulation (Accu Stimulator Apparatus), by DD wave, the intensity of stimulation within the patient's tolerance, and the needles were retained for 20-30 minutes. The treatment was given every day for 10 days as one course of the treatments and after rest for 10 days; the second course of the treatment was started again. The entire selected patient undergone acupuncture therapy for 3 months. Generally, the therapeutic effect could appear after 1-2 courses of the treatments.

After starting the acupuncture therapy for all the enrolled patients; monthly monitoring of plasma glucose (fasting & post prandial) was done at the end of Ist, IInd and IIIrd months. Review of HbA_{1c} and lipid profile test was taken after three months of the treatment. Body mass index of patients was calculated at the baseline and at the end of study. The records of all the collected data maintained throughout the study and were statistically analyzed after completion of study; for finding out the effect of acupuncture therapy in diabetes patients.

RESULTS

Comparison of fasting plasma glucose (FPG) level between pre and Post treatment

Figure 1 demonstrate that mean decrease in FPG level after every month (n = 20). In the treatment group FPG level after three months showed significant (p< 0.01) decrease as compared with baseline.

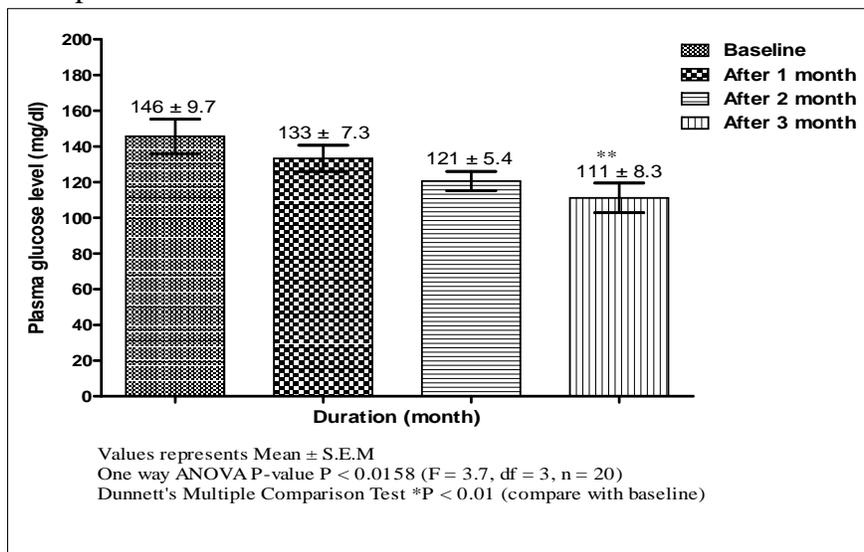


Figure 1

Comparison of fasting plasma glucose (FPG) level between pre and Post-treatment

Comparison of post prandial glucose level between pre and post treatment

Figure 2 displayed that post prandial glucose level in the patient treated with acupuncture therapy after each month showed significant decrease as compared to baseline. In the treatment group post prandial glucose level after two month (p< 0.01) and three months (p< 0.001) showed significant decrease as compared with baseline.

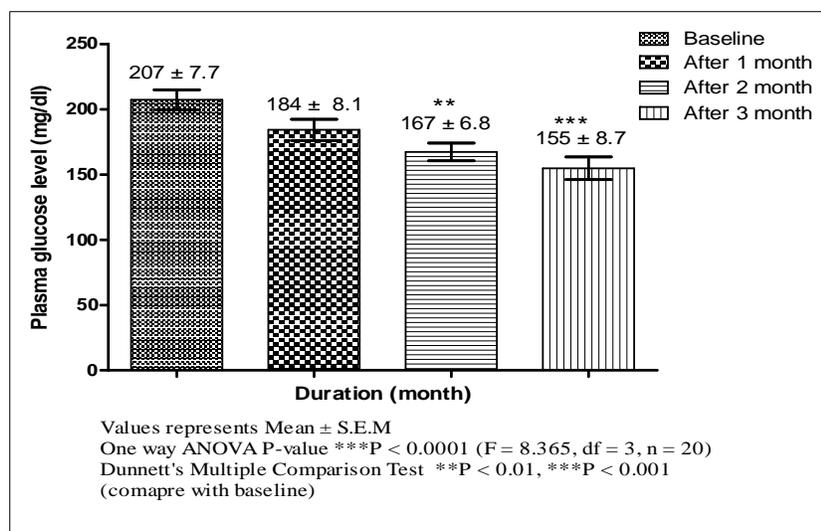


Figure 2

Comparison of post prandial glucose level between pre and post treatment

Comparison of glycosylated hemoglobin (HbA_{1c}) level between pre and post treatment

Figure 3 results obtained from the study showed significant ($p < 0.001$) reduction in glycosylated hemoglobin after three months of acupuncture treatment. The HbA_{1c} level of patients at baseline was 8.380 ± 0.2418 % and at the end of three months of acupuncture therapy; the HbA_{1c} level of the patient was reduced to 6.885 ± 0.2518 %.

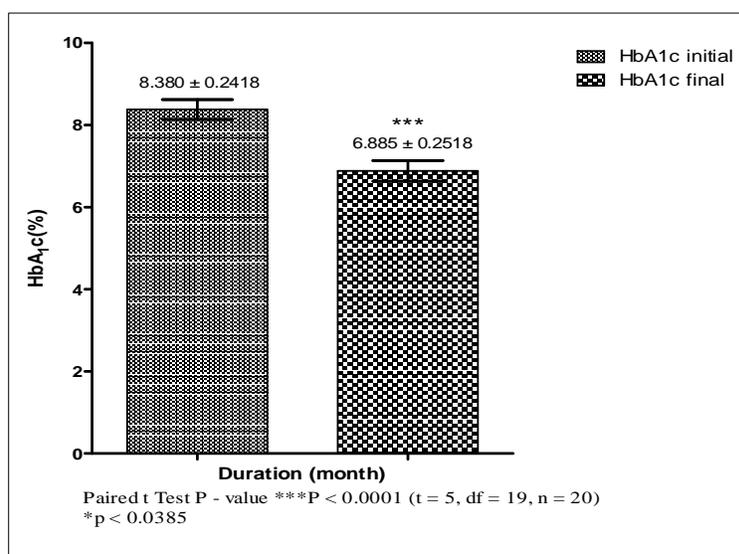


Figure 3

Comparison of HbA_{1c} level between pre and post treatment

Comparison of lipid level between pre and post treatment

Table 1 demonstrates the content of TC, TG, HDL and LDL-cholesterol in diabetes patients was higher before acupuncture treatment. After three months of acupuncture treatment; the level of TC, TG, and LDL-cholesterol in diabetes patients was significantly lower and the HDL-cholesterol level was increased.

TABLE 1: COMPARISON OF LIPID LEVEL BETWEEN PRE AND POST TREATMENT

Sr. No.	Treatment	TC	TG	HDL	LDL
1	Pre	158 ± 8.4	130 ± 11	39 ± 1.1	91 ± 8.8
2	Post	140 ± 8.7 (p<0.001)	105 ± 9.47 (p<0.01)	43 ± 2.7	76 ± 7.3 (p<0.001)

Comparison of Body mass index (BMI) between pre and post treatment

Table 2 shows that comparison of Body mass index of the patients receiving acupuncture therapy were taken at the start of therapy (pre-treatment) and at the end of three months (post-treatment) of therapy. The results obtained from the study showed significant (p< 0.01) reduction in body mass index after three months of acupuncture treatment.

TABLE 2: COMPARISON OF BODY MASS INDEX (BMI) BETWEEN PRE AND POST TREATMENT

Sr. No.	Treatment	BMI (kg/m ²) (mean ± sem)
1	Pre	26 ± 0.89
2	Post	25 ± 0.77

DISCUSSION

Treatment of diabetes with acupuncture has been effective in reducing blood glucose levels, especially in individuals with non-insulin dependent diabetes mellitus. Acupuncturists have identified about 20 body acupoints that are effective in lowering blood glucose level.

The Chinese medical approach to diabetes identifies its initial onset as due to a deficiency in yin. The yin deficiency causes an imbalance in yin and yang, resulting in a

yang deficiency. In advanced diabetes, these yin and yang deficiencies result in impairment of Qi. An unhealthy diet of excessive amounts of fatty and sweet foods exacerbates the condition^[12].

The diabetic patients were often accompanied by elevation of blood glucose level, elevated blood lipid, in addition to enhanced platelet aggregation and abnormal anticoagulant function. These pathological changes slow down blood flow, which is similar to pathogenesis of blood stasis in TCM and provides a scientific basis for adoption of the therapeutic method to activate blood flow and disperse blood stasis^[13].

Acupuncture may be effective in treating not only diabetes, but also in preventing and managing complications of the disease. Animal experiments have shown that acupuncture can activate glucose-6-phosphatase (an important enzyme in carbohydrate metabolism) and affect the hypothalamus. Acupuncture can act on the pancreas to enhance insulin synthesis, increase the number of receptors on target cells, and accelerate the utilization of glucose, resulting in lowering of blood glucose level. Data from other studies have shown the beneficial anti-obesity effect of acupuncture; it appears that the therapeutic effect of acupuncture on diabetes is not the result of its action on one single organ, but on multiple systems^[14].

The selection of acupoints was made with reference to various scientific studies related with the effect of acupuncture therapy in diabetes mellitus and its complication^[10,13]. After applying the acupuncture therapy at the selected acupoints like Pishu (BL 20), Feishu (BL 13), Shenshu (BL 23), Zusanli (ST 36), Sanyinjiao (SP 6), Hegu (LI 4), Jianjing (GB21), Quchi (LI 11), Waiguan (TW5), Jiexi (St.41), Taibai (Sp.3), Taichong (Liv3), Dazhui (Du14) for 3 months time period.

The results of this present study showed; fasting and post – prandial plasma glucose level, glycosylated hemoglobin (HbA_{1c}), lipid profile (total cholesterol (TC), serum triglyceride (TG), LDL – Cholesterol), and BMI were significantly decreased from the baseline. The increased in the HDL-C were observed at the end of study period. The results obtained were advantageous to the reversion of abnormal endocrine status and the metabolism of glucose and lipid at the same time achieving good therapeutic effect.

Acupuncture can treat symptoms but not cure diabetes. Acupuncture treatment for diabetes is most effective for those individuals who had diabetes for only a few years and

also most effective in treating diabetes in younger individuals. Diabetics receiving acupuncture also experience a decline in cholesterol levels. The clinical observation suggests that acupuncture, as a non-medication therapy, can reduce therapeutic cost with its better and faster effect and is worth spreading in clinical application.

CONCLUSION

From the observation of results of this present study, we can conclude that; acupuncture therapy shows significant effect on reduction of the plasma glucose level, lipid profile and it also increases the level of high density lipoprotein at the same time. It also shows significant reduction in the body mass index of the type 2 diabetics.

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