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The effect of Integrated Amrita Meditation (IAM) Technique on Glycemic Control in Type 2 Diabetes

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Abstract

Objective To determine the effect of Integrated Amrita Meditation (IAM) technique on glycemic control and short term stress response in type 2 diabetic subjects **Study Design** Thirty eligible type 2 diabetic patients were screened and informed about the study. After the initial drop out, ten diabetic subjects between age group of 30 – 60 years who agreed to participate were randomized to IAM and control group **Intervention** Participants in the IAM group practiced the meditation for 23 min/day for duration of three months and the control group participants continued with their daily routines without practicing any form of yoga and/ or meditation **Results** Within group analysis of IAM group showed a statistically significant decrease in weight, BMI, heart rate, systolic BP, fasting blood glucose, HbA1c, cortisol and perceived stress score. Between group analysis showed significant differences in the percentage change for Weight, BMI, Heart rate, Systolic BP, Fasting Blood Glucose, HbA1c,Insulin resistance, Cortisol and PSS from baseline to three months. **Conclusion** Our study shows the efficacy of the technique in bringing about a better glycemic control and psychological stress reduction in type 2 diabetic subjects

Keywords: *Diabetes, IAM, meditation, yoga, insulin resistance*

Introduction

Diabetes Mellitus (T2DM) is one of the major public health concern faced by several countries including India.[1] In India diabetes is approaching the status of a potential epidemic as is evident from the statistics projected by International Diabetes Federation 2015.[2] T2DM specifically is caused due to a combination of insulin resistance and an inadequate compensatory insulin secretory response. In addition factors like aging, obesity and lack of physical activity contribute considerably to the risk of T2DM.[3] This worsens the situation for diabetic patients who end up struggling with infections and lifelong medications to maintain good health. Hence maintaining blood glucose levels under control should be the paramount recommendation for diabetes management[4]

While attempting to integrate diabetes care into daily life, these patients are faced with multiple challenges including psychological and financial burden along with the complex treatment regimens. International Diabetes Federation advocates for evidence based care that is cost effective and is available to all people with diabetes.[5] Hence a logical option for diabetes management along with medication would be to incorporate some modes of life style habits in their daily routine such as increased physical activity and mind – body relaxation techniques in people surviving with diabetes

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In India there is rich history of using yoga to manage T2DM.[6] A number of studies on mind – body therapies such as yoga and meditation have been implicated in diabetes care and management to improve the glycemic control as well as reduce the level of psychological stress among type 2 diabetic patients[4,7]

Integrated Amrita Meditation technique designed by Sri Mata Amritanandamayi Devi lovingly called as "Amma" is a form of meditation that has its roots in Indian Tantric practices.[8] Understanding the potential of IAM technique in stress management [9] a new study was planned on diabetic patients so as to alleviate the stress relating hyperglycaemia and attain a better glycemic control. The objective of the study was to determine the effect of IAM on glycemic control and stress in type 2 diabetic patients. This is the first study of IAM technique on patients

Materials and Method

This is an open labeled, randomized case- control pilot study conducted in Amrita Institute of Medical Sciences. After the initial screening of 30 type 2 diabetic subjects, 10 eligible participants in the age-group of 30 -60 yrs with diabetes of 1-10 years duration and whose HbA1C level ranged between 7 – 10 % were recruited for the study. These patients had not previously undergone any specialized relaxation training and volunteered to participate in the study. Patients diagnosed with advanced diabetic complications - ongoing treatment for retinopathy/ renal impairment/ symptomatic or unstable heart disease / uncontrolled BP were excluded from the study

The subjects were randomly assigned to two groups. Group 1 consisting of Type 2 diabetic patients receiving standard medical care and undergoing IAM technique (Diabetic test group) and Group 2 consisting of Type 2 diabetic patients receiving standard medical care alone and not undergoing any relaxation exercises (Diabetic control group). IAM technique is taught by teachers who are well versed with the technique and approved as teachers by the Mata Amritanandamayi Math. Both the groups continued with the same dietary pattern and there was no change in medication during the study period

The test group patients were asked to report for the meditation class after an overnight fast of 8 – 12 hrs. Height and weight were measured and Body Mass Index (BMI) was calculated. Physiological measurements of heart rate and blood pressure were taken and fasting blood samples collected. Before starting the meditation the subjects were given the psychological questionnaires for rating. We used the standardized Sheldon Cohen's Perceived Stress Scale questionnaire for assessing the stress level of subjects.[10] A self maintained diary would assess their daily compliance on practice. These subjected were then called up to report for the second visit after 3 months and all the baseline parameters were repeated. Biochemical investigations were carried out to determine the level of Fasting Blood Glucose (FBG), HbA1c, Insulin, Cortisol and C Reactive Protein (CRP). The value of Insulin Resistance (IR) was calculated using Homeostatic model assessment (HOMA) formula[11]

Statistical Analysis

Statistical analysis was done using IBM SPSS Statistics 20 Windows. For all the continuous variables, the results are given in Mean±SD and for categorical variables as percentage. To compare the percentage difference of numerical variables between groups, Mann – Whitney U Test was applied for Non – parametric data. Wilcoxon Signed rank Test was applied for within group comparison. A 'p' value less than 0.05 was considered as statistically significant

Results

Table 1 provides the socio demographic characteristics of the study participants. The groups were found to be comparable on the basis of age, sex and BMI. We have used the non parametric test of analysis due to the small sample size. Within group analysis of IAM group at the end of third month showed significant decrease in mean values of Weight, BMI, Heart rate , Systolic BP, FBG, HbA1c and Cortisol. Continuous 3 months of IAM practice within this group had significantly brought down the mean values of weight from 60.60 to 58.60. BMI reduced from 24.14 to 23.36, Heart rate from 77.20 to 71.60, Systolic BP from 138.00 to 112.80, FBG from 132.92 to 122.52, HbA1c from 7.24 to 6.92 and cortisol from 8.74 to 6.70. However no significant change was observed for Diastolic BP, Insulin, Insulin resistance and C Reactive Protein. In case of control group, we observed a significant increase in weight, BMI, FBG and cortisol before and after the IAM intervention for 3 months. All other variables in the control group showed a non significant change (Table 2)

Since the baseline values of the study variables were different, on an average in the two groups comparison between the groups was done based on the percentage changes. Thus, when the percentage differences of variables from baseline to 3 months were compared between IAM and control group, significant changes were observed for Weight, BMI, Heart rate, Systolic BP, Fasting Blood Glucose, HbA1c,Insulin resistance and Cortisol(Table 3)

The Perceived Stress Scale analysis showed a significant drop in stress within IAM participants after 3 months of yoga and meditation. The mean stress score reduced from 22.80 to 18.00 (Table 2), while stress score was not significant in the control group. Between group analyses of PSS again showed a significant change in the percentage difference of total stress score from baseline to 3 months(Table 3)

Table 1: Sociodemographic characteristics of study participants

	IAM (n =5)	**Control (n =5)**	**p value**
Age (years) (mean ±SD)	54.80±9.88	45.60±6.69	0.15 (p>0.05)
BMI (mean ±SD)	24.14 ±1.87	27.13 ±2.60	0.06 (p>0.05)
Gender (Male : Female) (%)	3 : 2 (60 : 40)	2 : 3 (40 : 60)	1.00 (p>0.05)

Table 2: Within Group Analysis

Variables	**Visit (n=5)**	**IAM Mean ± SD**	**P value**	**CONTROL Mean ± SD**	**P value**
Weight(Kg)	Baseline 3 months	60.60 ± 10.64 58.60 ± 10.03	0.03	72.08 ± 6.73 73.20 ± 6.97	0.03
BMI(kg/m^2)	Baseline 3 months	24.14 ± 1.87 23.36 ± 1.76	0.04	27.13 ± 2.60 27.52 ± 2.61	0.04
Heart rate (Beats/min)	Baseline 3 months	77.20 ± 5.58 71.60 ± 6.69	0.04	75.80 ± 9.49 79.80 ± 8.89	0.10
Systolic BP (mmHg)	Baseline 3 months	138.00 ± 17.88 112.80 ± 14.80	0.04	132.60 ± 17.99 132.80 ± 17.29	1.00
Fasting Blood Glucose (mg/dl)	Baseline 3 months	132.92 ± 11.77 122.52 ± 9.32	0.04	120.76 ± 12.75 128.68 ± 16.57	0.04
HbA1c(%)	Baseline 3 months	7.24 ± 0.54 6.92 ± 0.34	**0.04**	7.24 ± 0.88 7.52 ± 1.04	0.06
Fasting cortisol(ug/dl)	Baseline 3 months	8.74 ± 2.73 6.70 ± 1.74	**0.04**	8.40 ± 5.71 9.63 ± 6.16	0.04
PSS	Baseline 3 months	22.80 ± 4.08 18.00 ± 3.31	0.04	22.40 ± 4.87 24.60 ± 3.97	0.14

Table 3: Comparison of percentage change of variables from baseline to three months BETWEEN GROUPS

Variable	IAM GROUP (n=5) Mean ± SD	CONTROL GROUP (n=5) Mean ± SD	P value
Weight(Kg)	3.24±0 .78	-1.53±0.67	**0.008**
BMI(kg/m^2)	3.21±0.75	-1.44 ± 0.56	**0.008**
Heart rate(beats/min)	7.35± 2.55	-5.66±8.97	**0.008**
Systolic BP(mmHg)	17.93±9.20	-0.21±1.82	**0.008**
Fasting Blood Glucose (mg/dl)	7.72 ± 2.14	-6.37± 3.24	**0.008**
HbA1c (%)	4.26±3.04	-3.71± 2.33	**0.008**
Insulin resistance	17.89±15.15	-25.968 ± 32.28	**0.032**
Cortisol(ug/dl)	21.49±14.86	-18.301 ± 15.71	**0.008**
PSS	21.13±1.60	-10.973 ± 12.03	**0.008**

Discussion

The results of the current study have found a significant reduction in FBG and HbA1c in the experimental group after 3 months of intervention. These positive changes in the yoga group are similar to other reports in the literature. In a community based follow up study on adherence to yoga and its resultant effects on blood glucose in type 2 diabetes a significant drop in HbA1c over a period of 3 months was observed in the study participants. In those subjects who continued to practice yoga till the completion of study, Fasting Blood Glucose (FBG) was found to have a negative correlation with their adherence level. The author points out the importance of motivating diabetic patients to undergo lifestyle modification practices so as to achieve a better glycemic control[12]

The exact mechanism by which yoga and meditation reduces blood glucose level, HbA1c and its related risk profiles is yet to be fully understood. However two major pathways have been postulated. First, by reducing the activation and reactivity of the sympatho adrenal system and the hypothalamic pituitary adrenal (HPA) axis and promoting feelings of well-being, yoga may alleviate the effects of stress and foster positive effects on neuroendocrine status and metabolic function. Second, by directly stimulating the vagus nerve, yoga may enhance parasympathetic activity and lead to positive changes in cardiovagal function, mood and energy state[13,14]

In our study the experimental group showed a significant decrease in weigh and BMI after 3 months of IAM practice. The changes in the percentage difference of both these variables from baseline to three months between the two groups were also highly significant in our study. This will further reduce the risk of several complications of type 2 diabetes. A comparative study of yoga and aerobic exercise in obesity demonstrated a highly significant drop in BMI in the yoga practitioners after one year of regular practice[15]

Our result shows that within IAM group there was a significant drop in heart rate in the second visit when compared to baseline. Similar positive findings were observed in a number of studies on Yoga on diabetic subjects as well as on normal subjects.[13,16] Positive impact of IAM technique on heart rate was studied by Vandana Balakrishnan et al and found that the heart rate reduced after 48 hrs onwards in IAM group and that drop was sustained for 8 months.[8] In the current study, the experimental group however showed a

significant decrease in systolic blood pressure after 3 months of practice. From baseline to 3 months when the percentage change in heart rate and systolic BP was compared between the two groups in our study, a statistically significant change was observed for both the variables. A growing body of evidence based on various randomized controlled trial in diabetic subjects have proved the possible improvement in blood pressure, both systolic and diastolic through intervention by Yoga and meditation.[17,18] This may be due to a normalization of autonomic cardiovascular rhythms as a result of increased vagal modulation and/or decreased sympathetic activity and improved baroreflex sensitivity[19]

In our study the level of stress hormone cortisol showed a significant decrease within the test group and significant increase within the control group. The percentage difference in cortisol levels from baseline to three months between the two groups also showed a significant change in our study. Study on the effect of IAM on stress hormones in normal healthy individuals showed that adrenaline reduced in IAM group within 48 hrs, and cortisol decreased significantly after 8 months of IAM practice.[20] In our study we have used the 10 item's Cohen's Perceived Stress Scale for assessing the diabetic subjects stress score. Both sympathetic and parasympathetic nervous system are often postulated as the mechanism through which yoga reduces stress Three months of pranayam training in young volunteers was associated with blunted sympathetic and enhanced parasympathetic activity.[21] We have already started a larger study with a bigger sample size and long term follow up to validate the short term as well as long term effects of IAM technique on type 2 diabetic patients

Conclusion

Meditation is one of the most desirable techniques that help patients achieve homeostasis by optimal functioning of autonomic and endocrine system in the body. Along with medically prescribed regimes, diabetic patients can safely incorporate meditation to their daily therapy to bring about a healthy and stress free life

Conflicts of Interest: The authors declare that they have no conflict of interest

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Ethical approval: All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee of Amrita Institute of Medical Sciences and Research Centre

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