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Original Article

Effect of Alternate Walking and Yoga on Blood Sugar Levels in Type 2 Diabete

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Abstract

Introduction: Yoga and walking help reduce blood sugar levels in type 2 diabetics. Since intensity of the aerobic activity cannot be always increased due to possible adversities, changing the type of stimuli is the other alternative to achieve better glycaemic control.

Methodology: 30 patients with type 2 diabetes were randomly allocated in 3 groups- walking, yoga and alternate walking and yoga. Participants were given 4 weeks intervention with 3-5 supervised sessions and follow up every week. Pre-intervention values were obtained i.e. Fasting and Post-Prandial Blood sugar levels (BSL) and Appraisal of Diabetes Scale (ADS) score. Post intervention values were obtained after 4 weeks. Statistical analysis was done for the obtained values and results were calculated.

Results: Intra group comparison for fasting and post prandial BSL for all 3 groups is significant (p value <0.05), ADS score for patient's perception in all three groups is also significant (p value < 0,05) pre and post intervention. On inter group comparison, no significant difference found between all 3 groups for fasting, post prandial BSL and ADS score (p value > 0.05)

Conclusion: Intervention given to all 3 groups were found to be equally effective on fasting, post prandial BSL and on patient's perception towards glycaemic control.

Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by high blood sugar levels (BSL) over a prolonged period that further produces symptoms like frequent urination, increased thirst and increased hunger. It is a state of hyper glycaemia which may result from many environmental and genetic factors, often acting jointly (1). Type 2 Diabetes Mellitus is characterized by a combination of peripheral insulin resistance and inadequate insulin secretion by pancreatic beta cells (2).

Diabetes Mellitus is most commonly assessed using the Fasting Plasma Glucose test. The test is positive if the fasting blood glucose level is greater than or

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equal to 126 mg/dl. The post prandial blood sugar levels are indicative of diabetes when glucose level is equal to or greater than 200 mg/dl (3). Glucose built up in the body leads to acute and long-term complications which affects the overall health of the patient.

Physical activity in the form of aerobic exercise and a structured intervention are effective in improving glycemic control and is a preventive step towards acute and long-term complications of type 2 diabetes mellitus (4). The American College of Sports Medicine (ACSM) defines Aerobic exercise as any exercise that is rhythmic, continually maintained and involves large muscle groups. According to the American Diabetes Association, moderate intensity aerobic exercise plays a key role in managing diabetes (5).

Aerobic activity such as walking and yoga in the form of Surya-namaskar and other Yoga-asanas are effective in achieving significant glycemic control (6, 7, 8).

Since it is observed that patients with diabetes also show poor adherence to treatment protocol, it is necessary to assess patient's perception towards their own glycaemic control for better understanding (9). Appraisal of diabetes scale (ADS) is a 7 questions scale which rates the patient's perception towards glycaemic control (10).

In order to progress in terms of exercise and in order to break the monotonicity, it is suggested to increase either exercise duration or intensity or both. Due to possible adverse events by increasing the intensity or the duration of exercise it is not always an option. Moreover, high intensity exercises also require constant monitoring of vitals and supervised sessions which may not be always feasible in long term. In that case, the type of exercise stimuli can be changed to achieve further glycemic control. Hence an intervention protocol with alternate yoga and walking is being considered in this study for effective glycemic control in diabetic.

Methodology

After ethical approval from Institutional Review Board (IBR), 30 subjects suffering from type 2 DM were included in this study. Inclusion criteria required the patient to be suffering from type 2 DM from at least 1 year and taking oral hypoglycemic drugs (sulfonylureas: dosage: 1-6 mg). Patients with any neurological or cardio-respiratory complications or patients performing yoga or walking or both as a regular exercise were excluded from this study.

The selected patients were then allocated into the 3 groups. Randomisation was done using Computer generated randomisation table to allocate patient into - Group 1: Only walking; Group 2: Only Yoga; Group 3: Yoga and walking alternate weeks. Exercise protocol details are shown in table 1. Pre-intervention fasting, post prandial BSL and ADS scores were taken. Procedure was explained to the patients. First 3-5 sessions were performed by the patients under supervision for better understanding of achieving an intensity of 13-15 on Borg's scale. A compliance chart was given to the patients to maintain a follow up regarding the sessions performed by themselves. Patients completing minimum 12 sessions out of 20 were considered further for analysis. Post-intervention fasting, post prandial BSL and ADS scores were obtained at end of 4 weeks.

TABLE I: Exercise protocols Group 1, 2 and 3.

	Group 1	*Group 2*	*Group 3*
Intervention	Walking	Yoga-Surya Namaskar, Tadasana, Trikonaasana, Virabhadrasana Padmasana, Vajrasana, Gomukhasana, Paschimottasana, Bhujangasana, Savasana	Alternate week training with walking and yoga
Time	30 Minutes	30 Minutes	30 Minutes
Intensity (Borg's Scale)	13-15	13-15	13-15
Frequency	5 times a week	5 times a week	5 times a week
Duration	4 weeks	4 weeks	4 weeks

Statistical analysis

The statistical analysis was done by using Statistical Package for Social Science (SPSS) version 17.0. The level of significance of <0.05 was considered to be statistically significant.

The statistical tests used

For Normal Distribution of Data- Shapiro-Wilk Test

For Baseline analysis- ANOVA

For F and PP BSL: within the group comparisons- paired t test

For ADS score: within the group comparisons- Wilcoxon test

For F and PP BSL: between the group comparisons- ANOVA

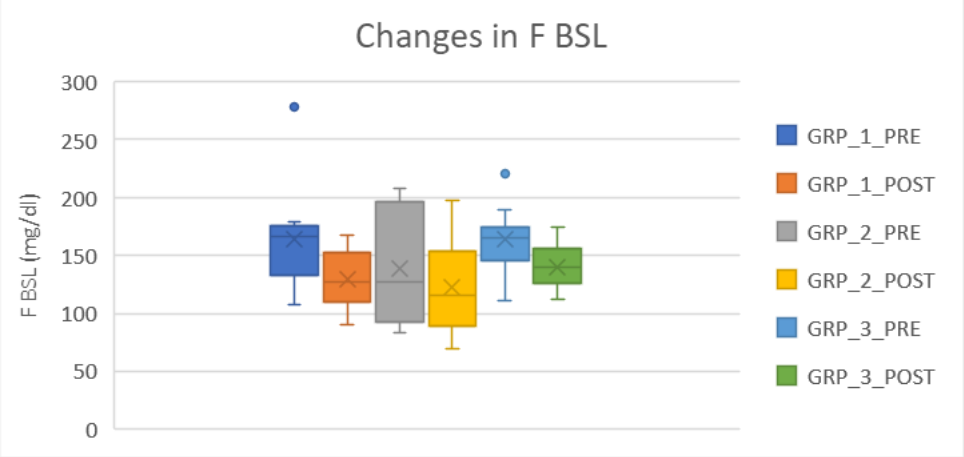
For ADS score: between the group comparisons- Kruskal-Wallis ANOVA

Results

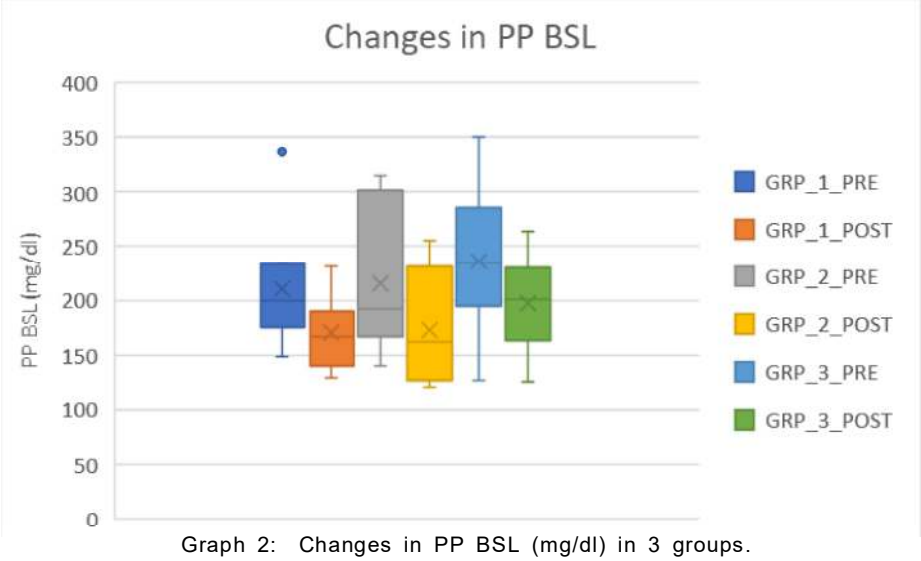
The demographic data and chronicity i.e. from how many years the patient was suffering from diabetes is shown in Table II.

TABLE II : Demographic Data.

	Group 1	*Group 2*	*Group 3*
Age (in years)	56.4±9.12	52.6±10.46	55±9.56
Chronicity (in months)	9.2±9.53	8.3±7.04	13.2±5.94



Graph 1: Changes in F BSL (mg/dl) in 3 groups.



Graph 2: Changes in PP BSL (mg/dl) in 3 groups.

TABLE III: Intra-group Results.

Groups	*F BSL (md/dl)*		*PP BSL (mg/dl)*		*ADS Score*	
Intervention	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
Group 1	163.5±47.56	129.5±24.10	210±52.88	170±30.69	28(26-29)	22(20-23)
P value	0.035*		0.035*		0.005*	
Group 2	138.4±48.64	122.8±39.79	214.9±67.10	173±50.77	26.5(25-28)	22(25-28)
P value	0.010*		0.010*		0.007*	
Group 3	163.8±29.10	140.1±19.50	235.8±64.56	197.1±46.07	26.5(24-27)	20(20-22)
P value	0.002*		0.002*		0.001*	

F BSL: fasting blood sugar level.
PP BSL: post-prandial blood sugar level.
ADS: appraisal of diabetes scale score.
For F and PP BSL: within the group comparisons- paired t test.
For ADS score: within the group comparisons- Wilcoxon test.

On intra-group comparison, p value is statistically significant for all 3 parameters that is fasting, post-prandial BSL and ADS score (p value <0.05) as shown in Table III and graphs 1, 2 and 3. On inter-group comparison, no significant difference was found in p value (p value >0.05) for all 3 parameters- fasting, post-prandial BSL and ADS score as shown in Table IV.

TABLE IV: Inter-group Results.

	Group 1	*Group 2*	*Group 3*	*P value*
F BSL (mg/dl)	129.5±24.10	122.8±39.79	140.1±19.50	0.362
PP BSL (mg/dl)	170±30.69	173±50.77	197.1±46.07	0.725
ADS	22(20-23)	22(25-28)	20(20-22)	0.866

F BSL: fasting blood sugar level
PP BSL: post-prandial blood sugar level
ADS: appraisal of diabetes scale score
For F and PP BSL: between the group comparisons- ANOVA
For ADS score: between the group comparisons- Kruskal-Wallis ANOVA

Discussion

In this study, 4 weeks intervention was administered to the patients in the form of only walking, only Yoga and alternate weeks of walking with yoga; all 3 of which had significant impact on Blood Sugar Levels (BSL) in patients with type 2 diabetes. High intensity exercise protocol requires a qualified professional for supervising all the sessions and a complete ECG screening and physician's approval (11). Therefore, the authors hypothesized that changing the stimuli of exercise would bring significant changes with more feasibility in improving BSL levels in 4 weeks.

The results found in this study are in agreement with the findings of many other studies that state that walking and yoga have a positive impact on BSL. In a study by Leili Yekefallah, it was found that 4 weeks intervention of yoga and walking were both effective in improving the blood sugar levels. They also found that yoga was more effective than walking (12).

Yoga reduces stress levels which in turn reduces the glucagon (13, 14). Yoga postures are slow rhythmic movements which specifically emphasises on stimulation of the organs and the glands by easy bending and extensions which do not over stimulate the muscles and rather concentrates on glandular secretions (15). Walking as an aerobic activity also has a significant effect on BSL. In a study by Sung K, shows that walking as a regular exercise programme effectively reduces BSL and also decreased FBG, HbA1c, and TG levels (16).

Alternate walking and yoga group also showed significant improvement in reducing BSL. Since the dosage of the entire exercise programme that is the intensity, duration, time and frequency-all remained constant for all the 3 groups, no significant difference was observed between them. In a study by Taruna

Sharma, it was found that poor adherence to treatment protocol is a major challenge for obtaining glycaemic control (17). Hence a protocol of alternate week of walking and yoga can definitely be administered so as to break the exercise monotony with comparable efficacy.

This study showed that the use of walking and yoga both has a positive impact over patient's perception helping the participating subjects to cope up with this disease and may also be a cause of achieving better glycaemic control in all three groups.

The volume of exercise- frequency, intensity and duration- was comparable for all 3 groups for 4 weeks intervention which may be the reason for achieving similar outcomes in all 3 groups. A longer duration study with the same exercise protocol in all 3 groups can be implemented to observe if a significant glycaemic control can be achieved in alternate Yoga and walking group.

Conclusion

Yoga, walking and alternate walking with yoga all 3 are equally effective in improving BSL and patient's perception of glycaemic control in type 2 diabetics.

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