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A Comparative Study to find the Effectiveness of Single Bout vs Recurrent Bout of Walking in reducing the Blood Glucose Level on Type 2 Diabetes Patients

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Abstract:
Purpose: Diabetes is the most common metabolic lifestyle disease that occurs when the body cannot effectively use the insulin it produces. Exercises are of immense use to the people with Diabetes Mellitus this is a wellknown fact. The Purpose of this study is to compare the effectiveness of exercising with single bout and recurrent bout of walking in reducing the blood glucose level. Methods: Thirty-four participants with type 2 Diabetes Mellitus were recruited in this experimental study by simple random sampling. A field researcher was assigned to conduct the pre and posttest evaluation, assessments and interaction with the participants including the explanation on the training involved in this study. Results: The statistical analysis are made within the groups of pre and post test values which shows there is a significant difference within the group and also between the group of post test Fasting blood glucose values of Group A and Group B using paired T – test shows that there is a significant difference between the two values (p = 0.0011) and also analyzed between post test of Post - Prandial blood glucose values of Group A and Group B using paired T – test shows that there is a significant difference between the two values (p = 0.0011). Summary: The study conclude that both single bout walkers as well as recurrent bout walkers had beneficial in reducing their blood glucose level but on comparing between these two group it is concluded that Group A (Single bout walkers) had more effective in reducing their blood glucose level in Group B (Recurrent bout Walkers) of type 2 diabetes mellitus.

Keywords: Diabetes; Exercises; Single Bout; Recurrent bout; Blood Glucose

1. Introduction

Diabetes is the most common metabolic lifestyle disease that occurs when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar which is a fuel that cells use to make energy (1). Diabetes is worldwide in distribution and it is estimated that 347 million people have diabetes (2). According to the survey conducted by WHO, in 2004 an estimated 3.4 million people died from consequences of fasting high blood sugar (3). Lower and Middle-income countries are reported to be the highest in the mortality due to diabetes (4).

Diabetes is categorized into two types Type 1 and Type 2 diabetes. Among the two types, the type 2 diabetes is most common form of ineffective use of insulin and comprises 90% of the people who are diagnosed as diabetes(5). The transition between normality and diabetes are due to impaired glucose tolerance and impaired fasting glycaemia. Patients with impaired glucose tolerance and impaired fasting glycaemia are at high risk of progressing to type 2 diabetes, although this is not inevitable. Symptoms may be similar to those of Type 1 diabetes, but are often less marked. As a result, the disease may be diagnosed several years after onset, once complications have already arisen. Diabetes mellitus is a chronic health disorder that can cause serious health problems overtime and these problems include kidney failure, heart disease, stroke, and blindness etc (6). The overall risk of dying among people with diabetes is at least double the risk of their peers who are normal (7).

WHO and recent research evidence suggest that by being physically active and maintaining healthy diet as a part of simple life style measure will prevent or control type 2 diabetes and its complication (1). According to Sigal RJ et.al conducted a study on type 2 diabetes patients to find the effectiveness of aerobic training, resistance training or both on glycemic control and the study reveals that greatest improvement in glycemic control is achieved by performing combined aerobic and resistance training rather than performing only aerobic or resistance training (8,9). Oberlin DJ et al has stated that single bout of exercise training is more effective on post prandial glucose level in type 2 diabetes patients (10). Even several studies supports that exercise are the key component in the treatment for type 2 diabetes patients and to improve long term glycemic control (11,12,13,14,15).

Exercises present a special challenge in patients with type 2 Diabetes Mellitus. Various evidence suggest that exercise helps in reducing the lipid levels, improves cardiovascular function, increases fitness and physical working capacity and improves sense of well being and quality of life.

Exercises are of immense use to the subjects with Diabetes Mellitus but the exact way of exercises is not clear. Various people have different types of exercises which varies in frequencies and also in duration. Despite with this strong evidence, if there is a right choice of frequencies at which the influence of exercises is felt more, then the type 2 diabetes patients are advised in that particular frequency. So this study tries to find that is there any realistic difference between the subjects exercising with single bout (Continuous walkers) and recurrent bout of walking (Split walkers) in reducing blood glucose level for type 2 Diabetes patients.

2. Materials and Methods

Thirty-four participants with type 2 Diabetes Mellitus were recruited in this experimental study by simple random sampling from a private Physiotherapy center situated in Chennai India. The participants are aged between 40-60 years old regardless their gender. In-order to compare the effectiveness of exercising with single bout and recurrent bout of walking these thirty-four participants were divided into two groups equally. Group A received single bout of walking and whereas Group B received recurrent bout of walking with 2 minutes rest in between each bout.

Participants are excluded from the study if any neurological, musculoskeletal, cardiovascular, sensory or motor neuropathy problems that hinders the training. Athletic person and obese individuals were also excluded from the study.

Both the group is trained based on the American College of Sports Medicine (ACSM) recommended physical activity that could be easily implemented in the routine life.

Based on our aim of the study, the training assigned for Group A was a single bout of walking for 20 minutes continuously without rest and the intensity is depends upon individuals self paced comfortable speed and the training is performed once in a day for continuous four weeks. Whereas Group B was assigned for recurrent bouts of walking for four 5 minute bouts with 2 minutes of rest in between the each cycle, the intensity is depends upon individuals self paced capability and the training is performed once in a day for four weeks. All the participants in Group A and Group B are advised to be self paced walk as increased speed in their walk may load to fatigue, stress and leads to other complications.

A field researcher was assigned to conduct the pre and posttest evaluation, assessments and interaction with the participants including the explanation on the training involved in this study. Before to start with the exercise pre – test blood glucose sample has been recorded. For about 4 weeks, 20 minutes participants have performed exercise per day and posttest blood sample has been recorded by using glucometer. A small drop of blood obtained by pricking the skin with the lancing device and then the drop of blood is placed on disposable test strips, which the meter reads and uses to calculate the blood glucose level. A consumable element containing chemicals that react with glucose in the drop of blood is used for each measurement. Each strip is used for only once and then discarded. The time it takes to read a test strip may range from 3 to 60 sec for different models. The meter then displays the level in mg/dl or mmol/l.

According to Guyton the random blood/sugar level is 80-120mg/dl, Fasting blood sugar level is 75-115mg/dl and Post-prandial sugar level is 120-140mg/dl.

3. Data Analysis

The field researcher obtains the pre and posttest results before and after four weeks of single and recurrent bout training as planned in the methodology. The results of this study shows that within group analysis of pre and post test of Fasting blood glucose values of Group A using paired T – test shows that there is a significant difference between the two values (p = 0.001). Secondly, within group analysis of pre and posttest of Fasting blood glucose values of Group B using paired T – test shows that there is a significant difference between the two values (p =0.511).

- Within group analysis of pre and posttest of Fasting blood glucose values of Group A

Fasting blood glucose values of Group A			
Pre	Post	P Value	Significance
170.8	135.33	0.001	SIGNIFICANT

Table 1

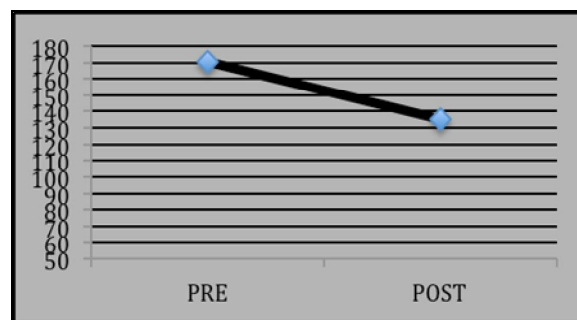*Figure 1*

- Within group analysis of pre and posttest of Fasting blood glucose values of Group B

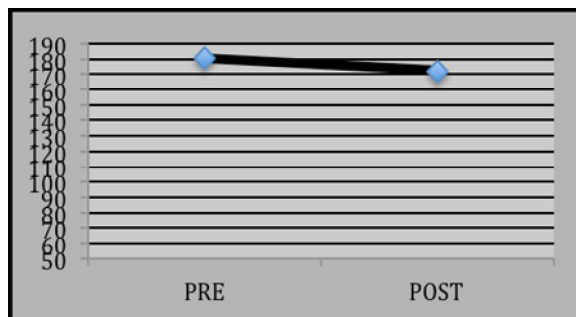| Fasting blood glucose values of Group B			
Pre	**Post**	**P Value**	**Significance**
180.33	172.33	0.0511	SIGNIFICANT

Table 2

Figure 2

Post-Prandial blood glucose results were analyzed on both pre and post test values within Group A using paired T – test shows that there is a significant difference between the two values (p = 0.0011) and also the within group analysis of pre and post test of Post - Prandial blood glucose values of Group B using paired T – test shows that there is a significant difference between the two values (p = 0.05).

- Within group analysis of pre and posttest of Post-Prandial blood glucose values of Group A

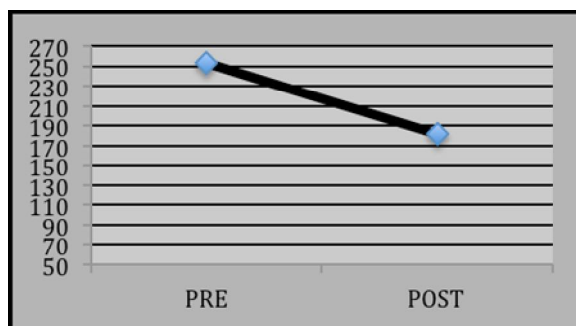| Post-Prandial blood glucose values of Group A			
Pre	**Post**	**P Value**	**Significance**
253	181.6	0.0011	SIGNIFICANT

Table 3

Figure 3

- Within group analysis of pre and posttest of Post-Prandial blood glucose values of Group B

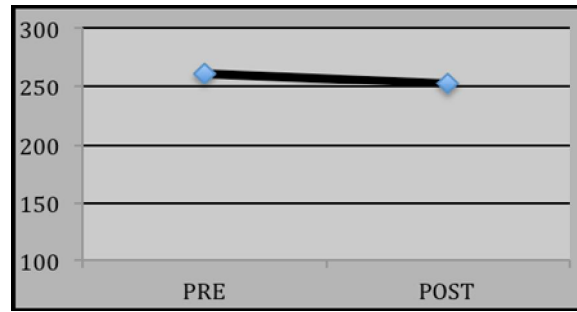| Post-Prandial blood glucose values of Group B			
Pre	**Post**	**P Value**	**Significance**
260.8	252.3	0.05	SIGNIFICANT

Table 4

Figure 4

Further analysis are made between the group of posttest Fasting blood glucose values of Group A and Group B using paired T – test shows that there is a significant difference between the two values (p = 0.0011) and also analyzed between post test of Post - Prandial blood glucose values of Group A and Group B using paired T – test shows that there is a significant difference between the two values (p = 0.0011).

- Between the group analysis of the posttest Fasting blood glucose values of Group A and Group B

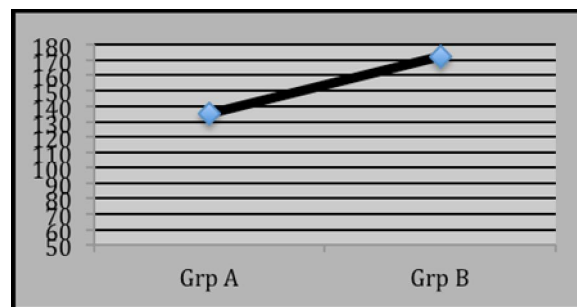| Posttest Fasting blood glucose values of Group A and Group B			
Grp A	Grp B	P Value	Significance
135.33	172.33	0.0011	SIGNIFICANT

Table 5

Figure 5

- Between the group analysis of the posttest of Post-Prandial blood glucose values of Group A and Group B

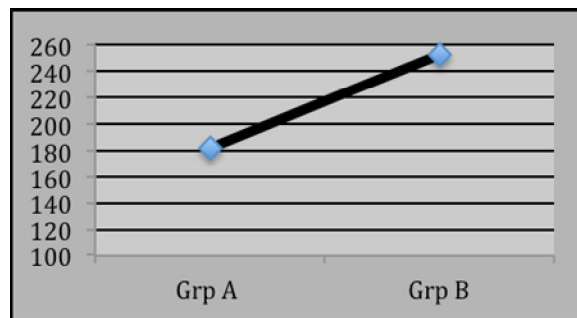| Posttest of Post-Prandial blood glucose values of Group A and Group B			
Grp A	Grp B	P Value	Significance
181.6	252.03	0.0011	SIGNIFICANT

Table 6

Figure 6

4. Discussion

Exercise is said to be a planned, structured and repetitive bodily movement performed to improve or to maintain one or more component of physical fitness. The possible benefits of physical activity for patients with diabetes are substantial and recent studies strengthen the importance of long-term physical activity programme for the treatment and prevention of common metabolic abnormality and complication. Several studies were undertaken many complication. Several studies were conducted to conclude the effect of either Continuous walking on blood glucose level. The results of this study clearly showed that the Group A

(Continuous walkers - Single bout walking) had more effect in reducing the blood glucose level than the Group B (Split walkers – Recurrent bout walking) and these findings were supported by Horton ES who showed that regular physical activity, promotes beneficial physiological changes in those with Type 2 diabetes mellitus (16). Wallberg – Henriksson H et.al reported that people with "NIDDM can enjoy regular physical exercise as a means of enhancing metabolic control and improving insulin sensitivity" which co-relates with this study (17). Therefore, it is said that Group A - Single bout (Continuous walkers) of walking training had benefited in reducing blood glucose level than in Group B – Recurrent bout of walking (Split walkers) with rest in between. When compared to continuous walkers, split walkers found to be easier since, they had 2 minutes of rest in between four 5-minute bouts of walking performance.

Single bout of continuous walking had more effect in reducing their blood glucose level because, acute stimulation of muscle glucose transport, acute enhancement of insulin action and longterm up regulation of the insulin signaling pathway resulting from regular exercise training as evidence supports. Further studies can be done on analyzing the physiologic effects underlying the difference shown in this study or by using more subjects, longterm follow up can be analyzed, can be done by including the risk factors such as Hypertension, Lipid levels, etc., the blood sample can be given to lab or using inclined and flat surface as comparison for reducing in blood glucose level.

5. Summary

The study concluded that both continuous walkers as well as split walkers had beneficial in reducing their blood glucose level but on comparing between these two group it is concluded that Group A (Single bout walkers) had more effective in reducing their blood glucose level in Group B (Recurrent bout walkers) of type 2 diabetes mellitus subjects.

6. References

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