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Effect of aerobic exercises on diabetes mellitus in young adults

Rajiv Sighamoney, Vinod Jadhav and Ujwal Yeole

Abstract

Background: Because impaired or inadequate insulin level blood sugar level in blood increases, we hypothesized that blood sugar level would decrease in type 2 diabetic individuals.

Aim and objectives: To find out the effect of aerobic exercise in type II diabetic young adults.

Methodology: For this study, 30 samples were selected according to the inclusion and exclusion criteria. 19 were males and 11 were non-females. Glucometer was used to assess blood sugar level.

Results: Blood sugar level in diabetic population. Mean of blood sugar level was fasting blood sugar in mg/dL before treatment was 143.967 and after treatment was 112.1 as well as post prandial blood sugar before treatment was 193.167 and after treatment was 156.49.

Conclusion: Aerobic exercises may increase activity of insulin level in blood which results in a reduction in blood sugar level in type 2 diabetic population.

Keywords: Aerobic exercises, blood sugar level, Type 2 diabetes, young adult, glucometer

Introduction

Diabetes is a metabolic disorder in which the body is unable to appropriately regulate the level of sugar, specifically glucose, in the blood, either by poor sensitivity to the protein insulin, or due to inadequate production of insulin by the pancreas. Type 2 diabetes accounts for 90-95% of all diabetes cases. Diabetes itself is not a high mortality condition (1.3 million deaths globally), but it is a major risk for other causes of death and has a high attributable burden of disability. Diabetes is also a major risk factor for cardiovascular disease, kidney disease and blindness.

Physical activity is a key element in the prevention and management of type 2 diabetes. Regular physical exercise can significantly reduce the risk of developing non-insulin-dependent diabetes mellitus. Aerobic exercise should be performed at least 3 days/week with no more than 2 consecutive days between bouts of activity because of the transient nature of exercise-induced improvements in insulin action. A moderate intensity should consider undertaking some vigorous physical activity to obtain additional blood glucose benefits. Individuals should engage in a minimum of 150 min/week of exercise undertaken at moderate intensity or greater. Aerobic activity should be performed in bouts of at least 10 min and be spread throughout the week.

Methodology

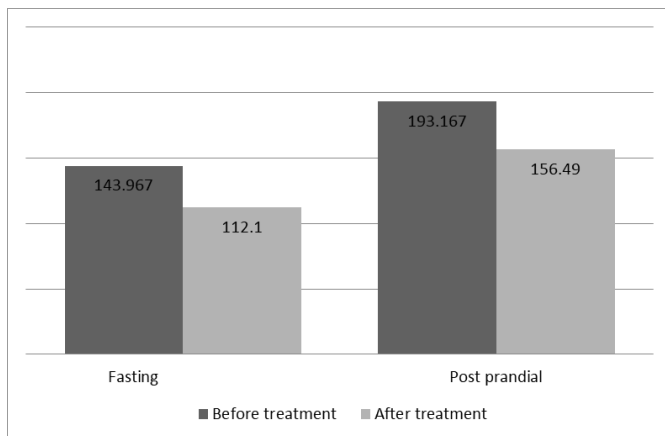
- **Study Design:** Experimental study
- **Target Population:** young adult (18-35)
- **Sampling Method:** Convenient Sampling
- **Sample Size:** 30
- **Materials required:** Pen, Pencil, glucometer, notepad, etc.
- **Inclusion Criteria:** Impaired Diabetic Patient between 18-35 years old who monitor their BSL levels on a regular basis.
- **Exclusion Criteria:** BSL below 110mg/dl and Above 250mg/dl.
- **Outcome Measures:** Glucometer.

Procedure

For this study, 30 Samples were selected According to the inclusion and exclusion criteria. In which 19 were males and 11 were non females. The assured and responsibility is taken that the identity of diabetic individuals is preserved. They were explained about the aim and objectives of the study. The consent form was signed by them. Data collection form was used for demographic identification. Glucometer was used to evaluate blood sugar level in diabetic individuals.

Results

Fasting blood sugar in type 2 diabetic in were assessed. Mean of blood sugar level before treatment was 143.967 mg/Dl and after treatment was 112.1 mg/Dl as well as post prandial blood sugar before treatment was 193.167 mg/Dl and after treatment was 156.49 mg/Dl.



Graph 1

Discussion

The study was aimed to study the effect of aerobic exercises in type II diabetic young adults in and around Pune.

The baseline demographic variables were homogeneous in nature in both the gender. There were 19 male subjects and 17 female subjects. Pair t-test was used for statistic in a paired sample t-test, each subject or entity is measured twice, resulting in pairs of observations. The mean age in 30.87 with SD of 1.907. The mean of fasting blood sugar of first week was 143.967 with SD of 12.928 and fourth week was 112.1 with SD of 14.351. The mean of post prandial blood sugar of first week was 193.667 with SD with 13.29 and fourth week was 156.43 with SD of 12.87.

According to a World Health Organization (WHO) fact sheet on diabetes, an estimated 3.4 million deaths are caused due to high blood sugar. The country having the highest number of diabetic patients in the world, the sugar disease is posing an enormous health problem to our country today. Often known as the diabetes capital of the world, India has been witnessing an alarming rise in incidence of diabetes according to the International Journal of Diabetes in Developing Countries. India today has more people with type-2 diabetes (more than 50 million) than any other nation. Regarding article was published early in 2016; according to this study they found prevalence of type 2 diabetes is more in young adult too.

In this study we have used aerobic exercises i.e. walking. Intend of this two component can use running, swimming or/and aquarobics. We can do study to check difference between any of two groups or among all different groups. Very few studies were did on young adult for type diabetes mellitus so we had chosen young adult age group to revised same research in Indian population. We did research with 30

individuals four week protocol, but it can perform for large numbers of individuals. According our referring articles this study also can be performing with resistance training exercises. We can do comparison between resistance training exercises verses aerobic training exercises on the basis of same references. We found similar result as our referring study in Indian population. We had taken age group (18 to 35) between in both genders. For further we study can compare effect between same age male and female. This study can be performing in regular workout and gym going population and non-gym going persons. In terms of diabetic population for such calories burning activities i.e. aerobic exercises should consider for those individuals who has addiction of smoking, alcohol consumption, etc. It can also affect on level of blood sugar level. In such aerobic exercise training protocol BMI or weight can be consider, we can compare effect in same BMI or weight group. Blood sugar level is dynamic parameter which can differ with respect food intake. Normal blood sugar level is 70-110mg/dL. For baseline blood sugar level in diabetic, we had included people who are monitoring regular basis. This gives actual blood sugar level in individuals.

A similar study was conducted by Normand G. Boulé, in 2001. They investigated the effect of aerobic exercise training on glucose control in diabetes mellitus. A total of 60 overweight individuals with type 2 DM, but without vascular complications, were randomly assigned to either a 6-month aerobic exercise training programme (four times/week, 45 - 60 min/session), designated as exercise group, or to the control group. Exercise training reduces hba_{1c} by an amount that should decrease the risk of diabetic complications, but no significantly greater change in body mass was found when exercise groups were compared with control groups.

Insulin is produced the beta cells of the pancreatic islets. Insulin is released when have just eaten a meal and the level of glucose in your bloodstream is high. It works by stimulating the uptake of glucose into cells, lowering blood sugar level. The liver and muscles can take up glucose either for immediate energy or to be stored as glycogen until it's needed. So this study demonstrates an improvement in glycaemic control and physical fitness with aerobic training in type 2 diabetic patients. An aerobic exercise also helps to reduce body weight and blood pressure.

Adding resistance training to aerobic training enhanced glucose disposal in postmenopausal women with type 2 diabetes. The improved insulin sensitivity is related to loss of abdominal subcutaneous and visceral Aerobic training and to increased muscle density. Glucose infusion rates increased significantly ($P < 0.05$) in the Aerobic and resistance training group. A combination of aerobic and resistance training may be more effective for blood glucose management than either type of exercise alone. Any increase in muscle mass that may result from resistance training could contribute to blood glucose uptake without altering the muscle's intrinsic capacity to respond to insulin, whereas aerobic exercise enhances its uptake via a greater insulin action, independent of changes in muscle mass or aerobic capacity. However, all reported combination training had a greater total duration of exercise and caloric use than when each type of training was undertaken alone. Mild-intensity exercises such as tai chi and yoga have also been investigated for their potential to improve blood glucose management, with mixed results. Although tai chi may lead to short-term improvements in blood glucose levels, effects from long-term training (i.e., 16 weeks) do not seem to last 72 h after the last session. Some studies have shown lower overall blood glucose levels with

extended participation in such activities although others have not. One study suggested that yoga's benefits on fasting improve blood glucose; lipids, oxidative stress markers, and antioxidant status are at least equivalent to more conventional forms of physical activity. However, a meta-analysis of yoga studies stated that the limitations characterizing most studies, such as small sample size and varying forms of yoga, preclude drawing firm conclusions about benefits to diabetes management. Most benefits of physical activity on type 2 diabetes management and prevention are realized through acute and chronic improvements in insulin action. The acute effects of a recent bout of exercise account for most of the improvements in insulin action, with most individuals experiencing a decrease in their blood glucose levels during mild- and moderate-intensity exercise. Participation in regular physical activity improves blood glucose control and can prevent or delay onset of type 2 diabetes. Aerobic exercise is physical activity, such as walking, bicycling or jogging that involves continuous, rhythmic movements of large muscle groups lasting for at least 10 minutes at a time. Resistance exercise is physical activity involving brief repetitive exercises with weights, weight machines, resistance bands or one's own body weight (e.g. pushups) to increase muscle strength and/or endurance. Flexibility exercise is a form of activity, such as lower back or hamstring stretching that enhances the ability of joints to move through their full range of motion. Some types of exercise, such as yoga, can incorporate elements of both resistance and flexibility exercise. Physical activity can help people with diabetes achieve a variety of goals, including increased cardio-respiratory fitness, increased vigour, improved glycaemic control, decreased insulin resistance, improved lipid profile, blood pressure reduction and maintenance of weight loss. Moderate to high levels of aerobic physical activity and higher levels of cardio-respiratory fitness are associated with substantial reductions in morbidity and mortality in both men and women and in both type 1 and type 2 diabetes. Large cohort studies have demonstrated that, in people with type 2 diabetes, regular physical activity and/or moderate to high cardio-respiratory fitness are associated with reductions in cardiovascular and overall mortality of 39% to 70% over 15 to 20 years of follow-up. Similarly, a cohort study in people with type 1 diabetes found that 7-year mortality was 50% lower in those reporting more than 2000 kcal of weekly exercise (equivalent to about 7 hours per week of brisk walking) compared to those reporting <1000 kcal of physical activity per week. Additional benefits of aerobic exercise include increased cardio-respiratory fitness in both type 1 and type 2 diabetes and slowing of the development of peripheral neuropathy. In contrast to trials in type 2 diabetes, most clinical trials evaluating exercise interventions in people with type 1 diabetes have not demonstrated a beneficial effect of exercise on glycaemic control. Pathophysiology of type 2 diabetes of type 2 diabetes in adults; therefore, it seems logical to expect similar benefits from physical activity in children with type 2 diabetes as has been achieved in adults. A recent systematic review found no good-quality studies directly assessing the effects of physical activity in youth with type 2 diabetes). type 2 diabetes strive to achieve the same activity level recommended for children in general: 60 minutes daily of moderate to vigorous physical activity and limit sedentary screen time to no more than 2 hours per day. This article provides a guide to physical activity recommendations for individuals with diabetes, including developing a physical activity prescription. Specific

considerations for physical activity in individuals with diabetes are provided for target organ disease, type 1 diabetes, and type 2 diabetes. Implications for physical activity are reviewed for both oral and injectable diabetes pharmacologic agents. The relationship between hypoglycemia and physical activity is examined. This article provides tools and information to facilitate the promotion of physical activity plans for individuals with diabetes. Although individuals with type 1 diabetes may participate in the standard recommendations for physical activity, there are clinical considerations that the NP must first address. Glucose monitoring, fuel or carbohydrate load, insulin dosing, type and timing of physical activity, and hydration should be factored into the physical activity prescription. Blood glucose levels should be assessed at designated time points, informed by the individual's response to insulin. These time points may include before, during, and after physical activity exceeding 30 minutes in duration. Exercise has been considered a cornerstone of diabetes management, along with diet and medication. However, high-quality evidence on the importance of exercise and fitness in diabetes was lacking until recent years. The present document summarizes the most clinically relevant advances related to people with type 2 diabetes and the recommendations that follow from these. Prevention of diabetes, and on the physiology of exercise. Physical activity can cause hypoglycaemia if medication dose or carbohydrate consumption is not altered. This is particularly so at times when exogenous insulin levels are at their peaks and if physical activity is prolonged. Hypoglycaemia would be rare in diabetic individuals who are not treated with insulin or insulin secretagogues. Added carbohydrate should be ingested if pre-exercise glucose levels are <5.6 mmol/l (100 mg/dl).

Conclusion

Aerobic exercises may increase activity of insulin level in blood which result reduce in blood sugar level in type 2 young adult diabetic population.

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