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Implications of Aerobic Exercises and Walking Parallel to Diabetes Medications on Diabetic Sportspersons

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Authors' contributions

This work was carried out in collaboration among all authors. Author AN designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors FA, SJ, AA, NN, IA, SY and AS managed the analyses of the study. Authors ARMS, SJ, HSA and WJ managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Objective: Diabetes have a central contribution with type I or type II towards the healthy lifestyles of sportspersons. Aerobic exercise and daily walking stay them fit and control their glucose levels in their bloodstream. The aim of this study was to find out the effects of aerobic exercises and walk on the sportspersons of type I and II diabetes.
Methodology: The existing research has experimental design itself wherein pre-tests and post-tests were employed to make sure the novelty of results. The data was collected from the diabetic sportspersons dividing them equally into control group (N-20) and experimental group (N-20). Both groups had type I (N-20) and type II (N-20) diabetic individuals. Aerobic exercise and walk protocol was applied for six weeks on experimental group, whereas, control group continued their routine activities. Afterwards, the data was collected through pre and post treatments and edited into SPSS (v-26). The collected data was analyzed through descriptive statistics using frequencies and percentages, whereas, T-test was applied to make the differences of pre and post treatments.
Results: The findings has shown that aerobic exercises and walk decrease the higher levels of glucose in blood and enable to stable glycemic balance, weight loss maintenance, decrease insulin resistance, blood pressure decrease, and blood glucose control.
Conclusion: The prominent differences were observed between control and experimental groups either type I or type II. It was concluded that the sportspersons may reduce the excessive glucose engaging in aerobic exercises and walk on daily basis rather than using medications. They should spend their happy lives and get rid of medications and insulin through spending their spare time using light exercises and maintain their glucose levels in blood as well.

Keywords: Walk; aerobic exercises; diabetes; sportspersons.

1. INTRODUCTION

Diabetes is one of the most dangerous chronic diseases that may harm human health and effected intimately 370 million diabetic patients globally by 2030 [1]. Diabetes is defined as a set of metabolic illnesses with various etiologies characterized by persistent hyperglycemia and abnormalities in glucose, lipid, and protein metabolism as a result of a deficiency in insulin secretion.

Diabetes is grouped by chronic hyperglycemia and protein metabolism and impaired carbohydrate, lipid, due to insulin secretion and/or action insufficiency. The two primary kinds of diabetes are insulin-dependent diabetes and non-insulin-dependent diabetes [2]. The high occurrence of complications such as stroke, heart attack, peripheral vascular disease, visual impairment, neuropathy, and depression are among the devastating symptoms of diabetes. The frequency of diabetes has exploded to epidemic proportions. Almost 390 million people globally are currently affected and more than 590 million people are predicted to be affected by 2035 [3].

Aerobic exercises are those having a 10-30-minutes period of rhythmic, repetitive, and continuous contractions of the same major group of muscles [4]. Activities provide resistance through exercises to develop muscular strength against a load [5]. Aerobic exercise is a widely recommended treatment for both types of diabetes since it improves not only the glycemic balance but also the metabolic risk factors for cardiovascular disease such as insulin resistance for type 2 diabetic patients. Previous research has demonstrated the benefits of moderate-intensity exercise in improving insulin sensitivity [6].

Greater cardio-respiratory capability, improved vigor, stable glycemic balance, weight loss maintenance, decrease insulin resistance, blood pressure decrease, and good lipid profile are all the goals that can be achieved with physical activities [7]. Adoption and maintenance of physical activity are necessary for blood glucose control and general health in patients with diabetes and prediabetes [8]. Physical activity has been shown to promote wellbeing and lower the risk of cardiovascular illness in a young individual including hypertension, obesity, and diabetes [9].

Aerobic exercise is more successful than normal medical therapy and dietary plans in the management of glycemic balance, abstaining

blood glucose level, plasma insulin level, and insulin resistance are all factors to consider when managing diabetes [10]. Many issues with primary care come across daily such as depression, obesity, coronary disease, and diabetes can be addressed and prevented by aerobic exercise [11].

Walking is the most common and preferred form of exercise for those people who are fighting against diabetes [12]. Walking is an isotonic aerobic exercise that has been linked in observational studies to lower blood sugar levels in diabetic individuals as well as other physiological changes [13].

Continuous walking reverses the glycemia deterioration and intermittent walking improves body composition, physical ability, and glycemic control better than energy expenditure as compared to continuous walking [14]. Exercise and walking are effective techniques for managing Type 2 diabetes and increasing diabetic patient's health. Brisk walking routines may help to maintain a stable blood sugar level and body weight in Type 2 diabetes [15].

Physical activity, when combined with other lifestyle changes, can help prevent and control insulin resistance, prediabetes, and diabetes. Both aerobic and anaerobic training improves insulin sensitivity in diabetics and as a result, it is helpful for glycemia management [16].

People with diabetes have several factors that may influence the effect of exercise on insulin and glucose plasma level as well as to develop resistance for insulin. A proper exercise program is one of the most important components determining population differences, lifestyle, and beginning values of laboratory measurements [17]. Physical exercise is a planned, systematic, and repetitious body movement to maintain or enhance one or more aspects of physical wellbeing [18]. Physical activity has been demonstrated to enhance blood pressure, glycemic control, body composition, insulin resistance, and physical and mental aspects of quality of life.

Previous studies revealed that a lifestyle involving food and exercise delayed the progression of uncontrolled diabetes to type 2 diabetes. Physical activity has long been known to aid in the handling of type 2 diabetes [19]. Regular exercise has been linked to a variety of health advantages including improved cardiorespiratory fitness, muscle strength, cardiovascular, and metabolic health. Such health benefits are especially more essential for diabetics who have a higher risk of cardiovascular problems and early death than the general population [20].

The American Diabetes Association (ADA) recently updated its advice and precautions for people with diabetes and gestational diabetes who engage in physical activity and exercise. Physical exercise adoption and maintenance are vital for general health and blood glucose management in people with diabetes and prediabetes [21]. Walking is a popular day-to-day activity. Although the beneficial effects of walking on the cardio-respiratory system and glycemic management have been demonstrated [22].

2. MATERIALS AND MATHODS

The present research was carried out under test experiments of diabetes. For the specific purpose, 40 male diabetic elder sportspersons with type I (n-20) and II (n-20) having similar age level were selected randomly from the educational and administrative intuitions of Faisalabad as sample size and divided them equally into two groups - 20 control group (10 type I & 10 type II) and 20 experimental group (10 type I & 10 type II).

Before the initial test, all participants were briefed about the aim of the study and cleared that their participation would be voluntary and data would be used for research purposes. The pre-test of blood was taken of all 40 diabetic sportspersons (20 type I & 20 type II) through Glucometer in fasting to assess their existing sugar levels.

Afterward, the aerobic exercises protocol was applied on the experimental group (10 type I & 10 type II) with a daily walk for six weeks (5 days/week) so that post-test would be achieved for further results (Table 1). On the other hand, the sportspersons of the control group were briefed to continue their daily life activities.

The collected data was assembled in statistical package of social sciences (SPSS, v-26). Descriptive statistics (frequencies) was utilized to determine the personal information of the respondents. Independent sample t-test was employed to analysis the results of pre-tests and post-tests.

Table 1. Protocol of aerobic exercises and walking

Week	Day	Activity	Distance/ timings	Repetition	Interval between repetitions
Week 1	Monday	Walking	2 KM	-	-
	Tuesday	Swimming	15 min.	2 x 15 min.	10 min.
	Wednesday	Cycling	15 min.	2 x 15 min.	5 min.
	Thursday	Light Jogging	20 min.	2 x 20 min.	5 min.
	Friday	Walking	3 KM	-	-
Week 2	Monday	Walking	3 KM	-	-
	Tuesday	Swimming	15 min.	2 x 15 min.	10 min.
	Wednesday	Cycling	20 min.	2 x 20 min.	5 min.
	Thursday	Light Jogging	25 min.	2 x 25 min.	5 min.
	Friday	Walking	4 KM	-	-
Week 3	Monday	Walking	2.5 KM	-	-
	Tuesday	Swimming	15 min.	3 x 15 min.	10 min.
	Wednesday	Cycling	15 min.	3 x 15 min.	5 min.
	Thursday	Light Jogging	20 min.	3 x 20 min.	5 min.
	Friday	Walking	3.5 KM	-	-
Week 4	Monday	Walking	4 KM	-	-
	Tuesday	Swimming	20 min.	3 x 20 min.	10 min.
	Wednesday	Cycling	20 min.	3 x 20 min.	5 min.
	Thursday	Light Jogging	25 min.	3 x 25 min.	5 min.
	Friday	Walking	3 KM	-	-
Week 5	Monday	Walking	4 KM	-	-
	Tuesday	Swimming	20 min.	3 x 20 min.	10 min.
	Wednesday	Cycling	25 min.	3 x 25 min.	5 min.
	Thursday	Light Jogging	30 min.	2 x 30 min.	5 min.
	Friday	Walking	4 KM	-	-
Week 6	Monday	Walking	3.5 KM	-	-
	Tuesday	Swimming	15 min.	4 x 15 min.	10 min.
	Wednesday	Cycling	15 min.	4 x 15 min.	5 min.
	Thursday	Light Jogging	30 min.	3 x 20 min.	5 min.
	Friday	Walking	4 KM	-	-

3. RESULTS

The data was collected from the diabetic sportspersons and their mean age was 47.23±2.1 years and the age of sportspersons was dropped between 40 to 55 years (Table 2). About 77.5% have belonged to public schools and 22.5 were from WAPDA employees. Furthermore, the type of these diabetic sportspersons was equally chosen as 50% from type I and the other 50% were type II.

Table 2. Statistics of sportspersons

Construct	Sportsperson	Percentage (%)
Age Level (Mean Age 47.23±2.1 years)		
▪ 40-45 years	11	27.5 %
▪ 46-50 years	23	57.5 %
▪ 50-55 years	06	15.0 %
Institution		
▪ Public School	31	77.5 %
▪ *WAPDA	09	22.5 %
Diabetes Type		
▪ Type I	20	50 %
▪ Type II	20	50 %

**Water and power development authority*

Table 3. Pre-test and post-test results of control groups type I & II (N-20)

Sportsperson Group 1 (Type I)	Diabetes frequency (Pre-test)	Diabetes frequency (Post-test)	Sportsperson Group 1 (Type II)	Diabetes frequency (Pre-test)	Diabetes frequency (Post-test)
1	163	176	1	335	347
2	186	179	2	303	312
3	169	182	3	311	314
4	157	169	4	295	308
5	192	199	5	283	295
6	181	178	6	323	319
7	158	167	7	303	299
8	173	181	8	271	286
9	157	164	9	285	291
10	159	173	10	305	312

Table 4. Pre-test and post-test results of experimental groups - type I & II (N-20)

Sportsperson group 2 (Type I)	Diabetes frequency (Pre-test)	Diabetes frequency (Post-test)	Sportsperson group 2 (Type II)	Diabetes frequency (Pre-test)	Diabetes frequency (Post-test)
11	166	105	11	274	115
12	155	101	12	331	121
13	174	112	13	317	110
14	162	105	14	327	124
15	188	110	15	299	113
16	166	107	16	284	118
17	179	109	17	316	129
18	159	101	18	306	119
19	169	105	19	285	114
20	158	109	20	319	123

Table 5. Treatment of control groups (Type I & II) without protocol

Constructs	Mean ± SD	
	Pre-Test	Post-Test
Diabetic sportspersons		
Control Group 1 - Type I (N-10)	169.5±6.3	175.8±6.3
Control Group 1 - Type II (N-10)	301.9±6.9	308.3±6.9

Table 6. Treatment of experimental groups (Type I & II) with protocol of Six weeks

Constructs	Mean ± SD	
	Pre-Test	Pre-Test
Diabetic sportspersons		
Experimental Group 2 - Type I (N-10)	168.2±61.8	106.4±61.8
Experimental Group 2 - Type II (N-10)	305.8±187.2	118.6±187.2

Table 7. Treatment of Control and experimental groups (Type I)

Constructs	Mean ± SD	
	Pre-Test	Post-Test
Diabetic sportspersons		
Control Group 1 - Type I (N-10)	169.5±6.3	175.8±6.3
Experimental Group 2 - Type I (N-10)	168.2±61.8	106.4±61.8

Table 8. Treatment of control and experimental Groups (Type II)

Constructs	Mean ± SD	
	Pre-Test	Post-Test
Diabetic sportspersons		
Control Group 1 - Type II (N-10)	301.9±6.9	308.3±6.9
Experimental Group 2 - Type II (N-10)	305.8±187.2	118.6±187.2

4. DISCUSSION

The findings in Table 6 highlighted the treatment of experimental groups of type I & II diabetes applying six weeks exercise and walk protocol. It was observed that a huge difference was found in results of type I (pre-test 168.2±61.8 & post-test 106.4±61.8) and Type II (pre-test 305.8±187.2 & post-tests 118.6±187.2).

The results of the pre-test in the fasting of type I and type II diabetic sportspersons of control group were drawn in Table 3. In fasting, the diabetes frequency ranges of type I were observed in pre-test from 157 to 192 (post-test 164-199), whereas, type II diabetic sportspersons' rages were 271-335 (post-test 291-347). Type I sportspersons were used medications to control their diabetes level and on the other hand, type II diabetics were executed insulin to overcome the level of their diabetes.

The findings of experimental group (type I & II) displayed in Table 4 indicated that aerobic exercises and walking have contributed vigorously to control the insulin level in blood stream of elder sportspersons. The post-test results shown that type I diabetes ranges in post-test were 101-112 (pre-test 155-188). Whereas, the ranges of type II diabetes in post-test were 110-129 (pre-test 274-331). It was observed that type I & II diabetes were dramatically controlled after six weeks through aerobic exercise and walk.

Independent sample t-test was applied to observe the differences of pre-test and post-tests results (Table 5). Mean and SD scores of control group type I were 169.5±6.3 (pre-test) and 175.8±6.3 post-tests. Therefore, pre-test Mean and SD scores of type II were 301.9±6.9 and post-test (308.3±6.9). The minor differences were found in type I & II control groups.

Results of type I diabetes in control group and experimental group were displayed in Table 7. It was observed that the experimental group (pre-test 168.2±61.8 & post-test 106.4±61.8) has great improvement to reduce the sugar level than the control group (pre-test 169.5±6.3 and post-test 175.8±6.3).

The findings of type II diabetes in control group and experimental group indicated that the mean and SD values of the control group has minor difference in its pre-test (301.9±6.9) and post-test (308.3±6.9), whereas, dramatically changes were observed in pre-test (305.8±187.2) and post-test (118.6±187.2) of the experimental group (Table 8).

The results has shown that type I & II diabetes of sportspersons as well as laymen can be controlled through applying effective aerobic exercises and walk protocol. It was observed in present results that regular aerobic exercises and walk maintain the glucose level in blood. The previous researches shown that aerobic exercises may cause of stable glycemic balance, weight loss maintenance, decrease insulin resistance, blood pressure (BP) decrease, and blood glucose control [7,8,10,12]. Whereas, few studies shown that glucose in bloodstream of may be less due to remaining engaged in high intensity exercises [3].

5. CONCLUSION

The purpose of the present research was to determine the effect of aerobic exercises and daily walk on the sportspersons of type I and II diabetes. The prominent differences were observed between control and experimental groups either type I or type II. It was concluded that the sportspersons may reduce the excessive glucose engaging in aerobic exercises and walk on daily basis rather than using medications. They should spend their happy lives and get rid of medications and insulin through spending their spare time using light exercises and maintain their glucose levels in blood as well.

CONSENT

As per international or university standard, respondents' written consent has been collected prior to data collection and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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