



## EFFECT OF EXERCISE ON THE HEALTH OF DIABETIC PATIENTS

Archana Singh<sup>\*1</sup>, Monika Bansal<sup>1</sup> and Prabhakar S Bais<sup>2</sup>

<sup>1</sup>Department of Biochemistry, Institute of Home Science, Dr. B.R. Ambedkar University, Khandari, Agra – 282002 (U.P.), India

<sup>2</sup>Department of Biochemistry, K.D.Dental College & Hospital –Mathura-281004 (U.P.), INDIA

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**Abstract:** Diabetes mellitus is a group of disease characterized by high blood glucose concentration in the blood and alteration in carbohydrate, protein and fat metabolism. People are greater risk of diabetes due to improper dietary practice, unhealthy life style, lack of physical exercise. The effect of exercise on the health of diabetic patient was conducted in 100 samples in both male and females. Statistical analysis showed that significant changes regarding mean blood sugar level were observed in male as well as in females before and after exercise. Thus, it can be concluded that exercise affects the blood sugar level in males as well as females.

**Keywords:** Body Mass Index, Diabetes mellitus

### INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder that prevents the body to utilize glucose completely or partially. It is characterized by high blood glucose concentration in the blood and alteration in carbohydrate, protein and fat metabolism. This can be due to failure in the formation of insulin. Observational studies addressing physical activity, weight loss, and dietary intake of whole grains and fiber etc. provided evidences for factor that might delay or prevent Type-2 diabetes<sup>1</sup>. The benefit of exercise in improving known risk factors for atherosclerosis is to be highly valued. However, it must also be appreciated that several studies have failed to show an independent effect of exercise training on improving glycemic control as measured by the AIC Test in patient with Type-1 diabetes. "In patient with Type 2 diabetes, structured regimens of physical activity for 8 weeks or longer improved AIC independent of change in body mass. Physical activity may cause transient increases in urinary albumin excretion but exercise has not been shown to increase the rate of progression of diabetic kidney disease. In contrast, insulin deficiency in a poorly controlled exercise results in increases in glucose concentration and free fatty acids release continues with minimal uptake. This can result in large increase in plasma glucose and ketone levels<sup>5, 6</sup>. So, in this study, we tried to find out the effect of exercise on the health of diabetic patients and to draw guideline for a healthy life style, which is valuable in treatment or prevention of diabetes.

### MATERIAL AND METHODS

The study is carried out in 100 diabetic male and female diabetic subjects. Multistage stratified random sampling technique was used in the selection of 100 samples. 62 males and 38 females. In which 50 patients

were doing exercise (Group-I) and 50 patients were not doing exercise (Group-II). In this study relevant information from the patient using the predesigned schedules was collected. Blood sugar level was access before and after exercise of the selected patients. The study is carried out under the following objectives:

1. To access the health status through BMI in male and female diabetic patients aged between 40- 50 years (All subjects had Type-2 diabetes and the only difference between groups was that they were assigned to either prescribed exercise regime or no exercise).
2. To study the effect of exercise among male and female diabetic patients.

Statistical analysis was performed to find out the effect of all factors on diabetes with the help of mean SD, t-test and to see the significance at 5% level. Correlation coefficient was also applied to assess the relationship between blood sugar level and exercise.

### RESULT AND DISCUSSION

Out of the 30 male patients in Group-I, majority of them (63.3%) belonged to 30 and above BMI while majority in Group-II (40.6%) each were of BMI 25-30 and 30 and above respectively. Further, table shows the mean BMI of the respondents in Group-I and Group-II. The mean BMI of the respondents was found to be more among Group-I (30.02) as compared to respondents of Group-II (28.74). Statistically, no significant difference was found regarding mean BMI between male respondents of Group-I and Group-II ( $t=1.117, p<0.05$ )<sup>3</sup> (Table 1).

#### \*Corresponding Author:

Dr. Archana Singh,  
Department of Biochemistry, Institute of Home Science,  
Dr. B.R. Ambedkar University,  
Khandari, Agra – 282002 (U.P.), India



Results and discussion of our study is summarized below:

**Table 1:** Distribution of the male and female diabetic subjects according to body mass index in Group-I and Group-II

Body Mass Index	Male				Female			
	Group I		Group II		Group I		Group II	
	No.	%	No.	%	No.	%	No.	%
15-20	-	-	-	-	-	-	-	-
20-25	2	6.7	6	18.8	-	-	3	16.7
25-30	9	30.0	13	40.6	9	45.0	2	11.1
30 and above	19	63.3	13	40.6	11	55.0	13	72.2
Total	30	100.00	32	100.00	20	100.0	18	100.0
Mean	30.02		28.74		30.56		30.73	
SD	3.08		5.52		3.20		4.53	
t	1.117				0.135			
p	>0.05				>0.05			

Out of the 20 female patients in Group-I, majority of them (55%) were having BMI of 30 and above while majority in Group-II (72.2%) were having BMI of 30 and above. Further table shows the mean BMI of the respondents in Group-I and Group-II. The mean BMI of the respondents was found slightly more in Group-II (30.73) as compared to Group-I (30.56). Statistically, no significant difference regarding mean BMI between female respondents of Group-I and Group-II (t=0.135, p>0.5) (Table 1). Other researchers also supported the findings of the present study as many as two third of the adults in developed nations are overweight (BMI-25.0-29.9kg/m) or obese (>/=30kg/m)<sup>7</sup> and many of these individuals suffered from weight related abnormalities such as hypertension, hyperlipidemia and Type-2 diabetes.

**Table 2:** Distribution of the male and female diabetic subjects according to type of exercise in Group-I

Type of Exercise	Group I			
	Male		Female	
	No.	%	No.	%
Walking	21	70.0	14	70.0
Gym	3	10.0	3	15.0
Yoga	6	20.0	3	15.0
Total	30	100.0	20	100.0

Among the male respondents in Group-I, majority of them (70.0%) were engaged in regular walk, followed by yoga (20.0%) while the majority in female respondents in Group-I (70.0%) were engaged in walk (15.0%), each were also attending gym exercises and yoga respectively<sup>7</sup> (Table 2)

Among the Group-I, majority of male subjects (40.0%) each were having the speed of walk 2-3 km/ hr and 3-4km/hr respectively while the majority of female respondents in Group-I (65.5%) were having the speed of walk 3-4 km/hr<sup>2</sup> (Table 3)

**Table 3:** Distribution of the male and female diabetic subjects according to type of exercise in Group-I

Speed of walk	Group I			
	Male		Female	
	No.	%	No.	%
2-3 km/hr.	12	40.0	3	15.0
3-4km/hr.	12	40.0	13	65.0
4-5	6	20.0	4	20.0
Total	30	100.0	20	100.0

**Table 4:** Distribution of the male and female diabetic subjects according to type of exercise in Group-I

Sex	Blood sugar level						Statistical values	
	Before exercise		After exercise		Changes		T	p
	Mean	SD	Mean	SD	Mean	SD		
Male	210.77	66.98	154.00	33.75	56.77	40.04	7.766	<0.05
Female	218.25	69.75	156.25	30.04	62.00	45.54	6.089	<0.05

Above table reveals the mean blood sugar level before and after exercise according to sex. Significant changes regarding mean blood sugar level was observed in male (56.77) as well as in females (62.00)<sup>4</sup> (Table -4). Thus, exercise affects the blood sugar level in male as well as female respondents. Exercise lowers the blood glucose level stimulating the β-cells of pancreas to liberate more insulin to act on blood sugar for glycogenesis and glycolysis.

**Table 5:** Distribution of the male and female diabetic subjects according to effect of exercise in Group-I

Effect of exercise	Group I			
	Male		Female	
	No.	%	No.	%
Average	0	0.0	2	10.0
Moderate	10	33.3	7	35.0
Good	20	66.7	11	55.0
Total	30	100.0	20	100.0

Among the male respondents in Group-I, majority of them (66.7%) were found good effect of exercise, followed by (33.3%) moderate effect of exercise, while the majority in female respondents in Group-I (55.5%) were found good effect of exercise, followed by (35.0%) moderate effect of exercise (Table 5). Thus exercises accelerate the utilization of carbohydrates in the tissues and ultimately lead to drastic reduction of muscle and liver glycogen. Physical exercise promotes the utilization of blood glucose and lower blood glucose levels.

### CONCLUSION

From the above observations, it can be concluded that exercise affects the blood sugar level in male as well as female respondents. Thus, along with other forms of treatment mild regular physical exercise played an important role in primary prevention of Type-2 diabetes. Therefore, the above discussion confirms that physical exercise help in reducing blood sugar level. If it is continue for prolonged duration it may

improves blood sugar level as well as health and fitness without any side effect.

### REFERENCES

1. Boule NG, Haddad E, Kenny GP, Wells GA, Sigal RJ, Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials, *JAMA*, 2001 Sep 12, 286(10), 1218-27.
2. Edward W. Gregg, Regular walking decreases morbidity rate by 50% in diabetes, *Arch. Intern Med*, 163, 1440-1447.
3. Weinstein AR, Sesso HD, Lee IM, Cook NR, Manson JE, Buring JE, Gaziano JM, Relationship of physical activity vs body mass index with type 2 diabetes in women. *JAMA*, 2004 Sep 8, 292(10), 1188-94.
4. Sigal RJ, Kenny GP, Wasserman DH, Castaneda Sceppa C, white RD, Physical activity / exercise and type 2 diabetes., a consensus statement from the American diabetes association, *Diabetic care* 2006, 29, 1433-1438(5).
5. Waden J. and colleagues, Exercise and type I Diabetes, American Diabetes association, Leisure time Physical activity is associated with poor glycemic control in Type I diabetes women. Sense of coherence, food selection and leisure time physical activity in type 1 diabetes, *Scand J Public Health*, November 2012, 40, 621-628.
6. Wasserman DH, Zinman B (1994): Exercise in individuals with IDDM, technical review, *Diabetes Care*, 1994, 17, 924.
7. Fritz T, Wandell HA, Peter E, Walking for exercise- does three times per week influence risk factors in type 2 diabetes?, *Diabetes Research and Clinical Practice*, 2006, 71, 1, 21-27.

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