

# Effect of Physical Activity on HBA1c Levels In Prediabetic Population

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## Abstract

**Background/ Objectives:** To study the effect of exercise on HBA1c levels in prediabetic population.

**Methodology:** This is an experimental study carried out in metabolic suite of Khyber Medical University from March 2019 to May 2019 on 10 prediabetic volunteers. The volunteers were given exercise protocol and step count standardized with pedometer for 8 weeks.

**Results:** The results are analyzed using SPSS version 24 and paired T test with 95% confidence interval and level of significance at 0.05. Paired t test is used showing significant correlation between pre and post exercise protocol of Fasting blood sugar (FBS) and glycosylated hemoglobin (HBA1c) levels with p value of 0.00 and 0.01 respectively.

**Conclusion:** Exercise has a marked effect on HBA1c and FBS levels and regular exercise, lifestyle change is a major factor in prevention of diabetes mellitus in the ever growing prediabetic population.

**Key Words:** Diabetes mellitus, prediabetes, glycosylated hemoglobin and fasting blood sugar.

## INTRODUCTION

Diabetes mellitus is a metabolic disorder with hyperglycemia due to deficiency of insulin, insulin resistance or both of them (1). In 2011, an estimate of 366 million people were affected by DM worldwide (2). Risk factors for developing diabetes include sedentary lifestyle, consumption of junk food, positive family history while the latter is considered as a strong determinant (1).

Prediabetes is a preclinical stage where people are at higher risk of developing diabetes mellitus type 2 (T2DM) (3, 4, 5).

It has been reported by WHO (World Health Organization) that "12.9 million people in Pakistan are affected by diabetes while 38 million people have prediabetes (6, 7, 8). The second National Diabetes Survey of Pakistan (second NDSP) conducted from February 2016 to August 2017 showed a prevalence of diabetes 26.3% and prediabetes 14.4%. The estimated count of prediabetics in the world is 314 million and is expected to rise by 2025 to 418 million (8,9).

The role of exercise as a treatment tool for DM and its complications is very well established (10,11,12). In this study we are looking at the effect of planned exercise protocol on HBA1c levels.

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## METHODOLOGY

An experimental study carried out in metabolic suite of Khyber Medical university for 3 months. The prediabetic volunteers after screening with Fasting blood sugar of 100 to 124mg/dL and HBA1c between 5.7 to 6.4 were included in the study. They were provided with breakfast and were given moderate exercise protocol to achieve 60% of heart rate maximum and the step count was standardized with pedometer. They were provided pedometers for monitoring their step count. 30 minutes exercise daily for 5 days a week for 8 weeks was the protocol. Record was maintained on a chart. After 8 weeks Post protocol FBS and HBA1c levels were repeated by calling the volunteers in fasting state.

## RESULTS

The results are analyzed using SPSS version 24. A significant correlation of FBS and HBA1c with exercise is seen with p value of 0.00 for FBS and 0.009 for HBA1c pairs. The paired t test with 95% confidence interval and level of significance at 0.05. It showed significant correlation of exercise on fasting blood sugar and HBA1c after moderate exercise for 8 weeks. The mean value of FBS1 and FBS2 is 16.90 with standard deviation of 7.752 and standard error mean of 2.452 with high level of significance of 0.00. The mean of HBA1c is 0.29, standard deviation is 0.1912, standard error mean 0.0605 and level of significance at of 0.001.

## DISCUSSION

The goal of the study was to look at the effect of moderate exercise on FBS and HBA1c in prediabetic population. According to Chris and Loris et al, 2016 (13) moderate-intensity exercise was significantly more effective than the same amount of vigorous-intensity exercise ( $p < 0.0207$ ), consistent with our study. Ross and colleagues (14) reached a conclusion that exercise had a marked effect on glucose control. According to Ivan and Barbara et al, 2018 (15) a decrease in HbA1c levels was observed

**TABLE 1: showing paired sample characteristics**

	Mean	N	Std. Deviation	Std.Error mean
FBS1	111.00	10	7.703	2.436
FBS2	94.10	10	14.279	4.515
HBA1c 1	6.010	10	.2767	.0875
HBA1c 2	5.720	10	.2898	.0917

Table 1 shows statistics, mean, sample size, standard deviation and stand. Error mean

**TABLE 2: showing paired sample correlation**

	N	Correlation	Sig.
Pair1 FBS1, FBS2	10	.923	0.000
Pair2 HBA1c1, HBA1c2	10	.773	0.009

Table 2 shows significant correlation of FBS and HBA1c with exercise.

**TABLE 3: Paired Sample t test**

	Mean	Std. Dev	Stand. Error Mean	upper	lower	t	df	Sig(2tailed)
FBS1, FBS2	16.900	7.752	2.452	11.352	22.445	6.894	9	0.000
HBA1c1, HBA1c2	.2900	.1912	.0605	.1532	.4268	4.795	9	0.001

Mean value of FBS1 and FBS2 is 16.90 with standard deviation of 7.752 and standard error mean of 2.452

in resistance exercise and in intervention length below 12 weeks consistent with our study.

## CONCLUSION

Exercise has a marked effect on HBA1c and FBS levels and regular exercise, lifestyle change is a major factor in prevention of diabetes mellitus in the ever growing prediabetic population.

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