

## Interconnection between the Timing of Physical Activity and Control of Diabetes in Type 2 DM Patients

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### Abstract

**Aim:** To associate the timing of Physical activity and control of Diabetes in Type 2 DM patients.

**Objective:** To study the timing of Physical activity in Type 2 Diabetes mellitus patients.

**Background & Introduction:** Type -2 Diabetes mellitus, is one of the common chronic diseases, where there is a disturbance in using the excess glucose getting entering into the blood. Thereby high glucose levels in the blood lead to disorders of the nervous, circulatory, and immune systems. Physical activity promotes positive self-image and good well-being. World health organization defines physical activity as any body movement in which the skeletal muscle is taking part that requires a lot of energy. Regular physical activity helps to decrease the morbidity from many non - communicable diseases. Knowledge about regular physical activity, type of physical activity and the timings to be followed to perform the activities among diabetes patients results in control of their glycemic status.

**Methods and Methodology:** 500 known cases of Type 2 Diabetes patients were enrolled in the study. Reports necessary for glycaemic status are collected. Physical activity or exercise history obtained from the patients.

**Results:** The person who did regular physical activity had better control of diabetes than those who did not do regular physical activity.

**Conclusion:** Globally it is very important to promote the importance of physical activity which can act as a single component that can reduce the risk of developing early complications and also act as a vital component for the prevention as well as management of type 2 diabetes. It must also be recognized that regular physical activity in improving the abnormalities in the metabolism of type 2 diabetes is probably the highest. This study helps to be aware of the morbidity associated with their lifestyle habits. Further, it also helps in changing their lifestyle from a sedentary lifestyle which will help in reducing the higher glycemic status and comorbidities.

**Keywords:** Complications of Diabetes, Physical activity and its timings, Type 2 Diabetes mellitus.

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## Introduction

Diabetes is one of the fastest-growing public health problems worldwide. India is home to the second-largest number of adults with diabetes worldwide. According to International Diabetes Federation (IDF) 2021, it is estimated that 537 million adults (20-79yrs) are living with diabetes and this number is projected to reach 643 million in the year 2030 and 783 million by 2045. India is home to the second largest number (77 million) of adults with diabetes worldwide with an 8.8% prevalence [1]. Three out of 4 members are living in low and middle-economic countries. Diabetes is considered a reason for 6.7 million deaths in the year 2021, i.e., one in every 5 seconds. Around 541 million adults are suffering from impaired glucose tolerance which is putting them at a high risk of developing Type 2 DM. A sedentary lifestyle and improper or no physical activity have been noted for the increasing cases all over the globe. A higher risk of diabetes is believed to be associated with increasing age, lifestyle, eating habits, ethnicity, family history of diabetes, and above all this is without any physical activity. Complications related to diabetes include neuropathy, retinopathy, cardiovascular diseases, renal diseases, etc. Hemoglobin A1C(HbA1C) is the glycemic status of an individual and will act as a biomarker for checking and monitoring diabetes. Increased value of HbA1C can be seen in patients with diabetes and poor control of diabetes. DM can be controlled through the patient's dietary knowledge, regular physical activity, and regular medications. These are considered an integral part of comprehensive diabetes care.

Physical exercise improves the Glycemic status in type 2 DM and can also reduce the risk of cardiovascular diseases. Moderate to high physical exercise is advised for patients with metabolic disorders to make them prevent type 2 DM. Numerous studies say, walking, a

simple exercise has a good beneficial effect in reducing type 2 DM. (3). Walking daily for at least half an hour has a positive impact in reducing the risk of Type 2 DM to approximately 50 %. (3). Exercising Walking will improve insulin sensitivity, blood glucose control, and can reduce the occurrence of obesity (3). And also, studies proved that physical activity along with dietary changes have reduced the risk of developing Type 2 DM with IGT (1). A prospective study says that an increase in physical activity either decreases or prevents the development of Type - 2 Diabetes mellitus (2). Richard L. Lipman, et al, explained in their study that decreased physical activity, produced by absolute bed rest given for even a short period of time or by immobilization results in significant peripheral insulin resistance and glucose intolerance (4). Chiara di Loreto, MD et al, confirmed by their study that, there should be definite physical activity counselling for patients to be followed to reduce cardiovascular risk and it is also considered an essential part of therapy for Type 2 diabetes.

## Materials and Methodology

A cross-sectional study was carried out with a known case of Type 2 Diabetes mellitus patients attending a Diabetic Clinic based on the inclusion and exclusion criteria. Informed consent was obtained from the selected subjects and their demographic profiles, and physical activity timings and type of activity is collected. The study subject's blood sample was collected by venous puncture using aseptic techniques. FBS, PPBS & HbA1C was determined.

## Results

Statistical analysis was done with the data collected using SPSS software. In this study, it is proved that regular physical activity with a specific duration had positive effects on the control of diabetes. People who did regular physical activity

when compared to occasional or no Diabetes. And the type of physical exercise like simple walking can reduce the HbA1C level to control or normal

physical activity had good control of level. When compared to increasing age, young age people had better control of diabetes.

**Table 1: Control of diabetes with physical activity:**

Physical activity	Normal HbA1C-6%	Good control HbA1C-6-8%	Poor control HbA1C->8%	P Value
Regular	17.1%	60.8%	22.3%	< 0.001
Occasional	7.0%	11.4%	81.5%	< 0.001
No physical activity	2.0%	8.1%	89.9%	< 0.001

Table 1 describes the control of diabetes between the individuals who are practicing physical activity regularly and those who are not.

**Table 2: Control of Diabetes with the type of physical activity:**

Physical activity	Normal HbA1C-6%	Good control HbA1C-6-8%	Poor control HbA1C->8%	P Value
Walking	13.8%	47.4%	38.9%	< 0.001
Jogging	16.7%	19.4%	63.9%	< 0.001
Yoga	0.0%	12.5%	88.5%	< 0.001
Nil	11.8%	39.0%	49.2%	< 0.001

Table 2 describes diabetes control in people who are performing a different kind of physical activities. That is control among walking, jogging, and yoga-practicing individuals with the people who are not practicing any physical activities.

**Table 3: Control of diabetes with the timing of physical activity**

	Mean	P value
Timing of physical activity	38.87	<0.001
HbA1C	8.4	<0.001

Table 3 explains, when the timing of physical activity increase, the HbA1C value decrease.

**Table 4: Control of Diabetes with age group**

Age group	Normal HbA1C-6%	Good control HbA1C-6-8%	Poor control HbA1C->8%	P Value
<30 yrs.	14.3%	42.9%	42.9%	< 0.001
31 – 40 yrs.	25.7%	50.0%	24.3%	< 0.001
41 – 50 yrs.	11.9%	33.6%	54.5%	< 0.001
>50 yrs.	8.3%	38.8%	52.9%	< 0.001

Table 4 explains the control of diabetes among various age groups who participated in the study. As explained earlier, as age advances the control in HbA1C declines

## Discussion

Which is performed regularly (more than 4 days a week) definitely had a positive impact on glycemic control for Type 2 DM patients. Probable reasons behind the reduction of blood sugars are when the individual performs physical activity, it is going to increase the oxygen consumption of the whole body including the skeletal muscle, which in turn uses its own storage

In this study, we proved that physical activity for at least half an hour per day of glycogen and triglycerides, which is the derived from the breakdown of triglycerides from adipose tissue and glucose from the liver (6). The goodness of exercise and physical activity is that they increase cerebral blood flow and oxygen consumption, deliver oxygen to all the tissue, reduce muscle tension and increase the level of serum concentrations of

endocannabinoid receptors [7]. Physical activities and exercise also increase neurotransmitters like endorphins and serotonin [8]. Many studies proved that exercise and physical activities can help in reducing depression [9]. One study proved that those who practice exercise regularly are free from anxiety and depression is very much reduced for the subjects. It has also been seen that people who practice exercise frequently are not often depressed and do not suffer anxiety [10]. So, Good physical activity and regular exercise can be considered one of the best and low-cost therapies for many diseases.

#### Strength of the study

Many researchers found that regular physical activity can reduce the onset of diabetes and reduce the level of high sugars in confirmed cases of type 2 Diabetes mellitus. In our study, we correlated the timings of Physical activity and their effect on glycemic control in patients with type 2 diabetes.

#### Conclusion

Diabetes is a chronic disease that is going to continue the whole life, proper therapy methods with special emphasis on physical exercise and diet can be given by the healthcare providers, in order to reduce the disease, and prevent the appearance of early complications. The patients should also have good knowledge about the disease and the need for regular physical activity and a diet plan to be followed, which will help in the reduction of the blood glucose level.

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