Exercise Effect Model (EEM) of Type II Diabetes: A case study of District Swat, Khyber Pakhtunkhwa, Pakistan

Muhammad Riaz[1] and Shah Dawran[2]

Abstract

The main objective of this study was to find the effectiveness of exercise on sugar level and to develop a model for measuring the unit change in the sugar level at different times. The sugar level depends upon the exercise, diet and hypoglycemic drugs. Regular exercise is the cheapest way to maintain the sugar level as compare to diet and the high cost of hypoglycemic drugs. A new model for assessing the effectiveness of exercise on blood sugar level was developed called Exercise Effect model. It was observed that the sugar level after three months exercise was reduced by 5 percent and after six months exercise it was reduced by 3 percent. The Exercise Effect Model is an effective Statistical method for assessing the unit change in sugar level after regular exercise.

Keywords: Exercise Effect Model, Mean sugar level, Standard Error.
Abbreviations: Exercise effect model (EEM), Standard error (SE), Blood sugar after exercise (BSE)

1 Introduction

Type II Diabetes is one of the most common debilitating multi system disorders. According to the report of world health organization (WHO) about 135 million throughout the world have diabetes and among them type II diabetes is about 90%. WHO predicts that about 300 million people will have this disease by the year of 2025. Type II diabetes is characterized by high glucose levels in blood and urine resulting from dysfunction of pancreatic beta cells and insulin resistance. The type II diabetes usually

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[1]Department of Mathematics and Statistics, University of Swat, Saidu Sharif, Swat, Khyber Pakhtunkhwa, Pakistan.
[2]Dr., Registrar/Deputy Medical Superintendent, Saidu Group of Teaching Hospitals, Saidu Sharif, Swat, Khyber Pakhtunkhwa, Pakistan.

starts at later stage of life (over the age of 40 years).It can be controlled with exercise, diet, hypoglycemic drugs and insulin (Khan, et al. 1993, Khan and Ahmed. 1994).

Regular exercise can help to reduce the risk of diabetes. Drugs therapy is the most common but costly approach in the treatment of diabetes also having side effects. Sulphonylureas stimulate the pancreas to produce insulin and increase the body's sensitivity to insulin. (Bennion.1979). Dietary therapy is of the 1st choice in the control of diabetes. It is natural, economical and feasible in developing countries.

Exercise plays a significant role in controlling type II diabetes as well as its complications (Manson, et al. 1991). Exercise is a cornerstone in the treatment of diabetes, along with proper diet and medication (Devlin. 1992).

Type II diabetes mellitus can be achieved by lifestyle measures with moderate exercise and diet (Tuomilchto, et al. 2001 and Knowler, et al. 2002).

2 Patients and Methodology

In this study a total of 70 patients were selected and their sugar level recorded at different times. The sugar level was tested by random blood sugar test. The variables under study were sugar level at zero time, after three months exercise and after six months exercise. The sugar level was measured by performing the random blood test of the individuals at various times. The relevant data were recorded for the seventy individuals. Statistical methods were applied to find the effect of exercise on sugar level.

3 Statistical Analysis

The purpose of this study was to find the effect of exercise on sugar level. In this study 70 diabetic patients between 35 to 50 years of age both male and female were selected. The blood sugar level was recorded at zero time and after three and six months exercise respectively. The average blood sugar level of the patients at zero time was 208.39 with standard error 3.27. Twenty five percent of the patients were having their blood sugar below 192.75 and seventy five percent were having blood sugar below 225. After three month exercise the average blood sugar level was 158.97 with standard error 4.24. Twenty five percent of the patients were having blood sugar below 121.75 and seventy five percent of the patients were having blood sugar level below 188.25. After six month of exercise the average blood sugar level was 157.1 with standard error 2.19. Twenty five percent of the patients were having their sugar level below 146.0 and seventy five percent of the patients were below171.25.

As blood sugar level depend upon exercise, diet and oral hypoglycemic drugs. Therefore a new model for assessing the effectiveness of exercise on blood sugar level was developed called Exercise Effect model (EEM)

The Exercise Effect Model (EEM) is given by

$(BSE)_0 = 221 - 0.0502 (BSE)_3 - 0.029 (BSE)_6$

$(BSE)_0$ represent blood sugar level at zero time.

$(BSE)_3$ represent blood sugar level of exercise group after three months.

$(BSE)_6$ represent blood sugar level of exercise group after six months.

The EEM shows that after three months exercise the blood sugar level was reduced by five percent and after six months exercise it was reduced by three percent.

4 Place and Duration of the Study

This study was carried out in medical camps organized by health department of district Swat from December 2007 to 16th April, 2009.

Table 1: Comparison of blood sugar level at zero time, after 3 months and after 6 month exercise

Sugar level	Mean ± SE	Below 25%	Below 50%	Below 75%
Zero time	208.39 ± 3.27	192.75	210.50	225.00
After 3 months exercise	158.97 ± 4.24	121.75	175.50	188.25
After 6 months exercise	157.10 ± 2.19	146.00	155.50	171.25

5 Conclusion

The sugar level depends on the exercise, diet and hypoglycemic drugs. The sugar level after three month exercise was reduced by five percent and after six months exercise it was reduced by three percent. As compare to diet and the high cost of hypoglycemic drugs regular exercise was cheapest way to control the sugar level. Thus by doing regular exercise, one can maintain his/her sugar level normal with out using hypoglycemic drugs and balance diet.

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