CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

S1208

Project Title

A Quantitative Analysis of the Effects of Controlled Exercises on Insulin-Dependent Diabetes Mellitus

Abstract

Objectives/Goals

Type 1Diabetes, or diabetes mellitus, is a genetic disease where the body#s immune system destroys the insulin-producing cells of the pancreas, or beta cells. In a person with type 1 diabetes, there is a complete deficiency of the insulin hormone. In order to deal with this defect, patients must give themselves doses of insulin in order to manage their blood sugar. Therefore, since one of us has type 1 diabetes and is constantly exercising, we wanted to find a quantitative relationship between the amount of exercise expended as measured by its duration and carbohydrate intake with the blood glucose levels in teens with type 1 diabetes.

Methods/Materials

For this study, we found three teenagers who are diagnosed with type 1 diabetes who were willing to participate in the study. Then, we tracked their blood glucose levels in 30-minute intervals before and after aerobic exercise. The carbohydrate and insulin intake was kept constant. (An apple was used as the carbohydrate to be taken before the exercise.) In addition, the basal rate or lantus dosage, insulin given over a 24-hour period, was also kept the same. This process was conducted three separate times for each participant. Then, the results were analyzed and compared to one another.

Results

The results of this study showed that on average, the blood glucose level of teens with type 1 diabetes significantly decreased after 30 minutes of exercise. For instance, the blood glucose level dropped by about 20 mg/dl. This means that the exercise did some of the work that insulin would normally have to do for the body. In other words, the exercise was able to break down some of the glucose in the body, and lower the level of sugar in the blood of these diabetic teens.

Conclusions/Discussion

Therefore, these data show that our hypothesis that exercise will decrease the amount of sugar in the blood by 5 mg/dl in type 1 diabetic teenagers is almost correct. Instead of decreasing by 5 mg/dl, the blood glucose levels decreased by about 20 mg/dl. With this knowledge, teens with type 1 diabetes can consider exercising to help regulate their sugar levels if they are too high. Also, this means that if a type 1 diabetic teen were to have a low blood glucose level, they should exercise with caution. In conclusion, exercise does in fact have the capacity to aid the insulin in breaking down the sugar in the blood of teens with type 1 diabetes.

Summary Statement

This experiment studies whether or not the blood glucose levels in teens with type 1 diabetes will decrease after exercise if the carbohydrate and insulin intake are kept constant.

Help Received

This project was conducted under the guidance of Ms. Adriatico.