CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

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Project Number

J1907

Project Title

How Much Glucose Is in That Drink?

Abstract

Objectives

I want to see if a glucometer, commonly used by diabetics, can be used to accurately determine whether or not a drink has glucose in it and can it tell how much glucose is in a drink. Knowing whether to not a drink contains glucose and roughly how much is critical for people with Type 1 Diabetes who require insulin for all carbs consumed.

Methods

A FreeStyle Lite glucometer and test strips commercially available from Abbott were used.
The following drinks were purchased:
Coke (x2), Sprite (x2), Sprite Zero, TreeTop Apple Juice, TreeTop Orange juice (x2), Bai Watermelon, Honest Tea Green Tea
Each drink was tested at room temperature using the Freestyle Lite and a new test strip each time. Each drink was tested 3 times and the average and standard deviation were calculated.

Results

Several of the drinks gave somewhat reproducible results, Coke (300-400 mg/dl), Sprite (300-425 mg/dl) apple (~170 mg/dl) and orange juices (~150mg/dl) All four of these have very similar amounts of sugars per 100ml, but the measured amounts were much lower for the apple and orange juices. Three of the drinks, Bai Watermelon, Sprite Zero and Honest Tea Green Tea all gave errors when they were read. These were tried multiple times, on different days and even with a different meter and still gave errors.

Conclusions

The data obtained were largely unexpected and somewhat different from what we had expected. The glucometer worked relatively well for some of the drinks (Coke, Sprite and the juices) but did not work at all for the others. Within the drink group that did work there was a fairly large range within the same drink and between different drinks even though all of them have very similar amounts of sugars per 100ml. The other drinks that gave error readings are difficult to interpret because they have little in common. The only common ingredient is citric acid, but the orange juice has high levels as well and worked fine.
This experiment shows that glucometers can be used to determine whether or not certain drinks have glucose in them, but not all drinks. Glucometers are designed and calibrated to detect glucose levels in blood, so the chemical makeup of the drinks may interfere with the readings. It would probably be best for individual diabetics to test the drinks they commonly consume using their particular meter to determine which drinks give accurate results and which ones give errors.

Summary Statement

Can a common glucometer be used to determine whether or not a drink contains glucose and if so, roughly how much?

Help Received

Rita Armstrong and Paul Denis