CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
31694

Project Title
Swimmer's Heartburn

Abstract

Objectives/Goals

The purpose of the experiment was to answer the following question. How do different swimming strokes (freestyle, backstroke, breaststroke, and butterfly) affect heart rate and why?

Hypothesis:

Butterfly will give you the highest heart rate because it requires a lot of upper body strength, has a fast pace, and requires breath control.

Methods/Materials

Forty-one swimmers were categorized into six groups by age (9-10, 13-14, 15 and up) and gender. Each swimmer measured their resting heart rate. Each swimmer swam the butterfly for 50 yards and immediately measured their heart rate. This procedure was repeated for the backstroke, breaststroke and freestyle.

The materials used include: one stopwatch, one clipboard, one data sheet, two pencils, forty-one swimmers, and a 25 yard pool.

Results

The information obtained from this project illustrates that freestyle (Australian Crawl), in most instances, results in swimmers having the highest heart rate after swimming a 50 yard sprint, particularly with male and older swimmers. This result was not uniform, however, in every age group and gender. Butterfly produced the highest heart rate in younger girls; this may be because of less upper body muscle mass necessary to execute butterfly effectively resulting in higher heart rates.

Conclusions/Discussion

The data obtained from the experiment did not support my hypothesis. The greatest elevation of the heart rate was caused by the freestyle, and was followed by the butterfly, breaststroke, and the backstroke. Freestyle uses the main arm and leg muscles in continuous fast strokes and thus results in the greatest increase in heart rate. Both butterfly and breaststroke utilize major muscle groups. However, they are short axis strokes that utilize body buoyancy; this might explain why they generally resulted in a lesser increase in heart rate than freestyle. Even though the backstroke uses major muscles, the access to oxygen may have resulted in less of an increase in heart rate than freestyle.

Summary Statement

Swimmer's Heartburn examines which of four competitive swimming strokes (butterfly, backstroke, breastroke, and freestyle) produces the greatest heart rate and why.

Help Received

My science and english teachers reviewed my science project. A professional swim coach helped me conduct the experiment and analyze the results.