CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35070

Project Title

Effective Headgear in Soccer

Abstract

Objectives/Goals

The goal of this experiment was to compare five brands of soccer headgear to observe differences in the forces of impact, at four different speeds, on each of the four sides.

Methods/Materials

Five brands of soccer headgear were used for this experiment: Donjoy, Full 90, Storelli, Headblast, and Forcefield. An accelerometer was inserted inside a hollow mannequin that was fixed onto a wooden pallet to restrict movement. A pitching machine projected tennis balls at the mannequin head where the headgear was placed. A GoLink adapter connected the accelerometer to a computer installed with Logger Lite software to collect data. Each side of every headgear was hit 20 times at four different speeds, 40 mph, 45 mph, 55 mph, and 65 mph.

Results

The analysis from the data indicate a varying percentage of decrease at each speed for each headgear. The data shows that at 40 mph Forcefield was the best overall, but the best for each side varied among the headgear. At 45 mph, Full 90 and Forcefield reduced force most. At 55 mph, Forcefield experienced the highest percentage decrease, and was the most effective on all the sides but the left. Finally, at 65 mph, Headblast showed the highest reduction of force overall, being the most effective on all sides but the front. Overall, comparing all the speeds, at 45 mph, the headgear reduced force more than at any other speed. There was a significant difference in force reduction between the lower and upper speeds, where the overall decreases dropped by 63% from 45 mph to 55 mph.

Conclusions/Discussion

In this experiment, Storelli was the least effective at reducing the force of an impact at the lower two speeds, while Donjoy was the worst at the higher two speeds. Forcefield was the best, reducing force by 81.2% for both 40 mph and 45 mph and by 22.4% and 21.3% at 55 mph and 65 mph respectively. At the lower two speeds, all the headgear were successful at reducing force by 75% or more. At the higher two speeds, the headgear were not as successful at reducing force. The force reductions at the higher two speeds were between 10% and 30%. The data from the lower two speeds supports the claims set by the manufacturers and exceeds the expectations set by the hypothesis. At the higher two speeds, the claims are refuted, and they do not meet the levels stated in the hypothesis. This data can help scientists create better and more effective headgear to provide more safety in soccer.

Summary Statement

The purpose of this experiment was to compare five different brands of headgear and observe how much they reduce the force of an impact and how effective they are at four different speeds

Help Received

Family helped with experimentation by taking shifts working the computer, spotting, and collecting balls. Parents helped proofread the paper. Dave Vernier, President of Vernier, sent accelerometer replacements. Dr. Kevin Carneiro was my mentor and helped with the paper and resources. Mr. Matt from Storelli and

Preliminary