CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
S1003

Project Title
Bat Grip and Hand Muscle Fatigue

Abstract

Objectives/Goals
The objective is to determine if holding the baseball bat in the correct position (with the proximal interphalangeal knuckles of both hands aligned) results in less hand muscle fatigue than other bat grips.

Methods/Materials
Informed consent (conforming with HIPPA regulations) was obtained from 10 subjects, 5 athletes, and 5 non-athletes. A preliminary fatigue test (consisting of catching a dropped yardstick as quickly as possible) was conducted on each subject to establish a baseline. Each subject swung a baseball bat 30 times in one minute holding the bat with 1) The Correct Grip, 2) Incorrect Position # 1,3) Incorrect Position #2, and 4) Correct Grip Retest. After each swing test, a fatigue test was done three times, and the results were averaged and recorded for each subject.

Results
In the Athletic group, the Position 1 mean was 6.2 inches compared to 7.0 inches for Position 2 (incorrect #1) and Position 3 (incorrect Position #2) which was 7.8 inches. In the Non-Athletic group, the mean was 8.8 inches for Position 1 compared to a mean of 9.2 inches for Position 2, and Position 3, which had a mean of 9.3 inches (n=5). Even after three swing trials, the mean for the retest of the correct grip was less than the incorrect grips tested earlier.

Conclusions/Discussion
The correct grip caused less fatigue than the two incorrect grips. The data was compared using a paired t-test and was found to be significantly different with P values of 0.05 or lower. Position 1 (Pos.1), the correct Position vs. Pos.2 (incorrect Position #1 was significantly different ($P=0.007513$). Pos.1 vs. Pos.3 (Incorrect Position #2) also had $P<0.05$. Position 1 vs. the Re-Test of Position 1 had a p-value greater than 0.05 showing that the two tests of the same grip were more or less the same. Athletes seemed to train themselves to watch and react to the falling yardstick, often competing to beat the previous measurement. From the first test to the last test there was a learning curve which took place, but despite this there was still a significant difference in hand muscle fatigue in both the athletic and non-athletic subjects using the correct grip Position 1, and the other bat grips used. With this information, baseball players can reduce hand muscle fatigue, and may reduce injuries that occur as a result of fatigue, while improving performance.

Summary Statement
This is an investigation of whether holding a baseball bat with the proximal interphalangeal joints aligned in both hands causes less muscle fatigue than gripping the bat with any other alignment.

Help Received
My science teacher, Leslie Gushwa, helped me with statistics and proofreading. My mother, a physical therapist, was a source of information, encouragement, and motivation. The San Dieguito Academy JV baseball Team supplied athletic test subjects.