Example of test retest reliability of the abl and acusport report

Law, Evidence

Test Retest reliability of the ABL and Acusport in measuring resting

Exercise Bioenergetics

Resting and exercise blood lactate concentrations were measured in order to Test Retest the reliability of two measuring devices, the ABL and the Acusport. The purpose of the test was to prove the reliability of the results. The t-test and the Pearson's product Correlation Coefficient were used in order to evaluate the experimental results. The t-test and the Peason's product Correlation Coefficient calculations proved that the experimental test results from the trials of the ABL and Acusport measuring devices are reliable. The results will be reproducible if the experiments are done again.

Introduction

High quality evidence based knowledge requires the intersection of four factors (a) " research evidence," (b) a client's values, and their life's situation, (c) " information from the practice context," and (d) " clinical experience" (Hoffman et al., 2012, 4). Information from laboratory experiments is very important part of being able to make good decisions. Clinical research can rely on qualitative measurements but it is very important that the measurements are proved to be reliable. Reliable results can be reproduced in other clinical trials. Accuracy demonstrates how close a measurement is to the true value. Precision demonstrates " how well experimental data and values agree with each other in multiple tests" (Helmenstine, n. d., Chemistry).

There are certain strategies and methodologies that have been developed so that researchers can test the accuracy, precision and reliability of their measurements. Good decisions require the measurements to be reliably reproducible. The general purpose of this laboratory was to test how reliable two types of measuring devices are, the ABL and the Acusport. Two types of trials were done for each device, measurement of blood lactate concentrations when resting and when exercising. The specific purpose of this laboratory is to evaluate and report the test retest reliability by using the t-test and the Pearson product Correlation Coefficient. The t-test is used to understand if the " means of two groups are statistically different from each other" (Trochim, 2006). The Pearson product Correlation Coefficient uses the linear relationship between x and x to demonstrate the correlation between the variables.

Methodology

The results of measurements from blood lactate concentrations were evaluated to understand if the measurements were high quality. The two devices used to measure blood lactate concentrations were ABL and Acusport. Measurements of the blood lactate concentrations were taken both when participants were resting and when they were exercising. Need to test the reliability and in testing about reliability must test equality of the two trials also the correlation between the two trials. The data from two trials of the ABL and two trials of the Acusport were evaluated for their reliability by using t-tests and the Pearson product Correlation Coefficient (PPCC).

Statistical Analysis

The calculations used to determine the t-test reliability and the PPCC are discussed here. The t-value demonstrates the ratio of signal to noise which equals the difference between group means divided by the variability of groups. A Table of Critical t-Values for 95% Confidence level can be found on the web page www. chem. utoronto. ca a table for the critical values for a 2-taled t-test is shared. The equation for finding the critical t-test critical: 1 – α = 95% confidence because 1 – 0. 5 = 95% confidence.

Degrees of Freedom refers to the number of data points minus 2 plus the error. Or another way to put it is that the number of values used in a final statistical calculation can (are free to) vary. This is a mathematical way to evaluate the graph of linear regression because some of the values are not free; they are forced to conform to a straight line. The Pearson product Correlation Coefficient (PPCC) was determined from linear relationship of the two variables in this analysis.

Results

The t-test tests the quality of the means for example from Table 1 whether or not 2. 3 and 2. 3 are statistically the same; and also from Table 1 whether 2. 7 and 2. 8 are statistically the same. The standard deviation for the two trials of ABL and the two trials of the Acusport t-test has to be less than the critical t-test. That is because of the null hypothesis that determines the two means are the same if each trial t-test is less than the critical t-test. Remember t-test values should be less than the Critical t-test value in order to demonstrate that the means are the same.

Table 1. Results of calculations of the 4 trials.

In Table 2 the critical t-test value of 1. 97 was found for two tales with α equal to 0. 05 and the degrees of freedom equal to 255 for the ABL trials. For the Acusport Degrees of Freedom was found to be 148. (157 – 7- 2 = 148). Table 2 shows that the PPCC shows a strong correlation for the regression. If the PPCC is between . 5 and 1. 0 there is a strong positive correlation. For the ABL the PPCC value is 0. 838718 and for Acusport the PPCC value is 0. 6788218.

Table 2. Statistical values.

T-test critical

a= 0. 05 two tail

www. stattools. net/tTest_Tab. php

Figure 1 shows a plot correlating the two ABL trials with the regression line y equal to 0. 8079x -+ 0. 4745. R squared is the coefficient of determination saying that both of the ABL trials are fairly close to linear because R2 is 0. 7 which is close to 1. 0.

Figure 2 shows a plot correlating the two Acusport trials with the regression line y equal to 0. 7374x -+ 0. 8137. R squared is the coefficient of determination saying that both of the Acusport trials are statistically the same because R2 is 0. 4608 which can be rounded to 0. 5. PPCC shows a good correlation for the regression but not as strong a correlation as the t-

tests showed. If the PPCC is between . 5 and 1. 0 there is a strong positive correlation.

Discussion

Both sets of trials have shown good correlations to the mean. The t-tests for the trials for both types of devices demonstrate a good reliability. For ABL the PPCC value is 0. 838718 and for Acusport the PPCC value is 0. 6788218 which is a strong correlation.

The ABL trials are linearly close because R2 is 0. 7 which is close to 1. 0.

Conclusions

The two trials for ABL and the two trials for Acusport were shown to correlate to the mean. Both the values for the t-tests and the PPCC value show that these tests when reproduced will give similar results.

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