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CORRELATION BETWEEN ISOMETRIC MUSCLE STRENGTH AND THE UPPER QUARTER Y BALANCE TEST PERFORMANCE IN SWIMMING ATHLETES

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Background: Functional tests are commonly used in sports injury rehabilitation and prevention to measure abilities associated with athletic demands, including muscle strength, power, and agility. The Upper Quarter Y Balance Test (UQYBT) is commonly used for assessment of upper limb physical performance of the athletes. However, the association of the UQYBT and isometric muscle strength of kinetic chain muscles is not yet fully understood in swimming athletes. Therefore, further studies are needed to investigate the relationship between muscle strength and the UQYBT in this population. **Objectives:** To evaluate the correlation between isometric muscle strength of the kinetic chain muscles and the scores of UQYBT in swimming athletes.

Methods: This is a cross-sectional study. This study was approved by Ethics Research Committee. Swimmers of both sexes, aged between 12 and 60 years, with at least one year of competitive swimming experience and a training regimen of at least twice a week, were included. The UQYBT was analyzed in its medial, superolateral, and inferolateral directions. The athletes placed one hand at the center of the lines, and the other hand moved the free limb as far as possible three times in each direction. The mean, normalized by upper limb length, and the composite score were considered for analysis. Peak (Kg) of isometric muscle strength was assessed for shoulder elevators (scapion), shoulder rotators, lower trapezius, serratus anterior, trunk extensors and flexors, hip extensors, abductors, and internal and external rotators, as well as knee extensors. Pearson's correlation coefficient was considered as = 0.25 no relationship; 0.25 to .050 weak; 0.50 to 0.75 moderate, = 0.75 strong. Data analysis was performed using the Statistical Package for the Social Sciences, version 23.0 (SPSS Inc, Chicago, IL).

Results: A total of 51 athletes participated in the study. The medial direction of the UQYBT was significantly weakly correlated with muscle strength of all assessed muscles groups (r ranging from 0.30 to 0.46), except with trunk flexors ($r = 0.26$) and internal rotators ($r = 0.27$), which showed non-significant weak correlation. The inferolateral directions of UQYBT showed positive moderate correlation with trunk flexors ($r = 0.59$), knee extensor ($r = 0.55$), and lower trapezius ($r = 0.50$), and significant weak correlation with all other muscles groups (r ranging from 0.36 to 0.43). The composite score was weakly correlated with all isometric muscles strength ($r < 0.03$, $p > 0.05$). The superolateral direction showed no relationship with the strength of all the muscle groups analyzed (r ranging from 0.05 to 0.24).

Conclusion: The findings indicated that performance in the medial direction of the UQYBT was weakly correlated with all the muscles analyzed, the inferolateral direction was moderately correlated with knee extensor, trunk flexors, and lower trapezius strength, and the superolateral direction was weakly correlated with all the muscles analyzed.

Implications: These results can support clinicians in making informed decisions regarding the application of the UQYBT and in identifying which components of the kinetic chain may influence test performance. Consequently, strengthening key muscle groups may help improve UQYBT scores.

Keywords: Physical Performance Test, Functional Test, Kinetic Chain

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ANALYSIS OF KNOWN-GROUP VALIDITY OF THE UPPER QUARTER Y BALANCE TEST FOR ASSESSING SWIMMING ATHLETES WITH SHOULDER PAIN

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Background: Upper extremity physical performance tests are widely used to assess the functional status of athletes, analyzing skills related to demands, including muscle strength, power, and agility. The Upper Quarter Y Balance Test (UQYBT) is commonly used for assessment of upper limb physical performance of the athletes. However, the information on the validity of the UQYBT in known groups of swimming athletes with and without shoulder pain is scarce. Therefore, further studies are needed to investigate the known group validity of the UQYBT in this population.

Objectives: To evaluate the known group validity of the UQYBT in swimmers with and without pain.

Methods: This is a cross-sectional study. This study was approved by Ethics Research Committee. Swimmers of both sexes, aged between 12 and 60 years, with at least one year of competitive swimming experience and a training regimen of at least twice a week, were included. The UQYBT was analyzed in its medial, superolateral, and inferolateral directions. The supporting hand was positioned at the center of the marking of the three lines, and the individual was asked to move the free limb as far as possible. The swimmers reached three times each direction and the mean and normalized by upper limb length were considered for analysis. To assess known-group validity, the scores of UQYBT were compared between athletes with shoulder pain and asymptomatic. The groups were chosen based on the assumption that shoulder pain would significantly affect physical performance measured by UQYBT, resulting in lower scores for athletes with shoulder pain. The Kolmogorov-Smirnov test was used to assess the distribution of the data. To compare the groups with and without pain, an independent samples t-test was conducted. Data analysis was performed using the Statistical Package for the Social Sciences, version 23.0 (SPSS Inc, Chicago, IL).

Results: A total of 51 athletes participated in the study. The asymptomatic group presented significant greater score than the shoulder pain group in the medial direction of the UQYBT (mean difference [MD]: 8,1, 95% CI: -14,22, -2,01 $p = 0.013$). For the superolateral and inferolateral directions, the asymptomatic group did not show a statistically significant difference compared to the shoulder pain group (MD = 5,43, 95% CI: -11,03, 0,15 $p = 0.056$) for superolateral directions and (MD = 0,70, 95% CI: -8,30, 6,89, $p = 0.85$) for inferolateral direction.

Conclusion: The findings indicated that performance in the medial direction of the UQYBT can identify differences between individuals with and without pain, however, for the superolateral and inferolateral directions did not show significant results to differentiate the groups.