2,719 were non-sarcopenic. The survival rate of patients with lung cancer and sarcopenia was lower than that of patients with lung cancer and non-sarcopenia after 5 years of follow-up (19.4% vs 28.9%, $p < 0.001$). Functional performance, assessed by the distance covered in the six-minute walk test, was lower in the sarcopenic group compared to the non-sarcopenic group (516 ± 75m vs 526 ± 74m, $p < 0.001$). There was no difference in length of stay (11 vs 11 days, $p = 1.000$).

Conclusion: Sarcopenia reduces survival in patients with lung cancer and results in lower functional capacity, with no influence on the length of hospital stay.

Implications: We emphasize the importance of synthesizing information about the effect of sarcopenia associated with lung cancer to contribute to the clinical decision-making of professionals who work in this health condition and population, helping professionals to base their interventions on evidence.

Keywords: Sarcopenia, Lung cancer, Survival

199

CARDIAC TELEREHABILITATION ON FUNCTIONAL AEROBIC CAPACITY AND CLINICAL VARIABLES IN PEOPLE WITH HEART FAILURE

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Background: Heart failure causes the highest rate of mortality and disability among people with some type of cardiovascular disease. As a non-pharmacological intervention, people are referred to cardiac rehabilitation programs in order to improve clinical outcomes; telerehabilitation is an alternative for those people with less adherence and limited travel to health centers.

Objectives: The objective of this study was to determine the effect of cardiac telerehabilitation on functional aerobic capacity and clinical variables in people with heart failure.

Methods: Randomized controlled clinical trial for 12 weeks in people with heart failure previously diagnosed by a cardiologist, with hemodynamic stability who entered a cardiac rehabilitation program for the first time at a clinic in Cali, Colombia. Institutional ethics endorsement (#17.115) was obtained, and all subjects signed informed consent. Through random sampling, people were divided into two groups: conventional cardiac rehabilitation (CR) and cardiac telerehabilitation (CTR) who received virtual technology assistance through "Google Meet". The primary variable was the distance covered in the 6-minute walk test and the secondary variables: some clinical variables (risk factors, symptoms, left ventricular ejection fraction (LVEF), weight, BMI, abdominal circumference, Sit to Stand, Total Cholesterol, HDL, LDL and Triglycerides). Subjects performed 20 minutes of upper and lower limb muscle strengthening, continuous aerobic exercise with 50-70% of HRmax reserve or perceived exertion less than 13/20 on the Borg scale. The t test for intragroup paired samples and the t test for intergroup independent samples were performed at the beginning and end of the intervention. There was significance of 95%.

Results: 31 people with heart failure were included, 14 in the CR group and 17 in the CTR group, 71.4% and 64.7% of them men, respectively p-value=0.690. The mean age for CR was 60.86±11.12 and CTR 60.18±11.54 p-value=0.870. The most frequent symptom for CR was lower limb fatigue (71.4%) and for CTR dyspnea (70.6%) p-value=>0.05. The most frequent risk factor for the CR group was sedentary lifestyle (92.9%), for the CTR group it was arterial hypertension (88.2%) p-value=>0.05. There were significant changes at the beginning and end of the study in the variables covered distance CR pre-251.53±38.49, CR post 360.59±58.47, CTR pre-245.68± 60.16, CTR post 342.85± 72.70 and Vo2e CR pre 7.71±1.18, CR post 10.09± 1.63, pre CTR 7.54±1.8, post CTR 9.61±2.03 showing p-value<0.05. Variables such as sit-to-stand repetitions, waist circumference, HDL showed significant changes for both groups p-value <0.05. LVEF showed significant changes only in the CR group.

Conclusion: Cardiac rehabilitation and telerehabilitation in people with heart failure cause significant changes in functional aerobic capacity, waist circumference, and HDL; Additionally, conventional cardiac rehabilitation presented significant improvements in LVEF.

Implications: Cardiac telerehabilitation causes changes similar to conventional rehabilitation in people with heart failure and can be used as a tool that allows a higher percentage of participation and adherence in people with difficult access to rehabilitation centers.

Keywords: Hearth Failure, Telerehabilitation, Cardiac Rehabilitation

200

THE EFFECT OF DIFFERENT TYPES OF BIOFEEDBACK ON THE LEVEL OF MUSCLE ACTIVITY DURING STANDING BALANCE

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Background: Biofeedback allows the individual to gain awareness and directly control a biomechanical or biological variable of interest. The biofeedback of postural performance has aroused a great interest of Rehabilitation Sciences due to its potential impact on the control of postural stability. While it is well established that biofeedback seems to limit body movements in orthostatism, it is not clear whether such a postural strategy occurs at the cost of increasing the level of muscle activity and whether it differs between different biofeedback techniques applied to postural control.

Objectives: This study is aimed at investigating the effect of different types of biofeedback techniques on the level of muscle activity postural sway during standing.

Methods: Three adults were tested in three standing conditions: (1) eyes open (EO); (2) biofeedback of acceleration (BFac), consisting of reducing the linear acceleration of the trunk in the anteroposterior (AP) direction; (3) biofeedback of laser (BFlaser), consisting of pointing a laser as close as possible to a target from the right wrist. The acceleration components were collected through a triaxial

accelerometer (TrignoTM Wireless EMG System Overview, Delsys, USA; $\pm 2g$), positioned roughly at L5 level, and the variability (standard deviation) calculated in the AP direction. Surface electromyograms (EMG) were collected from the medial gastrocnemius (MG) and tibialis anterior (TA) muscles bilaterally from the Trigno system (1.926Hz). The EMG's RMS amplitude was obtained to evaluate the degree of muscle excitation. Due to the small sample size, the statistical analysis involves data description by means of median (minimum − maximum).

Results: In relation to EO (8.41, 7.56 − 8.98 gx10-3), the standard deviation of ACAP reduced with BFac (median, min-max: 7.82, 4.32 − 11.45 gx10-3) and increased with BFlaser (9.83, 6.50 − 11.01 gx10-3). For the right body side, the RMS of TA increased with the biofeedback (BFac: 6.33, 2.99 − 9.67rms; BFlaser: 6.11, 2.31 − 8.32rms) when compared to EO (5.07, 2.11 − 7.16 rms). For the MG, while RMS was smaller with BFac (5.53, 2.95 − 17.84 rms), the RMS was higher with BFlaser (7.35, 2.93 − 16.95 rms) in relation to EO (6.63, 2.51 − 23.92 rms). For the left side, both ankle muscles showed a smaller RMS with BFac (TA: 4.29, 3,70 − 7.07rms; MG: 6.22, 2.53 − 10.93rms) and with BFlaser (TA: 3.59, 2,32 − 3.59rms; MG: 6.90, 2.38 − 15.44rms) do que EO (TA: 5.18, 4.50 − 6.70rms; MG: 8.31, 2.01 − 23.29rms).

Conclusion: These qualitative considerations indicate BFac seems to reduce the size of postural sway, while BFlaser increases it during standing balance, when compared to EO. Furthermore, an asymmetric postural activation was revealed regardless of biofeedback. TA and MG seem to reduce the level of muscle excitation at left, while they are more active at right.

Implications: Findings suggest that EMGs may provide different estimates of muscle arousal if collected unilaterally during upright posture with biofeedback. Ongoing study with more individuals to advance knowledge about the potential of biofeedback in improving postural control and reducing the risk of falling.

Keywords: Postural Control, Biofeedback, Electromyography

201

RELATIONSHIP BETWEEN MAXIMUM MUSCLE STRENGTH AND FREQUENCY SPEED OF KICK TEST FOR BLACK BELT TAEKWONDO ATHLETES

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Background: Taekwondo is a predominantly aerobic combat sport modality (58-66%) in which high-intensity actions are performed with the contribution of the anaerobic alactic system (26-30%) followed by the contribution of the anaerobic lactic metabolism (4-5%). High-intensity actions are performed repeatedly with muscular power and short duration. Thus, seeking to understand the relationship between the variables that represent maximum muscle strength, and the aerobic capacity of taekwondo athletes is relevant for a better understanding of the modality.

Objectives: The aim of this study was to determine whether the 10-second Frequency Speed of Kick Test ($FSKT_{10s}$) correlates with maximal muscle strength in black belt taekwondo athletes.

Methods: Nine male athletes (age: 20.3 ± 5.2 years; height: 177 ± 7.2 cm; body mass: 71.8 ± 15.3 kg and practice time: 9.6 ± 7.2 years) who competed at the state level or more prominently (international: 73%; national: 9%; state: 18%) participated in the study. All were free of any lower limb injury and had no neuromuscular disorder. Maximum muscle strength was achieved in the half-squat exercise, as previously described in the literature. $FSKT_{10s}$ is 10s long, alternating semi-circle kicks between right and left segments on a dummy using a simple torso protector, as often seen in taekwondo matches. Each participant was instructed to read and sign the Informed Consent Form with information about the procedures and risks associated with the study. The Kolmogorov-Smirnov test was used to assess data normality. Pearson's correlation was used to determine the relationship between selected variables. Correlations were classified as follows: $0.0 − 0.1$ (trivial), $>0.1 − 0.3$ (minor), $>0.3 − 0.5$ (moderate), $>0.5 − 0.7$ (large), $>0.7 − 0.9$ (very large), and $>0.9 − 1.0$ (perfect). For all analyzes an $\alpha = 5\%$ was adopted.

Results: The athletes reached 133 ± 33 kg (95% CI: $108 − 158$) during the maximal strength test performed in the half-squat exercise. Values are expressed in relation to the body mass value (1RM/Body mass: 1.9 ± 0.3, 95% CI: $1.6 − 2.1$) and allometric scale (1RM/(body mass)0.67 : 7.6 ± 1.4, 95% CI: $6.5 − 8.7$). Pearson's correlation showed a statistically significant correlation between the maximum muscle strength test and the $FSKT_{10s}$. The correlation between 1RM/body mass was $r = 0.72$ (p=0.014). The correlation between 1RM/ (body mass)$^{0.67}$ was $r = 0.84$ (p=0.004). Both correlations were classified as 'very large'.

Conclusion: There is a strong correlation between maximal muscle strength and $FSKT_{10s}$.

Implications: The strong correlation between the variables studied indicates that athletes with muscular strength developed at optimum levels also improve the frequency of blows applied in a short period of time. Thus, coaches and strength and conditioning coaches will be able to help taekwondo athletes to improve their performance by applying means and training methods aimed at developing maximum muscle strength at optimal levels.

Keywords: Combat sport, Martial art, Sports performance

202

AN ANALYSIS OF THE VARIABLES OF TACTICAL AND PHYSICAL PERFORMANCE IN THE U-17 MEN'S WORLD CUP

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Background: The tactical and physical demands of a soccer game are of interest to coaches and trainers for better prescription of the physical training process and understanding of the game's demands. When discussing the demands for games played by base categories, information is scarce. In this study, we will investigate correlations