

Conclusion: The adapted TSM has good agreement and validity when compared to the conventional TSM.

Implications: The results of this study can promote inclusion and accessibility of people with deafness for the assessment of functional capacity, contributing to a more equitable approach in the prescription of exercises. Additionally, we can provide a safe and efficient protocol for the assessment of cardiorespiratory fitness of this population.

Keywords: accessibility, deafness, exercise test

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ULTRASONOGRAPHIC EVALUATION OF DIAPHRAGMATIC FUNCTION AND ITS RELATIONSHIP WITH EXERCISE CAPACITY IN PATIENTS WITH CHRONIC HEART FAILURE

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Background: Heart failure (HF) is characterized by cardiac dysfunction and consequent exercise intolerance. In addition to peripheral muscle dysfunction, common in HF, diaphragmatic dysfunction may contribute to functional limitation and reduced exercise capacity. Maximal respiratory pressure measurement is widely used to identify respiratory muscle weakness, but diaphragmatic ultrasound has emerged as a promising tool for structural and functional diaphragm assessment, enabling early detection and therapeutic management of respiratory muscle dysfunction.

Objectives: To evaluate diaphragmatic function using ultrasound and its relationship with exercise capacity in individuals with chronic HF.

Methods: This is an observational, analytical-descriptive, cross-sectional study conducted with individuals aged 18 to 65 years diagnosed with chronic HF and left ventricular ejection fraction (LVEF) < 50%. Participants underwent diaphragmatic ultrasound assessment, including measurements of diaphragmatic excursion (DE), thickness (Tdi), and thickening fraction (DTF), as well as maximal inspiratory and expiratory pressures (PImax and PEmax). Functional capacity was evaluated using the six-minute walk test (6MWT) and maximal oxygen consumption (VO₂max). Statistical analysis was performed using SPSS 27.0 software, applying mean comparison tests and variable association analyses.

Results: A total of 18 individuals were evaluated, predominantly male (66.7%), with a mean age of 54.9 ± 8.08 years and a mean LVEF of $34.7 \pm 11.7\%$. The mean DE was 2.5 ± 1.3 cm during quiet breathing and 5.8 ± 1.9 cm during deep breathing, with 40% presenting below-normal values. The mean inspiratory Tdi was 4.6 ± 2.2 mm, reduced in 50% of cases, while DTF was decreased in 66.7% of participants. Respiratory muscle strength was relatively preserved, with 88.9% of individuals having PImax above 70% of the predicted value (mean 86.3 ± 24.16 cmH₂O) and 64.7% with PEmax above the reference value (mean 114.8 ± 37.3 cmH₂O). Functional capacity was impaired, with a mean VO₂max of 16.2 ± 3.98 mL/kg/min, where 66.7% were classified as "very weak" and 33.3% as "weak." In the 6MWT, the mean distance covered was 453.8 ± 106.7 meters, with 60% exceeding 80% of the predicted distance. Despite

these alterations, no statistically significant associations were found between diaphragmatic ultrasound parameters, respiratory muscle strength, and functional capacity.

Conclusion: The findings indicate a high prevalence of diaphragmatic dysfunction in HF patients, even in those with preserved respiratory muscle strength. The lack of significant associations between diaphragmatic function and exercise capacity may be related to the small sample size, reinforcing the need for studies with greater statistical power.

Implications: Diaphragmatic ultrasound may contribute to the clinical management of chronic HF, allowing early detection of respiratory dysfunction and personalized interventions such as respiratory rehabilitation and therapeutic adjustments. Additionally, its use in monitoring disease progression may help improve patient prognosis.

Keywords: Heart failure, Diaphragmatic ultrasound, Functional capacity

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INTRADIALYTIC PHYSICAL EXERCISE ON THE SLEEP QUALITY AND HEALTH-RELATED QUALITY OF LIFE IN CHRONIC KIDNEY PATIENTS: A RANDOMIZED CONTROLLED TRIAL

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Background: Changes in renal function resulting from chronic kidney disease (CKD) or hemodialysis (HD) have repercussions on sleep and quality of life. Patients with CKD often experience complications in the musculoskeletal system, such as frailty and fatigue, with impact their lifestyle and physical capacity. Exercise programs performed during HD have potential to reverse such complications and influence both sleep and quality of life. However, the evidence on this topic remains limited.

Objectives: To investigate the effectiveness of an intradialytic resistance exercise protocol compared to intradialytic aerobic exercise protocol on the sleep and quality of life in CKD patients.

Methods: This is a randomized controlled trial. Thirty-two patients with CKD in HD were randomly allocated into two groups of intradialytic exercise, during the first 90 minutes of hemodialysis for 3 months: Group A (resistance exercise protocol, performing 8 exercises using elastic bands, dumbbells, and a Swiss ball, 2 sets of 8-12 repetitions, with an interval of 2-3 minutes between sets, and an exercise of 6 on the modified OMNI scale) and GROUP B (aerobic exercise protocol performing 20 minutes of exercise on a cycle ergometer with an intensity between 5 and 7 on the modified Borg scale). Sleep quality (measured by the Pittsburgh Sleep Quality Index) and health-related quality of life (measured by the EQ-5D-3L) were measured at baseline and 3 months after randomization. Visual inspection of histograms was used to assess data normality.

Linear mixed model was used to assess the differences in intra and intergroup. The level of statistical significance was set at 5%.

Results: Participants in Group A received an average of 31.4 (± 3.4) sessions of effective exercise and Group B received an average of 32.5 (± 3.5) sessions. In the intragroup analysis, a significant improvement in sleep quality was observed for Group A (pre: 7.1 ± 4.0 ; post: 5.1 ± 3.7 ; 95% confidence interval [95%CI]: -3.2 to -0.6), but it did not occur in Group B (pre: 6.6 ± 3.0 ; post: 5.3 ± 2.4 ; 95%CI: -3.0 to 0.5). For the intergroup analysis, no significant changes were observed (mean difference [MD]: 0.7; 95%CI: -1.6 to 2.9). For health-related quality of life, no significant changes were observed in intragroup analysis (Group A, pre: 0.86 ± 0.16 , post: 0.87 ± 0.13 , 95%CI: -0.06 to 0.07; and Group B, pre: 0.86 ± 0.1 , post: 0.91 ± 0.2 , 95%CI: -0.01 to 0.11) and in intergroup analysis (MD: 0.04; 95%CI: -0.04 to 0.1).

Conclusion: Only resistance exercise seems to be effective for sleep quality after 3 months of treatment. However, there are no differences between the exercise protocols for sleep quality and health-related quality of life. These results suggest that future studies should be conducted with the inclusion of other clinical variables, such as pain, which may influence the effect of treatment.

Implications: Intradialytic exercise based on resistance exercise can benefit patients with CKD in the improvement of sleep quality. This type of exercise might be incorporated in hemodialysis centers under the guidance of physiotherapists.

Keywords: Intradialytic Physical Exercise, Sleep quality, Quality of Life

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CORRELATION BETWEEN INSPIRATORY MUSCLE STRENGTH WITH EXPIRATORY THICKNESS, THICKENING FRACTION AND DIAPHRAGMATIC MOBILITY IN INDIVIDUALS WITH COPD

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Background: Chronic obstructive pulmonary disease (COPD) is characterized by progressive airflow obstruction of an irreversible nature, causing persistent respiratory and peripheral symptoms. Diaphragmatic dysfunction can be observed in all stages of COPD development, presenting through structural and functional alterations. This dysfunction may be associated with hyperinflation, systemic inflammation, oxidative stress, and malnutrition. These interactions affect respiratory muscle function and diaphragmatic

biomechanics, with diaphragmatic ultrasonography being a valuable method to analyze the anatomy and function of this muscle.

Objectives: To correlate respiratory muscle function with expiratory thickness, thickening fraction, and diaphragmatic mobility in individuals diagnosed with COPD.

Methods: This was a descriptive, quantitative cross-sectional study conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations and approved by the research ethics committee. To assess respiratory muscle function, an electronic computerized device (KH2; PowerBreath International Ltd. UK) was used. The evaluation of expiratory thickness, thickening fraction, and diaphragmatic mobility was performed using diaphragmatic ultrasonography with a 2.5-5.0 MHz convex transducer and a 7.5-10.0 MHz linear transducer. Statistical analysis was conducted using IBM SPSS Statistics version 25. Descriptive statistics were initially applied to characterize the data, including measures of central tendency (mean) and dispersion (standard deviation). To assess data normality, the Shapiro-Wilk test was used. The correlation between variables was analyzed using Pearson's correlation coefficient, considering a significance level of 5% ($p < 0.05$). Differences between measurements were evaluated using the paired t-test, with the effect size estimated by Cohen's d. All analyses were performed with a 95% confidence interval.

Results: The study sample consisted of 11 participants, 6 male and 5 female. When analyzing the respiratory muscle strength of the patients studied, a reduction in maximal inspiratory pressure was observed compared to predicted values for individuals of the same age group without COPD ($p < 0.002$), indicating that the sample of patients studied demonstrates respiratory muscle weakness. Regarding the correlation analyses of maximal inspiratory pressure with expiratory thickness, thickening rate, and diaphragmatic mobility, only a negative correlation ($r = -0.729$, $p = 0.011$) was observed between inspiratory muscle strength, measured by maximal inspiratory pressure, and the expiratory thickness of the diaphragm muscle. This indicates that for this population of COPD patients, the lower the inspiratory muscle strength, the greater the expiratory thickness of the diaphragm.

Conclusion: Our findings demonstrated that in the studied population of COPD patients with diagnosed inspiratory muscle weakness, there was a negative correlation between inspiratory muscle strength and the expiratory thickness of the diaphragm muscle. These factors are justified by the mechanical disadvantage found in the inspiratory muscles in this population.

Implications: The results may contribute to a better understanding of the pathology and its repercussions, thus favoring a more effective rehabilitation process and positively impacting the quality of life of individuals with COPD.

Keywords: COPD, Diaphragm, Maximal Respiratory Pressures

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EFFECTS OF INSPIRATORY MUSCLE TRAINING ON DYSPNEA AND LUNG CAPACITY IN HEMODIALYSIS PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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