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Title: Respiratory muscle training in impaired elderly: Threshold loading versus Pranayama breathing exercises

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Body: Introduction: In the older elderly, the respiratory function may be seriously compromised when the decrease of respiratory muscle (RM) strength coexists with comorbidity and immobility syndrome. The aim of this study was to determine the effectiveness of RM training using the Threshold IMT device, or Pranayama breathing exercises vs. a control group in impaired elderly. Our general hypothesis was that RM training would improve RM function among this population. Methods: Institutionalized elderly, who were unable to walk, were allocated randomly into three groups: a control group and two experimental groups (Threshold and Pranayama). Experimental groups performed a supervised interval-based training protocol, either through respiratory threshold loading or Pranayama breathing exercises, which lasted six weeks (5 days per week). Maximum respiratory pressures (MIP and MEP) and Maximum Voluntary Ventilation (MVV) were measured at four time points: pre-training, intermediate, post-training and follow-up (weeks 0, 4, 7 and 10, respectively). Results: Seventy-one residents (90% female, mean age 85) completed the study: Control (n=24); Threshold (n=23); Pranayama (n=24). There was a significant treatment effect on the MIP ($F_{6,204}=6,755$, $p<.001$, $\eta^2=0.166$), MEP ($F_{6,204}=4.257$, $p<.001$, $\eta^2=0.111$) and MVV ($F_{6,204}=5.322$, $p<.001$, $\eta^2=0.135$). Conclusion: Pranayama training group works differently and significantly better than the other two groups, and may be therefore, a powerful alternative to general exercise conditioning in order to improve RM function (strength and endurance) in the elderly population with a significant loss of mobility and exercise capacity.