



RELATIONSHIP BETWEEN RESPIRATORY MUSCLE STRENGTH, FUNCTIONAL CAPACITY AND QUALITY OF LIFE IN PRE-OPERATIVE CARDIAC SURGERY PATIENTS

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WINNING ABSTRACT: The aim of this study was to investigate the relationship between respiratory muscle strength, functional capacity, physical activity, and quality of life in preoperative cardiac surgery patients.

Forty eight preoperative cardiac surgery patients (mean age 59.79 ± 10.29 years, 40 M, 8 F, FEV₁: $79.52 \pm 17.02\%$) participated in this study. Pulmonary function tests and respiratory muscle strength (MIP and MEP) were performed. Physical activity level was measured using International Physical Activity Questionnaire (IPAQ). Quality of life was determined using Nottingham Health Profile (NHP). Functional capacity was assessed using six-minute walk test (6MWT).

The MIP was significantly correlated with 6MWT distance ($r=0.31$, $p<0.05$). Respiratory muscle strength was not significantly correlated with quality of life and physical activity level ($p>0.05$). Total physical activity level was significantly related with NHP total score ($r= -0.35$, $p<0.05$), NHP emotional stress dimension ($r= -0.32$, $p<0.05$), NHP pain dimension ($r= -0.35$, $p<0.05$), NHP energy dimension ($r= -0.29$, $p<0.05$), NHP physical activity dimension ($r= -0.37$, $p<0.05$). The NHP physical activity dimension was significantly correlated with 6MWT distance ($r= -0.29$, $p<0.05$).

Inspiratory muscle strength is related to functional capacity in preoperative cardiac surgery patients. Quality of life is related with physical activity level and functional capacity in these patients.



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MY JOB AND THE UNIT IN WHICH I WORK

I am a research assistant working in the cardiopulmonary rehabilitation unit at the School of Physical Therapy and Rehabilitation, Hacettepe University, Ankara, Turkey. I work within a team led by Professor Hulya Arikan. My role in the unit is to ensure physiotherapy and rehabilitation management of patients with cardiothoracic surgery, chronic obstructive

pulmonary disease (COPD), cystic fibrosis, acute respiratory failure, and cardiac diseases. I am also a clinical educator and supervisor of students during their clinical affiliation experience.

The unit in which I work offers outpatient pulmonary rehabilitation and a wide range of in-patient physiotherapy services, including intensive care, paediatric and adult respiratory medicine and cardiothoracic surgery, and other surgical depts (orthopaedics, anaesthesiology, neurosurgery, urology, general surgery, etc.). Respiratory physiotherapy in the school is closely linked to clinical work. The unit also provides teaching and training in cardiopulmonary rehabilitation for physiotherapy undergraduate and graduate students and in-service training for graduated physiotherapists.

MY WINNING POSTER AS A PART OF MY RESEARCH

The primary focus of my research was the investigation of respiratory muscle training in cardiothoracic surgery. Recent work was based on pre-operative respiratory muscle strength, functional capacity and quality of life in coronary artery bypass graft (CABG) surgery patients. Although respiratory muscles were impaired after thoracic surgery, little attention has been paid to pre-operative assessment of their function [1].

The aim of this study was to investigate the relationship between respiratory muscle strength, functional capacity, physical activity, and quality of life in pre-operative cardiac surgery patients. We measured inspiratory muscle strength (*via* the maximal inspiratory mouth pressure; MIP), expiratory muscle strength (*via* the maximal expiratory mouth pressure; MEP), functional capacity (using the 6-min walk test), physical activity level (using the International Physical Activity Questionnaire) [2], and quality of life (using the Nottingham

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Health Profile) in 48 pre-operative CABG patients at least 1 week pre-operatively. We found that one-half of the patients had low MIP and nine patients had low MEP (<80 cmH₂O (<7.8 kPa)). When we compared functional capacity between the patients with normal and weak inspiratory muscle strength, we found a significant difference between the groups ($p < 0.05$; fig. 1). Most of the patients with pre-operative cardiac surgery (85.4%) had low physical activity level. This finding is important because it suggests that the waiting period for elective CABG surgery may be used to enhance functional capacity, respiratory muscle strength and early-phase recovery, and the length of hospital stay and post-operative pulmonary complications can thereby be reduced. The most frequent post-operative pulmonary complications are atelectasis and pneumonia. They are mainly caused by reduced ability to expectorate sputum (decreased MEP) and insufficient diaphragmatic breathing [3, 4].

MY RESEARCH AS PART OF MY WORKING GROUP/RESEARCH TEAM

My study fits perfectly into the main research area of our unit. I am part of a clinical and research team from the Cardiopulmonary Rehabilitation Unit lead by Professor H. Arikan, which is currently comprised of one professor (Sema Savci), one associated professor (Deniz Inal-Ince), and another research assistant (Meral Bosnak-Guclu). The team has been involved in many clinical and research projects.

Two related studies had winning abstracts from our unit; the first is "Respiratory muscle strength after CABG surgery", where we investigated the changes in lung function and respiratory muscle strength in patients undergoing CABG surgery. Both MIP and MEP values decreased after CABG surgery due to the discomfort perceived by the patients [5]. The second study, "Active cycle of breathing techniques and incentive spirometer in coronary artery bypass graft surgery", had the aim of evaluating the efficacy of incentive spirometer and active cycle of breathing techniques following CABG surgery. Both physical therapy treatment approaches had

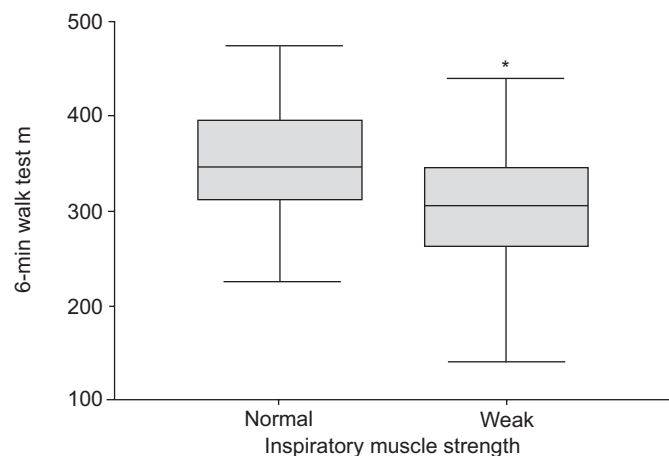


FIGURE 1. Comparison of 6-minute walk test distance between patients with normal (≥ 80 cmH₂O (≥ 7.8 kPa)) and weak (<80 cmH₂O (<7.8 kPa)) inspiratory muscle strength. *: $p < 0.05$.

similar effects on the incidence of atelectasis, pulmonary function and pain perception [6].

The team also collaborates on projects with pulmonology (physical activity and muscle strength in moderate-to-severe COPD), allergy (physical activity and quality of life on in patients with bronchial asthma and without analgesic intolerance), medical intensive care unit (effects of chest physiotherapy with cough assist and noninvasive mechanical ventilation on survival, hospital stay, complications and respiratory muscle strength in acute respiratory failure) and cardiology (comparison of aerobic and resistive exercise training after coronary angioplasty).

The faculty to which I belong teaches physiotherapy academic courses (pulmonary rehabilitation, cardiac rehabilitation, exercise physiology) as part of a Bachelor of Science degree in physiotherapy and rehabilitation. It is also responsible for postgraduate (Master of Science and PhD)-level teaching in physiotherapy and rehabilitation, and cardiopulmonary rehabilitation programmes. Evidence-based physiotherapy and education are important parts of our current practice. Our team assist the students in becoming better physiotherapists through the use of evidence-based practice.

The most important activity performed during the previous year was the organisation of the 30th European Cystic Fibrosis Society Annual Conference in Turkey with paediatric pulmonology.

THE IMPACT OF MY WORK ON CLINICAL OR RESEARCH PRACTICE

In summary, we found that respiratory muscle weakness is associated with higher risks of pulmonary complications, and respiratory muscles should be assessed and trained during the pre-operative period of cardiac surgery. The present study will increase our knowledge of pre-operative values of cardiac surgery patients. Further research is needed to understand the effects of pre-operative respiratory muscle training in clinical practice.

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