COMPARISON OF LUNG FUNCTION IN HIGH-PERFORMANCE SWIMMERS: A PRELIMINARY STUDY

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RESUMO

ABSTRACT

Introduction: Swimming involves multiple factors to enhance athletic performance, among which respiratory control stands out. Spirometry tests have become increasingly important to monitor the respiratory system. **Objective**: To analyze cardiopulmonary respiratory capacities in high-performance swimmers using spirometry devices.**Methodology**: The study included 24 high-performance swimmers, divided into an experimental group and a control group, with respiratory assessment performed using spirometry. **Partial Results**: Data collected included sex, age, height, weight, BMI, FVC (Forced Vital Capacity), %FVC (Percentage of FVC), FEV1 (Forced Expiratory Volume in the first second), FET (Forced Expiratory Time), and FEV1/FVC ratio. **Conclusion**: Additional data collection is necessary to obtain long-term results.

Keywords: Swimmers; Spirometry; Pulmonary Capacity.

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INTRODUCTION

Swimming is a comprehensive sport that engages all physiological mechanisms, providing benefits in cognitive development, motor skills, and body awareness. The sport can be performed through the four main strokes (freestyle, butterfly, breaststroke, and backstroke), requiring the individual to be comfortable in an aquatic environment. Training is generally divided into aerobic, anaerobic, and speed-focused modalities (VIEIRA, 2022; MASSAUD, 2001).

Pulmonary capacity is crucial for swimmers, as it improves gas exchange and contributes to overall health, enhancing performance. Studies also suggest that male athletes tend to exhibit better pulmonary performance compared to female athletes (GARCÍA et al.).

Cardiopulmonary exercise testing (CPET) or ergospirometry is a low-cost, non-invasive assessment tool that evaluates multiple systems. It is widely used for

both elite and recreational athletes to assess physical capacity, exercise tolerance, metabolic status, and oxygen consumption (BETTENCOURT; LUÍS, 2020; ALBOUAINI et al., 2007; HOLLEMANN & PRINZ, 1997).

Therefore, the objective of this study is to analyze respiratory capacity by sex in high-performance swimmers using spirometry.

METHODOLOGY

Study Type

This study is an extended abstract focused on the benefits and application of spirometry tests to compare pulmonary capacity in high-performance swimmers.

Population and Sample

The study included 24 federated high-performance swimmers (crawl stroke) of both sexes, representing the Associação Educativa Evangélica (UniEVANGÉLICA) in Anápolis, aged 11–18 years. Participants were recruited through invitation and, after consent, were randomly assigned to the intervention group (n=12) or control group (n=12).

Inclusion and Exclusion Criteria

Inclusion criteria: athletes aged 11–18, affiliated with the Goiás Aquatic Federation (FAGO), participation in regional or national competitions, and consent from legal guardians.
Exclusion criteria: athletes with acute respiratory conditions (sinusitis, bronchial asthma), cardiac diseases, or recent musculoskeletal injuries.

Study Design

The study evaluated the respiratory activity of swimmers. All participants provided informed consent (TCLE), and minors had consent forms signed by their guardians. Respiratory data were collected using a spirometer to assess the pulmonary capacity of high-performance athletes. The project was approved by the Ethics Committee under Opinion No. 6.616.367.

RESULTS

The sample included 24 athletes (n=24), with 16 males (n=16) and 8 females (n=8), aged 11–18 years (mean age 15.25 years). Variables analyzed included age (years), body mass (kg), height (m), BMI (kg/m²), FVC (Forced Vital Capacity), %FVC (Percentage of FVC), FEV1 (Forced Expiratory Volume in the first second), FET (Forced Expiratory Time), and FEV1/FVC ratio.

Tabela 1. Caracterização da amostra (n= 24)**.**

	Sexo			
	Total (n= 24)	**Feminino (n= 8)**	**Masculino (n= 16)**	
Variáveis	**Média±DP**	**Média±DP**	**Média±DP**	**P**

Idade (anos)	15,25±4,35	16,75±5,9	14,50±3,2	0,241
Massa Corporal (kg)	60,37±13,95	64,60±16,5	58,26±12,5	0,305
Estatura (m)	1,65±0,13	1,69±0,1	1,63±0,1	0,329
IMC (Kg/m^2)	21,76±2,87	22,18±3,4	21,54±2,66	0,618

Fonte: IMC= Índice de massa corporal.

Tabela 2. Comparação da função pulmonar entre os sexos (n= 24).

	Sexo			
	Total (n= 24)	**Feminino (n= 8)**	**Masculino (n= 16)**	
Variáveis	**Média±DP**	**Média±DP**	**Média±DP**	**P**
CVF (L)	4,49±1,17	3,47±0,55	5,00±1,06	<0,001
%CVF	143,22±51,37	113,00±33,03	158,33±52,98	0,038
VCF_1 (L)	4,02±1,05	3,15±0,52	4,46±0,98	0,002
$\%VCF_1$	128,90±49,40	102,97±32,32	141,87±52,12	0,068
VEF_1/CVF	0,89±0,05	0,90±0,46	0,89±0,06	0,499
TEF (seg)	2,13±0,84	1,97±0,56	2,21±0,96	0,521

Abreviaturas: CVF= Capacidade vital forçada; %CVF= Percentual do CVF; VEF_1= Volume expiratório forçado no primeiro segundo; TEF= Tempo expiratório forçado; VEF_1/CVF= relação do volume expiratório no primeiro segundo e capacidade vital forçada.

FINAL CONSIDERATIONS

The study demonstrated that male swimmers exhibited superior pulmonary capacities compared to female swimmers; however, the FEV1/FVC ratio was higher in the female group. Further studies are needed to analyze this scenario under different conditions, over extended training periods, and with a larger sample size.

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