

Effects of an Expiratory Muscle Strength Training Method on Young Individuals and its Clinical Use

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ABSTRACT

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Introduction

While examining elderly patients with pneumonia, we focused on a reduced coughing ability as the most important factor associated with its development. This study examined the effects of an expiratory muscle strength training (EMST) method to improve the coughing ability of young individuals in consideration of its clinical use for the elderly.

Methods



Figure 1: Expiratory Muscle Training.

Fourteen healthy males and females aged 20 to 30 without respiratory disease performed EMST by exhaling while pursing their lips and increasing the abdominal pressure after a maximum inspiration by contracting their abdominal muscles. During this procedure, an expiratory muscle training device (Calorie Breath;

Needs Co., Ltd.) was used to create expiratory resistance (Figure 1). A 10-minute EMST session was performed at the maximum loading level once daily for 3 weeks, and intervention-related changes in the values were examined. The following items, representing the respiratory function, were measured: the vital capacity (VC), %vital capacity (%VC), forced expiratory volume in one second (FEV1.0), %forced expiratory volume in one second (%FEV1.0), forced expiratory volume 1.0% (FEV1.0%), and peak flow (PEF).

Results

Although the intervention period was short, at 3 weeks, the respiratory function generally improved.

Improvements in the FEV1.0 and PEF values, associated with expiratory and coughing abilities, were particularly marked (Table 1).

Table 1: Effects of an Expiratory Muscle Strength Training.

		Mean(SD)	MDC95	Effect size(Ⓜ)
VC	Before	4.62(0.91)*	0.6	0.15
	After	4.75(0.85)*		
FVC	Before	4.77(1.10)	1.25	0.07
	After	4.69(0.84)		
FEV1	Before	4.04(0.81)	0.79	0.14

FEV1	After	4.15(0.9)	0.79	0.14
FEV1%G	Before	85.3(5.71)	14.2	0.45
	After	87.9(4.35)		
PEFR	Before	9.23(2.15)*	1.31	0.23
	After	9.73(2.39)*		

Note: *p<0.05

VC: vital capacity.

FVC: Forced Vital Capacity

FEV1.0%: forced expiratory volume in 1 second percent

PEFR: Peak flow

Discussion

The tendency of the respiratory function to generally improve, as well as the improved expiratory ability, may have been a result of increases in the abdominal rectus, transverse abdominal, and ex- and internal oblique muscle strength needed to enhance the intra-abdominal pressure when coughing or during forced expiration. In a study involving healthy individuals and Chronic Obstructive Pulmonary Disease (COPD) patients, expiratory muscle training improved their respiratory function related to the expiratory flow

rate [1]. Kim, et al. [2] provided expiratory muscle training for a healthy elderly group and reported that their maximal expiratory muscle strength increased. It may be possible to reduce the risk of aspiration pneumonia due to the difficulty in removing foreign bodies and secretions in the respiratory tract using this method for the elderly to strengthen their expiratory muscles, and consequently improve their coughing ability.

Conflict of Interest

The authors declare no conflict of interest.

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