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Research Article

EFFECTS OF RESPIRATORY MUSCLE TRAINING ON VENTILATION AND ENDURANCE PERFORMANCE OF ACTIVE MALE STUDENTS

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ABSTRACT
Respiratory system, including the lungs, respiratory muscles, and the nervous control, compound and complex physiological unit in order to survive in life, you have 24 hours a day and cycle through strictly controlled and coordinated work. Respiratory muscles, unlike muscles in everyday life should be repeated, approximately 12 to 20 beats per minute contract. The essential function of the respiratory muscles, while promoting exercise routine observations should be respiratory muscle fatigue because it can precipitate or occur aggravate respiratory insufficiency or failure. If respiratory muscles are very weak, muscle strengthening exercises can be part of endurance training. Improved outcome of respiratory muscle function, exercise performance, and exercise in relation to the whole body, there are many contradictory results and some studies have reported significant improvements and others have shown a slight improvement or no improvement in person's physical functioning reported that arises in this regard, this study is intended in a double-blind, placebo-controlled sham group exercises, effects of respiratory muscle training on ventilation and endurance performance time trial performance is evaluated.

Keywords: *Respiratory Muscles, Ventilation Function, Endurance, Active Male Students*

INTRODUCTION
Respiratory muscles are responsible for breathing more work. At the rest, about 12 liters of air per minute enters into the body through the respiratory system, this amounts reaches to 150 liters per minute during intense exercise, and on elite athletes to even 220 liters per minute. So, obviously the respiratory system during exercise and sports activities, the pressure can be fairly large. Respiratory muscle training for the first time since the late 1980s was proposed by Allison Mack O'Connell, a doctor at the University of Birmingham, has attracted considerable attention. Understanding the effects of respiratory muscle training on aerobic and anaerobic performance is very important in the physiology of human performance such supplementary training may have the potential to improve the performance by improving lung volumes and capacities affected (28). This is also important from a clinical point because respiratory muscle training in obstructive pulmonary disease often can be implemented as part of a treatment plan. Several recent studies in healthy subjects have shown that specialized training of respiratory muscles and increase endurance performance, at least when in practice, functional test requires 70 to 80 percent of maximum capacity or slightly lower (2, 3, 16, 19, 20, 30, 31). Further studies have been studied the effect of exercise on respiratory muscle strength and endurance training is very intense (85 to 95% of maximum capacity) (6, 13, 21, 37) and have not observed consistent effect on performance. Therefore, it may appear that while specialized training to improve athletic performance and endurance of respiratory muscles, is leading to Intensity below 85% of the maximum capacity of the individual. Almost all of the above exercise test to assess the effects of respiratory muscle training on endurance performance has used them, that were in constant workload and exhaustion was the criterion session (open ended). These exercises, which are related to the subjective sense of individual failure, Intensity range and repeat the test on the same subject, can produce variable results up to even 30% (14, 29). On the other hand, some researchers in the field of performance-based tests (performance oriented) have been used. These procedures are usually tried when (time trial) are implemented the subject with the maximum amount of work or a certain distance and speed might be doing. The big advantage of working is in a reproducible (coefficient of variation of one to four percent) (25, 26).

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The Importance and Necessity of Research

It is believed that the respiratory muscle training can improve the performance of respiratory muscles in healthy subjects. And submaximal exercise performance is also boosted. For example, Mac O'Connell, using techniques pioneered the IMT, has shown that using the device of Power Breathe Respiratory muscle strength as much as 30 to 50 percent, even with a lead of 30 breaths twice a day is effective.

Although many studies in healthy subjects after respiratory muscle training to improve endurance performance, whole-body (Butler and Pioko, 1992, Butler *et al.*, 1992, Spengler *et al.*, 1999; Makarov *et al.*, 2001, Stosy *et al.*, 2001) and the Extreme Trail of Time in short-term (Vilyanitis *et al.*, 2001) have been reported, however, several studies also show that the ergogenic and efficient effects of this practice have failed (Morgan *et al.*, 1987; Bellman and Gisero, 1988; Fierebarn *et al.*, 1991, Hanel and Sacher, 1991, Kohl *et al.*, 1997, Unbar *et al.*, 2000; Sonnet *et al.*, 2001).

Perhaps the most remarkable thing about this is that most of previous studies of respiratory muscle training to assess outcome focused on the performance and almost without exception, time to exhaustion at a fixed percentage of the workload and maximal oxygen consumption were examined. Such voluntary actions with endpoints (end the practice by saying voluntary exhaustion), to be competitive endurance performance cannot be accurately represented and reagent (low external validity) and not stable (Hopkins *et al.*, 1999) have been criticized.

Between individual differences in scale and size of area with a small sample size can be partially the report describes an improvement in exercise capacity but contribute reaching the level of significance in some studies (6, 10, and 29). Of these, some research on the use of matched control groups have not been successful in their experimental design (2, 3, and 30). In the studies that used a control group, similar exercises actual control group but there was no time to do (6, 16, 19, 21, and 31) and the intervention subjects were not applied in a blinded manner. A double-blind, placebo-controlled studies of the project have not low internal validity and potential of the subject and experimenter bias potential effects have been criticized.

Given all the foregoing, and considering that the country has a study using IMT Threshold effects of respiratory muscle training has not reviewed, the present study aims in a double-blind, placebo-controlled sham group exercises, the impact of such training on ventilation and endurance performance time trial performance is evaluated.

Research Aims

Objective: The effects of respiratory muscle endurance training on ventilation and endurance performance in healthy male university students' activation.

Research Hypotheses

1. Respiratory muscle endurance training on maximum oxygen consumption has a significant impact on male students.
2. Respiratory muscle endurance training on the 8-kilometer time trial in active male students, there were significant effects.
3. Endurance training of respiratory muscles in active male students, there were significant effects on tidal volume.

Theoretical Research

Theoretical study includes fundamentals of breathing, respiratory assessment, lung volumes and capacities.

Respiration

Normal breathing is relaxed by contraction of the diaphragm and external intercostal. During exhalation, the diaphragm relaxes and slowly returns to its elastic state, chest wall and the lung-abdominal structures push the air out of there.

Many factors can contribute to poor lung function, including smoking habits, history of surgery, accident risk, asthma, allergies, chronic pulmonary obstruction and obesity. The natural structure of the chest caused low gas exchange in circulation and respiration, excretion, as well as less carbon dioxide and less oxygen is absorbed.

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Respiratory System

A person can live even weeks without food, days without water but only minutes without oxygen. The respiratory system is redemptive to deliver oxygen to the body connection. It includes the diaphragm and chest muscles, nose, mouth, pharynx and trachea, and lungs Bronchiole.

Function of Respiratory System

Respiratory exchange, including the trachea, left and right lung and two in the bronchial airway branching and Bronchiole. The main purpose of the air navigation respiratory is to exchange between the external environment and the respiratory unit for allowing the exchange of oxygen and carbon dioxide.

Lung

Lung is a unique organ not only a means of delivering oxygen from the air to the blood and removing carbon dioxide from the blood supply but it is also capable of metabolism and detoxify a wide range of materials, protection against infectious diseases and environmental pollution and certain key composition is like surface tension in the lungs and prostaglandins helps to keep the infectious interaction is important in practice.

Pulmonary Function Test

Pulmonary function test (PFT) consists of a number of direct and indirect measurements to describe the physiology of breathing. This plays an essential role in the recognition and measurement guidance in patients with respiratory disease or at risk for respiratory illness.

Spirometric lung function test is the main element that directly exhaled the volume of air (exhaled) or tail by participants as a function of time as one of the most important measures and screening tools for lung disease and air flows, volumes and capacities expiratory pressure during one-lung measures.

Types of Spirometric Tests

1) Ring size chart or flow (flow volume loop)
2) Push vital capacity (FVC)
3) Vital capacity (VC)
4) Maximum Voluntary Ventilation (MVV)

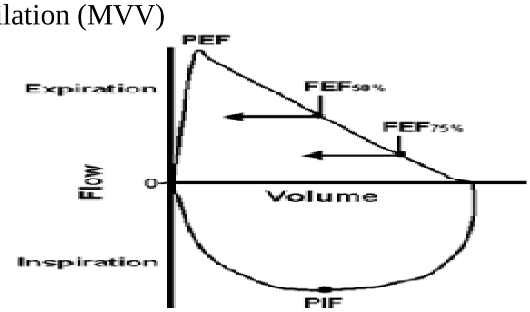

Figure 2-1: Spiro grams or normal maximum breathing flow-volume curve

Literature

Given that this has not been discussed in the country studies, the present study suggests that the effect of respiratory muscle endurance training on ventilation and endurance performance in healthy male students actively examine.

External Investigations

Goenteh *et al.*, (2006) emphasized that the respiratory muscle training has been an effective method to increase respiratory muscle strength and improve athletic performance, to evaluate the effects of respiratory muscle training on time to exhaustion and cycling determine any potential effect of gender on this hypothesis, a similar improvement in maximal inspiratory pressure and cycling time lag to make men and women as a result of respiratory muscle training put to the test.

They conclude that the respiratory muscle training, maximal inspiratory pressure increases and improves athletic performance but recovery is variable and there is no difference of opinion between men and women.

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Inspiratory muscle training significantly improved forced expiratory volume in one second strong inspiratory and expiratory volume in one second in vigorous exercise, which was higher than the results of dummy exercises. Significant improvements have been reported in the performance of ventilation, respiratory capacity, and ventilation threshold in both groups. A trend toward improvement (08/0 = p) in swim speed was observed after 12 weeks.
The present study examines the effects of respiratory muscle training on ventilation and endurance performance of the active male students.

Sample

The research students constitute the active male of those 24 student volunteers selected to complete the consent form and randomly divided into two groups of 12 experimental (training of respiratory muscles) or placebo control (sham exercise).

MATERIALS AND METHODS

Method

Overview of the experimental design of the study is shown in the following figure:

Figure 1: Overview of the research protocol

Breathing Exercises	Third session	Second session	First session
(1 Eight weeks of respiratory (2 muscle training: day two 30 series of respiratory intensity of 50% maximal inspiratory pressure, with a ten minute break Recorded daily physical activity (2	test the function (1 of trial 8km Time Introduction to (2 the practice of respiratory muscles	1) Learn how to perform the function of trial 8km Time 2) Introduction to the practice of respiratory muscles	anthropometric (1 Breathing Survey (2 Measurement of (3 maximum oxygen consumption

Statistical Methods

To examine the differences between the two groups at pre-test and post-test, independent t test, and the difference between pre-test and post-test for each group of dependent groups T test was used. Deviation from pre-test to post-test among the groups will be discussed using independent t-tests. KS test for normal distribution of data and homogeneity of variances of the two groups will be determined by Levine test. 05/0 zero level benchmark test hypotheses and research where a significant difference, the smallest level of significance will be calculated and reported.

Descriptive Analysis of Data

View homogeneous groups of subjects and the results are shown in the following table:

Table 4-1: Information about the homogeneity indices of body composition

Significance level	T observed	mean ±SD	Group	Variable
0/988	0/025	84/55±5/65	experimental	Weight (kg)
		83±6/57	control	
0/976	0/046	12/15±1/88	experimental	BFP
		11/83±5/03	control	
0/989	0/035	76/81±4/83	experimental	Lean body weight (Kg)
		77/16±4/65	control	

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As can be seen, of the lean body mass that can be a factor in making a difference in the performance and effectiveness of the training participants, there was no significant difference between the two groups and all of the above are considered homogeneous groups. In this case, if the change occurs in the test results between the two groups, it can be more likely attributed to the effects of the independent variables. After ensuring the homogeneity of the two groups, and then apply the independent variables in the two groups, the statistical analysis was performed to test the hypothesis as follows.

Inferential Analysis of Data

To determine the appropriate statistical methods to compare the mean (parametric or nonparametric), normal distribution of data was checked using the Kolmogorov-Smirnov test, if you are the preconditions to ensure the application of t-test, paired T test to compare means between groups of pre-test and post-test in both groups. And the independent samples of T test compare means between the two groups at pre-test and post-test should be used. The results of the Kolmogorov-Smirnov test for normal distribution data presented in the table below. Where the level was significantly higher than that of the normal distribution of data has 05/0:

Table 4-2: Results of Kolmogorov-Smirnov test.

α	**Z**	**Stage**	**Group**	**Measured factors**
0/871	0/735	Pre-test	Respiratory muscle training	Inspiratory muscle strength (Inches of water)
0/734	0/671	Post-test		
0/654	0/465	Pre-test	Dummy exercises	
0/628	0/750	Post-test		
0/872	0/764	Pre-test	Respiratory muscle training	Vital capacity (L)
0/788	0/653	Post-test		
0/354	0/874	Pre-test	Dummy exercises	
0/782	0/563	Post-test		
0/990	0/442	Pre-test	Respiratory muscle training	Tidal volume (L)
0/764	0/873	Post-test		
0/761	0/834	Pre-test	Dummy exercises	
0/748	0/678	Post-test		
0/817	0/854	Pre-test	Respiratory muscle training	Maximal oxygen consumption Ml per kilogram per) (minute
0/853	0/545	Post-test		
0/794	0/674	Pre-test	Dummy exercises	
0/762	0/655	Post-test		
0/934	0/459	Pre-test	Respiratory muscle training	km time trial -8 performance (Min)
0/678	0/488	Post-test		
0/971	0/834	Pre-test	Dummy exercises	
0/678	0/663	Post-test		

Statistical Analysis of Hypotheses

Hypothesis 1: Respiratory muscle endurance training on maximal oxygen consumption did not significantly affect the active male students. The variations in the pre- and post-test results of the two groups are shown in the following table:

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Table 4-3: The maximum oxygen consumption in the two groups

Significance level	**T observed**	**Post-test**	**Pre-test**	**Group**	
0/71	1/881	46/58±2/84	46/1±2/9*	Respiratory muscle training	Maximal oxygen consumption)Ml kg per minute(
0/672	2/12	46/73±2/02	46/26±1/8	Dummy practice	
		-1/592	-1/767	T observed	
		0/812	0/764	Significance level	

** Mean ± standard deviation*

The results show that:
A) The results of the pretest and posttest control group showed no significant difference. This means that the mock exercise, aerobic power, subjects had no significant change.
B) The results of pre-test and post-test showed no significant difference in the respiratory muscle training on respiratory muscle training, aerobic power, and subjects had no significant change.
C) Comparing pre- and post-test showed that no significant differences existed between the groups at any stage. The results are shown in the following figure.

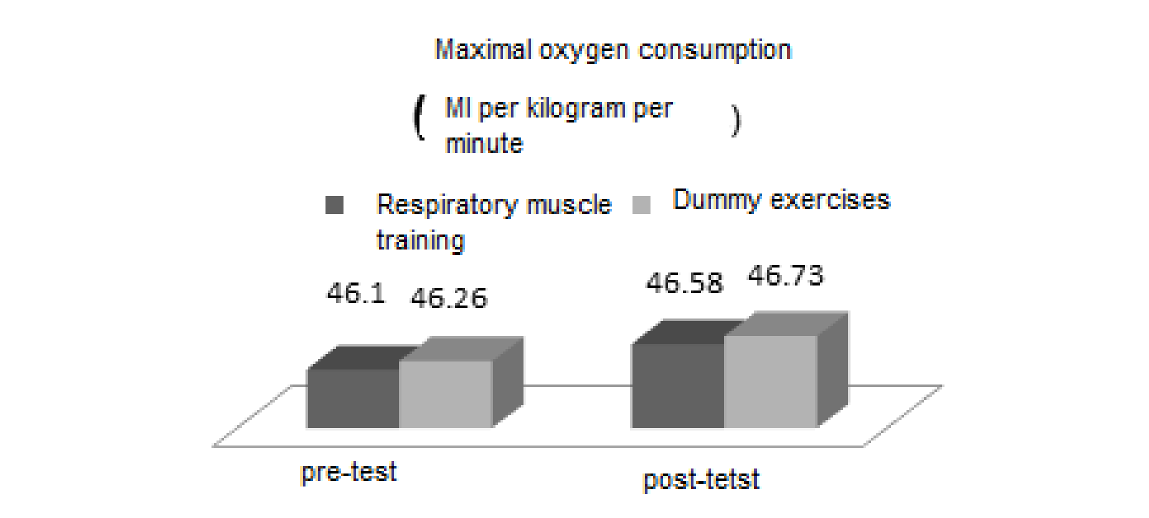

Figure 4-1: Aerobic capacity in the pre-test and post-test

Hypothesis 2: The respiratory muscle endurance training on the 8-kilometer time trial in healthy male university students' activation is not significantly affected.

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Table 4-4: The trial timeout of 8 km in the two groups

Significance level	T T Observed	Post- test	Pre-test	Group	
0/786	-0/998	37/12±1/73	37/33±1/82*	Respiratory muscle training	Time travel 8 km (Min)
0/134	-1/785	36/13±1/88	36/50±1/87	Dummy Practice	
		0/436	0/589	T T observed	
		0/721	0/774	significance level	

** mean ± standard deviation*

The results show that:
A) The results of the pre-test and post-test control group showed no significant difference. This means that a dummy training, performance 8-kilometer time trial subjects had no significant change.
B) The study of pre- and post- test results showed no significant difference between groups. This means that respiratory muscle training, performance 8-kilometer time trial subjects had no significant change.
C) Comparing pre- and post-test showed that no significant differences existed between the groups at any stage. The results are shown in the following figure.

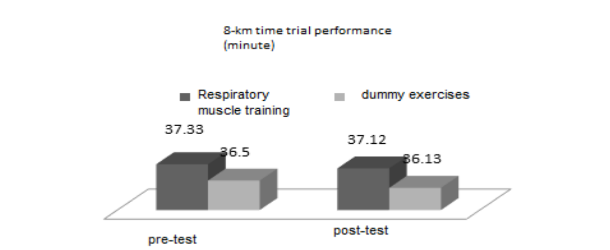

Figure 4-2: The 8-kilometer time trial in the pre-test and post-test

Hypothesis 3: Respiratory muscle endurance training on inspiratory muscle strength did not significantly affect the active male students.

Table 4-5: Changes in blood lactate concentration at maximal test groups

Significance level	T observed	Post-test	Pre-test	Group	
0/024	5/825	180/24±0/006	134/15±2/26*	Respiratory muscle training	I inspiratorymuscle e strength (Inches of water)
0/651	1/223	137/2±2/19	135/29±1/87	Practice Dummy	
		5/231	0/1377	obsrved T	
		0/03	0/675	Significance level	

** mean ± standard deviation.*

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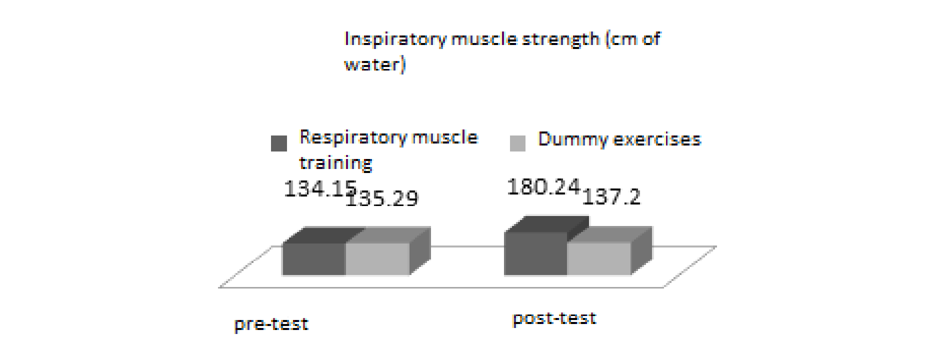

Figure 4-3: Inspiratory muscle strength in the pre-test and post-test

The results show that:

A) The results of the pretest and posttest control group showed no significant difference. This means that a dummy training, inspiratory muscle strength in subjects is not significantly changed.

B) To evaluate pre- and post-test results showed significant differences between groups. Inspiratory muscle training on respiratory muscle strength increased significantly.

C) Comparing pre- and post-test showed that although there was no significant difference between the two groups in the pre-test and post-test, the experimental group was significantly higher than inspiratory muscle strength training dummy.

The results are shown in the above diagram:

Conclusion

As we said, it does not seem that the athletic performance is limited by ventilation or respiratory muscle function, the incidence of respiratory muscle fatigue after submaximal and maximal exercise of short duration have been reported, somewhat suggests that ventilation system may be involved in limiting exercise performance.

Statistical analysis and hypothesis testing showed that although the inspiratory muscle strength was significantly improved as a result of workout but has no significant change in tidal volume and vital capacity and exercises have significant influence on endurance performance was not subjects in 8km time trial.

Based on the results of this research include tidal volume and ventilation function, there was no significant change in vital capacity was significantly increased, but the peak inspiratory muscles. Romer *et al.*, (2002) in a double-blind study with a control scheme contrived by the group practice (as in the present study) found that over 16 trained cycling following respiratory muscle training with a pressure threshold device (such as a device that is used in the present study) showed no significant change in ventilation function The dynamic performance is significantly improved in respiratory muscles. Research results have also been implicated in such effects.

Research Suggestions

1. The simple breathing exercises and little time to devote to these exercises, considering the impact of the training on respiratory function dynamically recommended minimum if athletes to improve their practice of these exercises are not used, minimum warm-up exercises apply to their specialized respiratory muscles.

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