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THE EVALUATION OF RESPIRATORY PARAMETERS OF ROWING ATHLETES IN SINOP PROVINCE*

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A Çalışma Deseni (Study Design)

B Verilerin Toplanması (Data Collection)

C Veri Analizi (Statistical Analysis)

D Makalenin Hazırlanması (Manuscript Preparation)

E Maddi İmkanların Sağlanması (Funds Collection)

Abstract: The aim of this research was to examine the respiratory parameters of elite rowing athletes in Sinop province. 15 male elit athletes participated in this research. In athletes, conditions such as not having chronic or acute disease and having no limitation of mobility due to any reason were sought. The respiratory parameters of the athletes were measured on the same day without disturbing the daily life and training program, and the lung volume and capacities were determined by COSMED Pony FX device. Measurements and tests were performed in the same time period and equal physical conditions. Mean and standard deviations of the participants were calculated by using SPSS package program. When we examine the mean values of respiratory capacity of the athletes participating in the study; The mean VC 4,29 ± 1,62, TV mean 1,21 ± 0,29, FVC mean 5,10 ± 0,81, FVC mean 107,40 ± 11,75, FEV1 mean 4,03 ± 0,83, the mean FEV1% values were 99,20 ± 15,99, the mean PEF was 6.58 ± 2.48, and the mean FEF was 3.95 ± 1.30. It is important to investigate the limits of the respiratory performance of athletes in the rowing branch related to physical competencies such as high strength, strength, and speed. Besides, performance tests including physical and anthropometric characteristics of athletes are very important in talent selection. Therefore, it is thought that the results of the study will contribute to the selection of early athletes and the studies to be carried out in this area.

Key Words: Rowing, Lung capacity, Spirometer, Respiration

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1. INTRODUCTION

Rowing is an intense, dynamic exercise that activates the whole organism and encompasses all muscles of the body. Furthermore, a significant muscle tension is required during each rowing. A positive correlation was found between rower performance and muscle tension. Synergetic work of various muscle groups against a certain load is a sign of good functioning of the central nervous system. The aerobic metabolism of the rowers, who have endurance training as well as muscle stretching exercises, is high. This is an indication of the high use of oxygen for rowers (Reilly, Secher, Snell, Williams & Williams, 2005).

For rowers, it is important that the required oxygen is supplied to the blood as well as the lung functions and capacities being sufficient. Because of the high aerobic metabolism of the rowers, tissues need extra oxygen (Akgün, 1989; Astrand, Rodahl, Dahl & Strømme, 2003). Therefore, it is thought that lung function and capacities are developed with rhythmic breathing. 2000meter rowing race is a race that is performed between 5.5-8 min. and requires high amounts of strength. 70-75% of the energy is met by aerobic, and the remaining 25-30% by anaerobic metabolism. It is stated that 67% of the energy needed in the rowing race is met by the aerobic system, 21% by alactic anaerobic and 12% by lactic anaerobic system (Steinacker, Lormes, Lehmann & Altenburg, 1998).

In the rowing branch, the effects of respiratory muscles should not be forgotten. These are; the diaphragm, the muscles between the ribs and the neck muscles. Respiratory exercises improve the muscles, allowing the rowers to breathe most effectively and efficiently. Besides the performance of the body, the techniques that are developing today allow to obtain more perfect degrees in rowing (Öğretici & Karcılılar, 2005).

Considering that the Rowing is a new sport in Turkey, it is thought that studies on this branch will provide literature support to the field. Therefore, the purpose of this study is to evaluate the respiratory of elite rowing athletes in Sinop province and to compare these with similar studies.

2. MATERIAL AND METHOD

Research Group: This study was carried out on trained rowing athletes with a mean age of 20,80 ± 2,37. 15 volunteer men participated in the study, and the same tests were applied to the athletes. Athletes were required to be healthy, free from chronic or acute illness, and any disability caused by an injury. Sinop University Human Research Ethics Committee examined the purpose, rationale, approach and method of this study according to the Directive of Ethics Committee of Human Research (Issue: 57452775-050.02.04-Date of issue: 25/04/2017 Decision number: 2017/12), and concluded that there was no ethical problem.

Measurements: Height and body weights: Weighing Instrument (InBody) Subjects were weighed on a scale with a 0.01 kg degree of accuracy. During the measurements,

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measured values were recorded as "kg" and while athletes were bare feet and only with underwear. The lengths were measured while the subjects were in a perpendicular position to a "metal rod" which was fixed on the precision scale. It was ensured that the athletes' body was completely upright and the jaw held parallel to the ground. Received values were recorded as “cm".

Measurement of Respiratory Parameters: The measurements of the athletes were carried out on the same day with the COSMED Pony FX device, without affecting the daily life and training program systems. All of the measurements of the individual, in the sitting position and with a pincer closing the nose, were performed connected to the spirometer with the aid of a mouthpiece, after getting used to breathing in the respiratory volume. The measurements were repeated three times with a 5 min interval and recorded at the best grade. Vital Capacity and Forced Vital Capacity measurements were made. In addition, the following other respiratory values were recorded.

Vital capacity (VC): The volume of air excreted by deep expiration after a deep inspiration.

Tidal volume (TV): the volume of air inspirated and expirated by each normal breath.

Forced vital capacity (FVC): The maximum volume of air excreted by hard, deep and fast expiration after a deep inspiration. In addition, the predicted (expected) FVC% was recorded.

Forced Expiratory Volume in 1 Second (FEV1): It is the volume that is expelled at 1 second of forced expiration. In addition, the predicted (expected) forced expiratory volume in 1 second percentage (FEV1%) was recorded.

Peak Expiratory Flow Rate (PEF): It is the point where the air flow rate is the highest in expiration. It is a parameter showing obstruction of large airways (central airways such as trachea, main bronchi).

Maximal Mid-Expiratory Flow Rate (FEF25-75): It is the mean flow rate between 25% and 75% of forced expiration. It gives information about medium and small airways.

Statistical Analysis: Descriptive statistics (arithmetic mean and standard deviation) of the data obtained in the study were calculated using SPSS 22 package program.

3. RESULTS

Table 1. Age, height, body weight mean and standard deviation values of subjects

Physical Properties of Subjects					
	n	Minimum	Maximum	Mean	Standard Deviation
Age (years)	15	18.00	24.00	20.80	2.37
Athlete's Age	15	4.00	8.00	5.28	2.21

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Height (cm)	15	170.00	194.00	175.12	7.72
Body Weight (kg)	15	67.74	81.14	72.18	5.80

The study included 15 participants who were actively involved in bodybuilding. The average age of the athletes was 20,80 ± 2,37 years, the mean sports age was 5,28 ± 2,21 years, the average length was 184,66 ± 6,13 cm, the average body weight was 72,66 ± 5,78 kg and the average body mass index (BMI) was found to be 21.26 ± 1.17 kg / m2 (Table 2).

Table 2. Mean respiratory capacity values of subjects

Respiratory Capacity Values of Subjects					
	n	Minimum	Maximum	Mean	Standard Deviation
VC (lt)	15	3.17	6.88	5.29	1.92
TV (lt)	15	0.97	1.54	1.21	0.29
FVC (lt)	15	3.75	6.33	5.10	0.81
FVC %	15	87	128	105.40	11.75
FEV1 (lt)	15	2.49	4.99	4.03	0.83
FEV1 %	15	58	123	99.20	15.99
PEF (lt)	15	3.67	10.31	6.58	2.48
FEF (lt)	15	1.48	6.05	3.95	1.30

When the breathing capacity values of the rowing athletes were examined in Table 2, it was found that the air volume (VC) excreted by deep expiration after a deep inspiration was 5.29 ± 1.92, the air volume inspirated and expirated in each normal breath was 1.21 ± 0.29, maximum volume of air (FVC) excreted by forceful, rapid and deep expiration after deep inspiration was 5,10 ± 0,81 and redicted FVC% was 105,40 ± 11,75. While forced expiratory volume in 1 second (FEV1) was 4,03±0,83, the predicted (expected) forced expiratory volume in 1 second percentage was 99,20±15,9. While peak expiratory flow rate (PEF) was 6.58±2.48, mean flow rate (FEF) was found to be 3,95±1,30 between 25% and 75% of the forced expiration

4. DISCUSSION

In sport activities, the O2 requirement of the muscles increase and a harmony occurs with the physiology of the respiratory system which eliminates the need for increased O2. Increase in respiratory functions according to the type of exercise performed is related to the development of respiratory muscles, chest cage's expansion ability and flexibilities of bronchus and bronchiole (Gözü, Liman & Kan, 1988). Vital capacity and forced vital capacity are parameters that demonstrate lung function and it is normal for every person to have 80% or more of the expected value according to age, height, gender and body weight (Weinberger & Drazen, 1998). A FEV1 value below 80% may indicate a problem with expiration (Tamer, 1995). FVC measurement is used to determine the problems in the diaphragm muscle. If the diaphragm muscle is weak, FVC values are lower than normal (Kürkçü & Gökhan, 2011). It is known that sport has a positive effect on VC and FVC values. An increase in breathing volume occurs for increased metabolism during exercise to provide the needed O2. As exercises gain continuity, respiratory muscles will improve (Mahoney, 1992; Fox, Bowers & Foss, 2000).

When the studies performed in various branches in terms of respiratory parameters are examined Mehrotra, Varma, Tiwari & Kumar (1998) compared four different group, playing volleyball, basketball, hockey and swimming, between themselves and with the sedentary group and as a result, they reported that FVC, FEV1 and PEF values of all groups were higher than sedentaries. In another study, Ghosh, Ahuja & Khann (1985) examined lung-related functional capacities of 168 athletes engaged in different sports and desk employees. As a result of the study focusing on VC, MVV, FEV1, the functional capacities of the athletes engaging in different sports were higher than those of the stationary individuals. Mean VC values of basketball, cricket, football, hockey, ping-pong player and boxer groups, mean MVV values of all groups except athlete, badminton and football player groups and mean FEV1 values of football, kockey, volleyball player and swimmer groups were higher than the mean values of these stationary individuals.

Combined inspiratory and expiratory muscle training was applied to the rowing athletes. Inspiratory muscle training was found to improve rowing performance, but combined inspiratory and expiratory muscle training did not improve the rowing performance (Griffiths & McConnell, 2007). It has been observed that respiratory muscle training applied to rowing athletes increased inspiratory and expiratory respiratory strength (Forbes, Game, Syrotuik, Jones & Bell, 2011). It has been found that respiratory muscle training performed on rowing athletes has little effect on lung functions (Driller & Paton, 2012). Forbes et al. (2011) reported in their study on Canadian local rowers that the average FVC (lt) values of the athletes were 4.22 and the FEV1 (lt) values were 3.88. Driller and Paton (2012) found FEV1(lt) value as 4.39 and FVC(lt) as 5.49, in their study examining the respiratory parameters of Australian national rowers.

According to the results of our study, FVC (lt) values of the local athletes in Sinop Province were determined as 5.10, FEV1 (lt) values as 4.03, VC (lt) values as 5.29 and TV (lt) values as 5.29. When the results of our study are compared with the literature, it is seen that the respiratory capacity values of our athletes are equivalent to rowers who are competing at the national level in the world but they are below the level of national teams.

5. CONCLUSIONS

The findings suggest that the respiratory capacity values of the athletes interested in rowing in Sinop Province are sufficient at national level, but they need to be further developed to represent our country at international level. The acquisition of this data, along with new and improved exercises, will help the athlete prepare faster for the next level of endurance performance.

Although the used method and obtained findings seem to be an important result for improving breathing performance in rowing sport, further research is needed on the types of training to increase respiratory values.

Information about the breathing performance of our country's rowing athletes can be obtained with researches carried out on the rowing athletes in other provinces competing at national level.

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