Selami YÜKSEK[1]

Erkal ARSLANOĞLU[1]

EFFECTS OF 14 WEEKS OF REGULAR EXERCISE AND MINI TENNIS ACTIVITIES ON THE RESPIRATORY PARAMETERS OF 8-12 YEARS-OLD MALE CHILDREN[2]

ABSTRACT

The purpose of this study is to examine the effects of 14 weeks of regular exercise and mini tennis activities on the respiratory volumes of 8-12 year-old male children.

The study group comprised of 14 healthy young male subjects with the average age of 9,9±1,2 years; the average height of 138,7±8,1cm; the average weight of 34,4±10,3kg and the BMI of 17,9±3,5 kg/m^2. Upon permission by parents, the medical committee and Kafkas University Sarıkamış School of Physical Education and Sports, each exercise was practised for 2 hours throughout 14 weeks (Saturday and Sunday). The respiratory volumes were measured with Pony spirometers. Forced Expiratory Volume (FEV1), Forced Vital Capacity (FVC), Maximal Voluntary Ventilation (MVV) and Vital Capacity (VC) of the subjects were tested. The measurements were conducted before and after 14 weeks of activities, in resting condition. Within the scope of the training programmes, there were 20 mins. of warm-up and gymnastics, 20 mins. of aerobic step with music to improve coordination and rhythmic skills, 20 mins. of educational games including various sports branches (basketball, football, volleyball, handball), and finally 60 mins. of mini tennis activities. Each week, avoiding routine exercises, the activities were conducted in different forms. The analysis of the data was performed by using SPSS for Windows 11.0 with Wilcoxon test at the level of 0.01 and 0.05.

Consequently, as a result of the 14 weeks of regular training and mini tennis activities and of the comparison between the parameters of FVC, FEV1, VC and MVV before and after the programme, it has been established that there is a 0,01 level of significant difference.

Key words: Mini tennis, respiratory parameters, male children.

14 HAFTALIK DÜZENLİ EGZERSİZ VE MİNİ TENİS ÇALIŞMALARININ 8-12 YAŞ GRUBU ERKEK ÇOCUKLARIN SOLUNUM PARAMETRELERİNE ETKİSİ

ÖZET

Bu çalışma; 14 haftalık düzenli egzersiz ve mini tenis çalışmalarının 8-12 yaş grubu erkek çocukların solunum parametrelerine etkisini incelemek amacıyla yapıldı.

Deney grubu; yaş ortalaması; 9,9±1,2 yıl, boy ortalaması; 138,7±8,1 cm., vücut ağırlığı; 34,4±10,3 kg ve Vücut Kitle İndeksi; 17,9±3,5 kg/m^2 olan, 14 sağlıklı erkek olgudan oluşturuldu. Çalışmalar; velilerinin onayı, sağlık ocaklarından alınan sağlık raporları ve Kafkas Üniversitesi Sarıkamış Beden Eğitimi Spor Yüksekokulu Müdürlüğünün izinleri doğrultusunda, 14 hafta boyunca (Cumartesi-Pazar) ve her çalışma 2 saat süreyle uygulandı. Solunum parametrelerinin ölçümleri Pony marka spirometre ile alındı. Deneklere; Zorlu Ekspirasyon Hacmi (FEV1), Zorlu Vital Kapasite (FVC), Maksimum İstemli Ventilasyon (MVV), Vital Kapasite (VC) solunum testleri uygulandı. Ölçümler, istirahat şartlarında egzersiz uygulamalarına başlanmadan önce ve egzersiz uygulamalarının bittiği 14. haftanın sonunda olmak üzere iki kez alındı. Çalışmanın içeriğinde; 20 dakikalık ısınma ve jimnastik çalışmaları, 20 dakikalık koordinasyon ve ritm becerilerini geliştirecek müzikli aerobik step çalışmaları, 20 dakikalık çeşitli spor branşlarını içerecek (basketbol, futbol, voleybol, hentbol) eğitsel oyunlar formunda temel teknik çalışmalar ve son olarak da 60 dakikalık mini tenis uygulamaları yaptırıldı. Her hafta çalışmalar değişik formlarda uygulanıp rutin çalışmalardan kaçınıldı. Elde edilen verilerin analizi, SPSS for Windows 11.0, programında Wilcoxon testi kullanılarak 0.01 ve 0.05 düzeyinde incelendi.

Sonuç olarak; uygulanan 14 haftalık düzenli egzersiz ve mini tenis çalışmalarının, çocukların FVC, FEV1, VC, MVV solunum parametrelerinin, uygulanan program öncesi ve sonrası karşılaştırılması sonucunda 0,01 düzeyinde anlamlı farklar tespit edildi.

Anahtar kelimeler : Mini tenis, solunum parametreleri, erkek çocuk.

[1] Kafkas University, Sarıkamıs School of Physical Education and Sports

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INTRODUCTION

Gas exchange between a living creature and its outer environment is called respiration (Noyan, 1993). Inhaled air is called air of inspiration and exhaled air is called air of expiration (Milo et al, 2004). The functional status of the respiratory system can be classically traced by measuring the volume and capacity of lungs. Respiratory systems of well-trained people adjust faster to the increased need of oxygen during sports (Bingöl et al, 2000). With physical training, a significant change occurs in the volume and frequency of respiration. Besides, with physical training, the O_2 utilization rate in maximal aerobic metabolism in tissues, which is called $MaxVO_2$, increases. With 7-13 weeks of training, an increase of over 10% occurs in $MaxVO_2$. A person can always provide more oxygen to the organism than his/her body needs. Therefore, the important thing is to increase the utility of oxygen, namely $MaxVO_2$, with trainings (Tamer, 1995).

Regular sports activities during childhood play an important role in the development and continuity of a healthy physical structure. Doing sports regularly has a significant place in balanced and healthy growth of children. Every child should be in a certain physical activity to have a healthy growth. When expecting a performance from children in sports, their physiological and psychological statuses should be taken into consideration. Sports activities for children should be determined according to these features and instead of monotonous, simplex and repetitive static input, versatile, creative and vibrant activities should be exercised.

This study was conducted with the aim of analysing the effects of 14 weeks of regular exercise and mini tennis trainings on the respiration parameters of male children from the age group of 8-12.

METHOD

The study was conducted with 14 healthy young male subjects of 8-12 years of age with the average age of 9,9±1,2 years; the average height of 138,7±8,1cm and the average weight of 34,4±10,3kg. Upon the consents by parents and Kafkas University Sarıkamış School of Physical Education and Sports, each exercise was practised for 2 hours throughout 14 weeks (Saturday-Sunday).

Measurements of the respiratory parameters were conducted with Pony spirometers at the Physiology Laboratory of Kafkas University Sarıkamış School of Physical Education and Sports. Forced expiratory volume in the first second (FEV1), forced vital capacity (FVC), maximum voluntary ventilation (MVV) and vital capacity (VC) tests were applied to the subjects. The measurements were conducted twice: the first was before starting the exercises, when the subjects were at rest and the second one was conducted at the end of the 14-week period of exercise. After the test procedure was explained and shown to each subject, being guided through the process, the subjects had the tests twice and the best scores were recorded with the utmost care regarding the correctness of the measurement. Within the scope of the training programmes, there were 20 mins. of warm-up and gymnastics, 20 mins. of aerobic step with music to improve coordination and rhythmic skills, 20 mins. of educational games including various sports branches (basketball, football, volleyball, handball), and finally 60 mins. of mini tennis activities. Each week, avoiding routine exercises, the activities were conducted in different forms. Body mass index (BMI) was estimated with the body weight in kilogram divided by the square of the height in meter. BMI=Body weight (kg)/height^2 (m^2)

The statistical analysis of the data was performed by using SPSS for Windows 11.0 (before and after the training

programme) with Wilcoxon test at the level of 0,01 and 0,05.

FİNDİNGS

Table 1: The Age, Height, Weight and BMI rates of the Subjects

N=14	AGE (year)	HEIGHT (cm)	BODY WEIGHT (kg)	BMI (Kg/m^2)
X±SD	9,9±1,2	138,7±8,1	34,4±10,3	17,9±3,5

n: Number of subjects, X:Average rate, sd: Standard Deviation,

The study was conducted with 14 voluntary male participants with the average age of 9,9±1,2 years; the average height of 138,7±8,1cm; the average weight of 34,4±10,3kg and Body Mass Index of 17,9±3,5kg/m^2. (**Table 1**)

Table 2: The Average and Standard Deviation Rates of the I-II. Measurements of the Subjects' Respiratory Parameters and Significance Levels of the Differences between the I.-II. Measurements

PARAMETERS		I. Meas. X±sd	II. Meas. X±sd	MD Av. Difference	p
FVC	n:14	1,80±0,4	2,24±0,5	-0,437±0,3	**0,002**
FEV1	n:14	1,73±0,4	2,03±0,4	-0,29±0,2	**0,001**
VC	n:14	2,44±1,4	3,29±1,3	-0,85±0,6	**0,001**
MVV	n:14	56,95±19,6	71,31±24,2	-14,36±12,4	**0,001**

n: Number of subjects, X:Average rate, sd: Standard Deviation, p :Level of significance

As a result of the statistical analysis, it was found that there is a 0,01 level of significant difference between the I. and the II. measurements of FVC, FEV1, VC and MVV rates of the 14 male subjects. (**Table 2**)

DISCUSSION

This study was conducted with the aim of analysing the effects of 14 weeks of regular exercise and mini tennis trainings on the respiration parameters of male children from the age group of 8-12. It was established that these subjects have the average age of 9,9±1,2 years; the average height of 138,7±8,1cm; the average weight of 34,4±10,3kg and the Body Mass Index of 17,9±3,5 Kg/m^2

Through researches, it has been confirmed that, physiologically, regular training programmes influence respiration, circulation and blood parameters in a positive way (Sohal et al, 1998). During exercise, cardiovascular and respiratory mechanisms' working in harmony is mandatory to provide active tissues with O_2 and remove excessive CO_2 from them. Besides, during exercise, there is an increase in the O_2 intake by the working muscles and with rising ventilation, extra O_2 is provided, body temperature is lowered and excessive CO_2 is removed (Gözü et al,1998).

With physical training, a significant change occurs in the volume and frequency of respiration. Also, with physical training, the O_2 utilization rate in maximal aerobic metabolism in tissues, which is called $MaxVO_2$, increases. With 7-13 weeks of training, an increase of over 10% occurs in $MaxVO_2$ (Tamer, 1995)

Regular sports activities during childhood play an important role in the development and continuity of a healthy physical structure. Doing sports regularly has a significant place in balanced and healthy growth of children. Every child should be in a certain physical activity to have a healthy growth. When expecting a performance from children in sports, their physiological and psychological statuses

should be taken into consideration. Sports activities for children should be determined according to these features and instead of monotonous, simplex and repetitive static input, versatile, creative and vibrant activities should be practised (Açıkada ve Ergen, 1990).

Tunay's research group (2008) found that the average respiratory function rates of the children who play basketball are FVC;2,48±0,49lt and FEV1;2,37±0,41lt., while sedentary children's rates are FVC;1,65±0,32lt. and FEV1; 1,62±0,31lt. In their study on children, Çoksevim's group (2002) found that VC is 2,9±0,8lt., FVC is 2,96±0,8lt. and FEV1 is 2,82±0,8lt. Kalkavan's group (2005) examined 22 male basketball players who played for 2,3 years and who had 10,5 years of age on average. Their respiration rates were reported as VC; 2,4±0,5, FVC; 2,44, FEV1;2,34 and FEV1%; 94,7. With their study on the basketball players, Tunay's group stated that basketball significantly increased some respiratory functions and hence, with basketball trainings, this sport could be linked to the development of respiratory muscles. It can be observed that the data we obtained from the 14 weeks of regular training and the data of other researchers are parallel. Just as the higher respiratory rates of the children who did sports activities, those regular exercises are parallel with our 14 weeks of regular exercises in terms of the rise in respiratory parameters.

In another study, for 3 months, 20 children who did not do sports actively and whose ages ranged from 10-16 practised 60 minutes of exercise 4 days a week. No significant difference was found in their FVC and FEV1 rates, according to the pre-test and post-test measurements (Taşğın ve Dönmez, 2009).

In their study on the primary school students whose ages range from 11-13, Alpay's group (2008) compared the respiratory parameters of the athletes who are members of the school teams and the athletes who were not. As a result, it was found that those who were in the school team had higher rates in VC and FVC. These results show parallelism with our current study.

In their study on 459 sports people with ages ranging from 10 to 21, Doherty and Dimitriou found that male and female rates of FEV1 are higher in swimmers. In our study, while those who participated in tennis trainings had the FEV1 rate of 2.03lt, Doherty and Dimitriou stated that the rate was 3,5lt (Doherty ve Dimitriu, 1997). This difference is thought to stem from the fact that our subjects are of a younger age group.

In another study (Khrisanapant et al, 2011), 293 male and 295 sedentary people whose ages range from 13-19 were compared in terms of their lung capacities. The students who exercised regularly were observed to have higher lung capacities than those who were sedentary. The rates (FVC, FEV1) of the subjects who did sports in that study are higher than the rates of our study.

In the study conducted by Baltacı's group (1997), the FVC and FEV1 rates of the sports people at the age group of 11-12 years were higher, compared to the control group. In another study conducted in 1997 by Erol's group, the FVC rate of 13-14 years old basketball players was 3,46lt and the FEV1 rate was 2,98lt (Erol et al, 1997). The higher rates in that study could be explained by the fact that the average age in our study is lower.

In a study on the badminton players with the average age of 12, it was found that there was no difference between the estimated parameters of the male and female participants, and that those who were at the same age group and from different sports branches had similar average rates (Erkman and Taşğın, 2004). Examining the vital capacity rates of the trained and untrained children at 14-18 years of age, Harre found that those who had physical training had 3,700 lt/min, and those who were untrained had 2,900 lt/min (Harre, 1982).

When the literature is analyzed, it can be noticed that in different sports

branches and similar age groups, and in evaluated respiratory parameters of children who do sports and who do not, various results can be obtained. As for the higher forced vital capacity rates of those who do sports than those who do not, the effects of VC and diaphragm muscle may be taken into account because to trace the weakness of the diaphragm muscle, FVC is measured. If there is a weakness in the diaphragm muscle, FVC rates are low (Hancox, 2004).

Consequently, as a result of the comparison between the parameters of FVC, FEV1, VC and MVV before and after the programme, it has been established that there is a 0,01 level of increase in all of the respiratory parameters measured at the end of the 14-week training programme and mini tennis activities performed by the male children 8-12 years old. We can say that those who joined the regular training programme had higher results in their respiration tests at the 2nd measurements because their diaphragms and respiratory muscles became stronger in connection with the exercises.

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