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Aerobic Exercise Treatment Model as an Attempt to Improve Promotif and Preventive Functions of Pulmonary Capacity

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Abstract
Pulmonary function respiration system as important in the human body, the function provides oxygen (O_2) from the outside of the body for the process of cell metabolism and removing carbon dioxide (CO_2) and water (H_2O) from the body. Function lung capacity is influenced by genetic, age, gender, height, pulmonary disease, smoking habit and custom of the sport. Aerobic exercises are done routinely run will cause the change form on the muscular system, circulatory system, cardiovascular system and ability of lung capacity function. Response to aerobic exercise against pulmonary function capacity depending on exercise intensity, duration and frequency of exercise. The purpose of this research is to know the influence of aerobic exercise against pulmonary function capacity. This research is Experimental Quasy Study, with design of Pretest-Posttest with control group design. The sample amounted to 35 people. The results of the statistical analysis show that there is a significant influence of aerobic exercise to increased lung capacity function. The mean FVC after sports increased 1, 10% with p value = 0,017 and average FEV1 after sports increased 0, 23% with p value = 0,005. Time duration of exercise indicates the absence of effect on the changes in pulmonary function capacity (FVC p value = 0,494 and FEV1 p value = 0,805). Frequency of exercise 3 times a week showed the existence of significant influence towards increasing lung capacity function (FVC p value = 0,001 and FEV_1 p value = 0,000).
Key words: aerobic Exercise, time duration, frequency, FVC (Forced Vital Capacity), FEV_1 (Forced Expiratory Volume in One Second)

1. Introduction

Respiratory system is a very important process in the human body. Function pulmonary respiration system functioning as a provide oxygen (O2) from outside the body to the body's circulation was released to the process of cell metabolism and produce carbon dioxide (CO2) and water (H2O) are removed from the body.[1]
An increase in the level of the economy and the welfare of society and the advancement of technology and transportation impact on daily activities experienced a shift from passive into active behavior, lack of exercise, lack of motion, thus causing decreased organ function is called with hipokinesis. The organ that feels its effects since hipokinesis is a muscles, heart and lungs causing pulmonary function capacity maximum No. 2 of this state of Affairs continued when coupled with individual character the less healthy as has the habit of smoking will aggravate condition function lung which resulted in the occurrence of respiratory tract blockage (Obstruction) and emerging infections that cause damage to the walls of the alveoli so that cause interference function lung development (Restriction)[1].
Function lung capacity is affected by many factors, including genetic factors, age, gender, height, pulmonary disease, smoking habit and custom of the sport. Capacity can be measured with pulmonary function tool pyrometer. 3 the capacity of a normal lung function resulted in cell metabolism of the body runs good so can increase productivity of work, otherwise if there is lung disorder then function cell metabolism will be disrupted as a result of physical activity decreases so that the labor productivity also decreased [4].
Promote and preventive efforts against the emergence of a pulmonary disorder function can be done by increasing the physical freshness through sporting activities on a regular basis. Kind of a good sport to retain freshness of aerobic exercise is physical. Aerobic exercise response against lung function capacity depending on exercise intensity, duration and frequency of exercise time enough exercise as well as the State of the environment and the physiological status of the individual. [5]
Report inspection results spirometri against 1136 military members by 2013 there is 9% or 104 people experiencing disruption needs to be lightweight. These results illustrate the still found the presence of impaired pulmonary function on the TNI members. [6] research purposes to know the influence of aerobic exercise against pulmonary function capacity based on the time duration and frequency of exercise on TNI members AL who underwent the task of studying in the School of Medicine X Surabaya.

2. Method

This Research Study, Experimental Quasy design with Pretest-Posttest design method with control group design. The intervention group was given treatment in the form of aerobic exercise run and a control group not given the treatment. Model treatment in the intervention group was given based on the difference in the duration of exercise time, namely; 15 minutes, 30 minutes and frequency of exercise a week, namely; 1 time a week, twice

a week and 3 times a week.
The population of this research is a member of the TNI AL who underwent the task of studying in the School of Medicine X Surabaya as many as 44 people. Large samples of respondents determined that qualifies inclusion and replication, so the calculation result is obtained the sample of 35 people who were divided into 7 groups.
Group 1 is the control group, in this group there is no aerobic exercise treatment. Group 2 received treatment with aerobic exercise running time 15 minutes duration and frequency of exercise 2 times a week. Group 3 gets treatment duration of aerobic exercise with a run time of 15 minutes and a frequency of 2 times a week. Group of 4 got aerobic exercise treatment duration of run with a 15-minute frequency is 3 times a week. Group 5 gets treatment duration of aerobic exercise with a run time of 30 minutes and a frequency of exercise once a week. Group 6 aerobic exercise treatment model gets a run with time duration and frequency of 30 minutes exercise twice a week and the Group of 7 got aerobic exercise treatment models run with a 30-minute duration and frequency of exercise 3 times a week.
The independent variable was the exercise aerobic research independent manner, time duration and frequency of exercise in a week. The dependent variable in the form of pulmonary function capacity FVC (Forced Vital Capacity) and FEV_1 (Forced Expiratory Volume in one second).
The data obtained through questionnaires and direct measurements carried out at the end of December 2014 to mid January 2015. Data analysis, descriptive statistics (minimum, maximum, mean/average and deviation standard), while the multivariate analysis with anova test models the influence of linear regression and treatment.

3. Result

Table 1. Description of the Age, height, weight, Body Period Index on the respondents, January 2015

Description	Minimum	Maximum	Mean	Deviation Standard
Age	24 years old	35 years old	27,17 years old	2,57
Height	162 cm	176 cm	167,4 cm	3,69
Weight	55 kg	93 kg	71,23 kg	10,81
Body Mass Index	20	35	25,40	3,97
FVC (*Post-Pre*)	-3,0 %	-1,0 %	+1,10 %	1,1
FEV_1 (*Post-Pre*)	0 %	+1,0 %	+0,23 %	0,88

Table 1 shows that the characteristics of the gender of the respondents are all men, average age 17 years, average height 167, 43cm, average weight 71,23 kg and average Time Index of the body (IMT) 25,40. There is an increase in the mean FVC measurement results before and after the exercise of + 1.10% and on average FEV_1 measurements there is an increase of + 0.23%.

Table 2. The results of the analysis of the influence of Aerobic Exercise Anova against Pulmonary Function (FVC and FEV_1) Respondents, January 2015

Variable	N	Mean (*Post-Pre*)	p value
FVC	35	+1,10	0,017
FEV_1	35	+0,23	0,005

Test result analysis of Anova model the influence of aerobic exercise against pulmonary function capacity FVC p value = 0,017 and FEV1 p value = 0.005. This shows that there is a significant influence of aerobic exercise to increased lung capacity function. Anova analysis results can be seen in table 2.

Table 3. The results of the analysis of Anova Influence the duration of Aerobic Exercise Time against Pulmonary Function (FVC and FEV1) on Respondents, January 2015

Variable	Time Duration (in minute)	N	p value
FVC	0 15 30	5 15 15	0,494
FEV_1	0 15 30	5 15 15	0,805

Table 3 shows the results of test Anova model influence treatment duration of exercise time of 15 minutes and 30 seconds to change the value of FVC and FEV1 before and after aerobic exercise obtained FVC p value = 0,494 and against test analysis of FEV1 obtained p value = 0,805, this indicates that there is no influence of duration time to increased lung capacity function.

Table 4. The results of the analysis of the influence of frequency of Aerobic Exercise Anova against Pulmonary Function (FVC and FEV1) on Respondents, January 2015

Variable	Frequency Of Exercise (in one week)	N	p value
FVC	0 x	5	
	1 x	10	
	2 x	10	0,001
	3 x	10	
FEV_1	0 x	5	
	1 x	10	
	2 x	10	0,000
	3 x	10	

Table 4 shows the results of the Anova test models the influence of aerobic exercise frequency treatment run 1 times a week, twice a week and three times a week against changes in the value of FVC and FEV1 before and after exercise. Test result analysis of FVC retrieved p value = 0.001 and test analysis of FEV1 obtained the p value = 0.000. These results indicate a significant influence of frequency of exercise to increased lung capacity function.

4. Discussion

4.1 Aerobic Exercise

Aerobic exercise is a physical activity that involves almost all skeletal muscles of our body. Increased muscle tone, muscle contractions as well as neuromuscular reflexes that occur when doing aerobic exercise will affect the response to increased ventilation capacity function. [7] have much research showed the presence of influence capacity function lung after doing physical exercises. Research results Edgar8 stated that the recovery of pulmonary function after a workout is a Predictor for assessing someone's lung health, the faster means getting healthy anyway. Other studies conducted by Pomatahu [9] show that by doing gymnastics Mosesahi can increase capacity of pulmonary function Gorontalo National University students.

Function lung capacity is influenced by age, gender, height, pulmonary disease, the habit of smoking and the habit of doing exercise. [1.3] The respondents are members of the military are trained do sport and the age of the respondents was young (17 years), so value of the average lung capacity function (value of FVC and FEV1) more than 80%. This indicates that the condition of lung function respondents quite healthy. Pulmonary function capacity will decline at age 30-40, impaired lung functions will appear as we get [3.8].

Aerobic exercise run as far as 2400 meters traveled within 12 minutes was one of the Cooper test for physical freshness. [10] in a military environment, test Cooper is known for its Kesamaptaan routine physical activities performed by members of the military to test physical ability and in an attempt to maintain her health.

The results of the research conducted, [11] Madina mentions that by giving it a test run on the treatment of men as far as 1200 m and 1000 m daughter with duration of travel time average 5.48 seconds, gained lung capacity value differences based on gender, where capacity function lung men is higher than the capacity of the lung function's daughter. Other studies being done Sirait[11] shows that a grown man doing exercises sports with intensity and duration sufficient time and is done on a regular basis have the capacity of the lungs better than any grown man who did not exercise regularly.

4.2 Time Duration of Exercise

The duration of the exercise time is the thing to note, if the exercise intensity is higher than the exercise time is shorter, otherwise if the exercise intensity is small or short then the exercise should be longer. Measure the length of exercise to health exercise 20-30 minutes of exercise in the zone. The duration of the exercise to get good results for cardiovascular and pulmonary function is reached area zone exercise and maintained between 20-45 minutes. Just the normal practice that is recommended is 15-60 minutes regularly. [5.15]

Based on the test results the analysis of anova model influences the duration of exercise time to increased lung capacity FVC and FEV1 function which distinguished between a group of treatment duration of 15 minutes and a duration of 30 minutes treatment groups showed no significant effects against lung function capacity, this can be understood because the respondents are members of the regular military trained do run samapta exercises conducted with certain duration on a regular basis will effect on muscle strength and pulmonary , so the difference in the duration given as treatment does not cause different effects.

4.3 Frequency of Exercise

Research to find out which distinction lung capacity FVC on swimming athletes and athletes instead of swimming showed the existence of very significant differences, this can be understood because swimming is a

sport aerobics the most defenseless populations, because it involves the whole body's main muscle that is able to deliver results better than any other sport in the enhancement of the capacity of the lung function. [13]
Frequency of exercise is closely related to the intensity and duration of exercise time. Several studies have concluded that exercise will have an impact well if done at least 3 times a week, either for sports or sports health achievements. [2] this is due to the resilience of someone dropping after 48 hours not doing exercises, so labored before declining resilience must be practiced more. [2] the frequency of exercises should be done 3-5 times per week are intermittent, such as Monday – Wednesday – Friday, while the other day used to break so that the body has a chance of doing recovery (recovery). Exercises conducted with a frequency of 6-7 times per week or daily is not recommended because it could endanger health. The body requires sufficient recovery to keep the physical freshness. [5.15]

5. Conclusion

The conclusions that can be drawn based on the results of this research are:

1. The respondents in this study were all males, with a mean age of 27, 17 years, average height 167, 4 cm and average weight 71, 23 kg.
2. Aerobic Exercise running may increase capacity of pulmonary function (FVC and FEV1).
3. The duration of the exercise time is 15 minutes and 30 seconds no effect on increasing the capacity of the lung because function respondents are trained do aerobic run (physical kesamaptaan).
4. Frequency of exercise 3 times a week do aerobic effect on lung capacity function (FEV1 and FVC)

Based on these conclusions, then it is recommended that:

1. Aerobic Exercise better done routine with the frequency of exercise 3 times a week for 30 minutes in order to defense and increase capacity of pulmonary function.
2. Healthy way making exercise or run as a culture of healthy living.

Reference

Alsagaff Hood dan Abdul M, *Dasar-dasar Ilmu Penyakit Paru,* Surabaya : AirlanggaUniversity Press, 2008

Cooper H. Kenneth, (2004), The aerobic Program For Total Well-Being, Toronto, Alih bahasa , Aerobik, Antonius Adiwiyoto, cetakan ke 5 Gramedia, Jakarta.

Djaja Surya A., (2003). *ACSM Panduan Uji Latihan Jasmani dan Peresapannya,* alih bahasa, Jakarta : EGC

Edgar, A Randomized Trial Comparing Lung-Volume-Reduction Surgery with Medical Therapy for severe Emphysema, *The New England Journal of Medicine* , //www.nejm.org/doi/full/10.1056/NEJMoa030287, 2002 (sitasi May 22, 2002)

Giam, C.K.,*Ilmu Kedokteran Olahraga*, Jakarta : Fakultas Kedokteran UI, 1999.

Giriwijoyo,H.Y.S.S dan Zafar Sidik, *Ilmu Kesehatan Olahraga*,Bandung : Penerbit PT Remaja Rosdakarya, 2013.

Giriwijoyo,H.Y.S.S, dan H. Muchtamadji M.Ali, *Ilmu Function Olahraga , Fungsi tubuh manusia pada olah raga untuk kesehatan dan untuk prestasi*. Buku perkuliahan Mahasiswa FPOK, Bandung :UPI, 2006.

Guyton CA, Hall JE, (2006), Textbook of Medical Physiology.11th edition, Philadelphia: Elsevier Saunders, pp: 597-605

Kepala Lembaga Kesehatan Kelautan (Kalakesla),*Laporan Hasil Uji Pemeriksaan Kesehatan Anggota TNI AL Tahun 2013.*

Madina, Deasy Silviasari, *Nilai Kapasitas Vital Paru dan Hubungannya dengan Karakteristik pada Atlet Berbagai Cabang Olahraga*. Fakultas Kedokteran Universitas Padjajaran, 2007.

Pomatahu, A.R, *Peningkatan Kapasitas Paru Dan Kemampuan Kardiovaskuler melalui Senam Mosesahi Pada Mahasiswa Universitas Negeri Gorontalo,* Disertasi, Program Doktor Tidak dipublikasikan. Universitas Airlangga Surabaya, 2013.

Sirait Ferdinan, *Perbandingan Kapasitas Vital Paru pada Pria Dewasa Normal yang Rutin Berolahraga dengan Tidak Rutin Berolahraga*, 2009.

Situmorang, Lintong, Supit , Perbandingan Forced Vital Capcity Paru pada Atlet Renang dan bukan Atlet Renang di Sulawesi Utara. E-Biomedik (eBM) Jurnal.2014; 7 (2) : 485-2.

Suma'mur,*Higiene Perusahaan Dan Kesehatan kerja (Hiperkes)*. Jakarta : CV Agung Seto, 2009.

Wiarto Giri,*Fisiologi dan Olah raga,*Yogjakarta : Graha Ilmu, 2013.

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