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DIFFERENCES OF PEAK EXPIRATION FLOW RATE (PEFR) BETWEEN BRISK WALKING AND HIGH INTENSITY INTERVAL TRAINING (HIIT) IN YOUNG ADULTS

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ABSTRACT

Background : Sedentary lifestyle makes people having less physical activities that may lead to the reduce lung function. Peak expiratory flow rate (PEFR) was used to measure lung function. *High Intensity Interval Training* (HIIT) is a high-intensity aerobic exercise, while brisk walking is an moderate-intensity aerobic exercise. The aim of this research is to determine the difference of PEFR between HIIT and brisk walking, that could depict lung function. **Method :** This research used *quasi experimental* with *pre-test* and *post-test comparison group* design. The samples were medical students at Diponegoro University, who had inclusion criteria and did not have exclusion criteria. This research used samples of 3 groups that contained of control group, HIIT, and brisk walking with 14 people in each group. Groups of HIIT and brisk walking got 3 times of intervention in each week, for 6 weeks. Measurement of PEFR was using Miniwright Peak Flow Meter. The normality of numerical scaled data was tested by using Saphiro-Wilk method, to find abnormal data that was tested by using Mann Whitney Method. **Results :** The average *post-test* of PEFR in HIIT was (397.14±33.738), while in brisk walking was (370.14±34.851), and in the control group was (327.78±29.271). The increase in PEFR between the HIIT and the brisk walking group after statistical testing was p = 0.000 (p <0.005), which shows a significant difference. **Conclusion:** There is a significant difference in the PEFR between HIIT group and brisk walk in early adults that could describe a person's lung function.
Keywords : Lung Function, PEFR, HIIT, Brisk walking.

INTRODUCTION

The development of technology tend to create a sedentary lifestyle. Sedentary lifestyle is a lifestyle that lack of physical activities or lack of movements due to a very low energy expenditure.[1] Lack of physical activities could reduce a person's lung function. One of the parameters that could be used to measure pulmonary function is Peak Expiratory Flow Rate value (PEFR). PEFR could be measured using a mini wright peak flow meter.[2]

An exercise could increase people's lung function, because by exercising regularly, people will increase their muscle strength, muscle flexibility, dexterity, coordination, and endurance cardiorespiration.[3,4] Previous studies have shown that there is an increase in the peak

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expiratory flow rate value of college students after being given a swimming intervention for 12 weeks.[5] Mild or moderate aerobic exercise with a long enough intensity and duration could also increase lung function. One of the aerobic sports is brisk walking. Brisk walking is a moderate intensity exercise that is very easy and simple. However, if it is done regularly, programmed, structured and systematically, it will provide benefits for fitness and health, including lung function.[6]

In addition, there is another type of exercises which is more effective and efficient. It do not require a long time and results good health. The exercise is *high intensity interval training* (HIIT). It is a cardio training with combination of high intensity and low intensity in a certain time interval.[7]

Based on the description, researcher is eager to know the difference in the effectiveness of brisk walking and High Intensity Interval Training (HIIT) in increasing the value of peak expiratory flow rate (PEFR) in early adults.

METHOD

This research was conducted at the stadion of Diponegoro University. This research used quasi experimental with pre-test and post test comparison groups design. The sample method was purposive sampling. Samples consist of 42 female students of the Faculty of Medicine in Diponegoro University, year of 2016 and 2017, who met the inclusion criteria and did not have exclusion criteria. The exclusion criteria consists of superior and inferior extremity abnormalities, having cardiorespiratory disease, abnormal IMT, exercising regularly, active smokers and refusing to be involved in the research.

The sample was divided into two intervention groups. The first group received intervention of HIIT, while the second group received brisk walking intervention for 3 times in a week with a total of 6 week. There was also a control group with no exercise intervention. The peak expiratory flow rate value was measured by using mini wright peak flow meter before and after the interventions.

The data normality was tested by using Saphiro-Wilk test. Meanwhile, the hypothesis of the difference between peak expiratory flow rate value in before and after the intervention, was tested with Wilcoxon test. The difference of peak expiratory flow rate value between the intervention group (HIIT, brisk wakling)

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and the control group was tested with Mann-Whitney test.

RESULTS

Table 1. Measurement PEFR value

Time Measurement	Groups		
	Control (n=14) Mean±SD; Median Min-Max	**HIIT (n=14) Mean±SD; Median Min-Max**	**Brisk Walk (n=14) Mean±SD; Median Min-Max**
Pre-test	328.00±28.06; 336.50 (280-360)	346.64±39.24; 332.00 (300-417)	337.21±36.15; 331.50 (277-387)
Post-test	327.78±29.27; 330.00 (260-363)	397.14±33.73; 388.50 (357-450)	370.14±34.85; 368.50 (310-413)
P	0.916	0.001*	0.001*
Gap	-0,21±24.40; 3.50 (-33 – 66)	50.50 ± 11.27; 48.50 (33 – 73)	32.92 ± 5.37; 33.00 (23- 40)

SB = Simpangan Baku ; Min = Minimum;Max = Maximum; *p* = Nilai Kebermaknaan;
* = Significant

Based on the pre-test, the value of peak expiratory flow rate was 328.0±028.068 in the control group. This was lower than the HIIT group and brisk walking that valued at 346.64±39.247 and 337.21±36.156. While the post-test value of control group was 327.78±29.271, which also got lower value, compared to groups of HIIT 397.14±33.738 and brisk walking 370.14±34.851.

In table 1, there was a significant increase between the pre-test and post-test value of the HIIT group and the brisk walking group p <0.005, while in the control group the results were not significant p> 0.005.

Table 2. Differences PEFR value in the control, HIIT, and brisk walking

Groups	N	*Mean Ranks*	P
Control	14	9.32	
HIIT	14	33.93	**0.000***
Brisk Walking	14	21.25	

Table 2 shows that there were significant differences in three groups,

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related to changes in PEFR values, due to the p value <0.05. This meaningful result needs to be followed up by the Mann-Whitney test to find out which differences exist between the examined groups.

Table 3. Differences of APE values in the control group and HIIT

Group	N	Mean Ranks	*P*
Control	14	8.32	**0.000***
HIIT	14	20.68	

After conducting the Mann-Whitney test, it was obtained p = 0.000 (p <0.05) which indicates a significant difference in the PEFR value between the control group and HIIT.

Table 4. Differences APE values in the control group and brisk walking

Group	N	Mean Ranks	*P*
Control	14	8.32	**0.000***
Brisk Walking	14	20.58	

After conducting the Mann-Whitney test, it was obtained p = 0.000 (p <0.05) which indicates a significant in differences of the PEFR value between the control group and brisk walking.

Table 5. Differences PEFR values in the HIIT group and brisk walking

Group	N	Mean Ranks	*P*
HIIT	14	20.68	**0.000***
Brisk Walking	14	20.50	

After conducting the Mann-Whitney test, it was obtained p = 0.000 (p <0.05) which indicates a significant in differences of the PEFR value between the HIIT group and brisk walking.

DISCUSSIONS

The research's result showed that after the intervention of HIIT or brisk walking for 3 times in a week in a total 6 weeks, there was a significant change in PEFR values, while in the control group, there was no significant change in PEFR values. These results are consistent with the Aliverti A's literature which stated that when exercise ventilation mechanisms will be different, this will result a decrease in the final expiratory volume, which has an impact on increasing the PEFR value.[8]

High Intensity Interval Training (HIIT) is a concept of the combination of high intensity training> 80-95% VO_2 max, interspersed with moderate or low intensity training. This exercise is carried out at intervals that could stimulate the work of the heart as well as to increase oxygen consumption and metabolism.[9] Meanwhile, brisk walking is one of the moderate intensity aerobic exercises with 70-80% of the maximum aerobic capacity and heart rate of 150-170 times per minute.[10]

The comparison of change in PEFR value between HIIT group and brisk

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walking shows significant result. This result is consistent with the research conducted by Meng Cao et al which stated that HIIT is more effective in increasing cardio respiratory fitness (CRF) in early adults aged 15-18 years-old.[11] Explanations might be given regarding to why the effect of HIIT on PEFR was better than MICT. In HIIT mitochondrial adaptation, there are bigger increases in mitochondrial content and in maximal activity of citrate synthase, in activation of type ii fibers and in adenosine monophosphate, which activates protein kinase, that leads to the greater muscle strength.[12] Previous studies indicate HIIT protocol was more effective in central adaptation, such as maximal stroke volume, cardiac output and blood volume, which are important components of cardiorespiration that could effect on peak expiratory value.[13]

CONCLUSION AND SUGGESTION

Conclusion

The result of this research shows there is signifcant difference of peak expiratory flow rate (PEFR) value between HIIT and brisk walking in early adults, with the PEFR is increasing higher in the HIIT group.

Suggestion

Further research is needed to assess the effect of HIIT and brisk walking for other parameters such as attention, sleep quality, and short memory.

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