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THE DIFFERENCE OF ATTENTION LEVEL BEFORE AND AFTER SKIPPING EXERCISE IN MEDICAL FACULY OF DIPONEGORO UNIVERSITY STUDENTS

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ABSTRACT

Background: Skipping exercise is a kind of physical exercise which is inexpensive and easy to do. Skipping is one of many kinds of aerobic physical exercise. Aerobic physical exercise have been known from its function in improving cognitive function including attention in human brain. However there haven't been any research which discusses about the difference of attention level before and after skipping exercise in Medical Faculty of Diponegoro University. **Aim:** To find out a difference of attention level before and after skipping exercise. **Methods:** This study conducted in quasi experimental pre-test and post-test nonequivalent group method. This study was conducted in May until July 2019. The subjects were 46 male students of Medical Faculty of Diponegoro University, divided in 2 groups. Experimental group was instructed to do 6 weeks of skipping exercise (3 times in a week) and control group was instructed to not do any exercise. Attention level was measured with software Attention Network Test a day before skipping exercise started and a day after skipping exercise ended. Significance was analyzed by Paired T Test/Wilcoxon and Independent T Test/Mann-Whitney. **Results:** There were no significant difference of alerting and orienting score before and after skipping exercise in both experimental and control group. Meanwhile, there was significant difference of executive control score (p=0,001) that could be seen from its first mean score 94,296 and then the score declined to be 65,130 in the second test. It indicated an increasing executive control function. **Conclusion:** Six weeks of skipping exercise increases executive control function of attention.

Key Words: Skipping exercise, attention level, alerting, orienting, executive control

INTRODUCTION

Physical activity is every body movement which increases energy expenditure.[1] Regular physical activity has many benefits for physical or psycological health.[2]

World Health Organization (WHO) stated that 1 of 4 people on the world aged more than 18 years old is physically inactive.[3] Meanwhile based on Riset Kedehatan Dasar 2018, almost all of the provinces in Indonesia have 40% of their population are physically inactive.[4]

A person is classified as physically inactive if his aerobic activity is less than 150 minutes in a week or his high level aerobic activity is less than 75 minutes in a week.[3] Physical inactivity is the fourth risk

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factor of death globally because it can cause some of Non Communicable Diseases (NCD).[5]

Exercise is a subcategory of physical activity that is planned, structured, repetitive, and purposeful in order to improve or maintain of physical fitness. Exercise id divided into 2 types based on its oxygen dependency for metabolism, there are anaerobic and aerobic.[6]

Aerobic exercise depends on oxygen for its metabolism. Aerobic exercise can improve heart's stroke volume so that heart can work efficiently in its every beat. Aerobic's benefit for vascular is that it can maintain vascular elasticity by degrading fat deposit for energy metabolism. Furthermore, lung elasticity will be increased so the lung compliace will be increased too.[8] Aerobic exercise can improve brain function by increasing cerebral blood flow (CBF). A study has proved that a person doing aerobic exercise regularly had better cognitive function linked with its dorsal striatum and hipppcampus volume.[9] Cognitive function consists of memory, attention, visuospatial, and language.[10] Skipping is classified as aerobic exercise which can improve cognitive function too.

Attention is the ability to actively process a limited amount of information from the enormous amount of information available through our senses, our stored memories, and our other cognitive processes. Attention is important to respond quickly and accurately the target stimulation.[12]

Attention consists of 3 components, there are alerting, orienting, and executive control. Alerting is defined as achieving and maintaining a state of high sensitivity to incoming stimuli. Orienting is the selection of information from sensory input. Executive control involves mechanisms for monitoring and resolving conflict among thoughts, feelings, and responses.[13]

METHODS

This study conducted in Facuty of Medicine of Diponegoro University, Semarang in May until July 2019. This study is a quasi expeimental pretest and posttest nonequivalent group. The subjects are chosen by purposive sampling based on the criterias that have been determined before.

This study involved 46 students of Medical Faculty of Diponegoro University aged 18-22 years old including the

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inclusion criterias and willing to join the study. Subjects are divides into 2 groups, there are experimental group which is instructed to do skipping exercise for 6 weeks (3 times a week) and control group which is instructed to not do any exercise. Attention level is measured by Attention Network Test software a day before the skipping exercise was started and a day after it ended.

Normality was analyzed by saphiro-wilk. Significance was analyzed by Paired T Test/Wilcoxon and Independent T Test/Mann-Whitney.

RESULTS

Table 1. Alerting Data

Alerting	Kelompok		p
	Experiment (Mean±SD)	Control (Mean±SD)	
Pre	15,657±17,806	36,891±52,332	0,055*
Post	19,078±15,501	27,296±32,622	0,491*
p	0,472¶	0,559ᵂ	-
Difference	19,078±15,501	23,600±27,032	0,413*

Note: p = Significance; ‡ = Mann whitney; ᵂ = Wilcoxon; ¶ = Paired T Test; * = Independent T Test

Based on the table above, alerting in both experimental and control group didn't have any significant difference (p>0.005) after 6 weeks of experiment. The difference of pretest and posttest between experimental and control group didn't have any significant difference (p>0.005) too.

Table 2. Orienting Data

Orienting	Kelompok		p
	Experiment (Mean±SD)	Control (Mean±SD)	
Pre	15,657±17,806	36,891±52,332	0,055*
Post	19,078±15,501	27,296±32,622	0,491*
p	0,472¶	0,559ᵂ	-
Difference	19,078±15,501	23,600±27,032	0,413*

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Note: p = Significance; ‡ = Mann whitney; ʷ = Wilcoxon; ¶ = Paired T Test; * = Independent T Test

Table 2 shows that there was no significant difference (p>0.005) in orienting between pretest and posttest in both groups. There was no significant difference between pretest and posttest between experimental and control group (p>0.005).

Table 3. Executive Control Data

Executive Control	Kelompok		p
	Experiment (Mean±SD)	Control (Mean±SD)	
Pre	94,296±70,027	65,026±28,439	0,156‡
Post	65,130±71,202	61,139±17,613	0,435 ‡
p	0,001ʷ	0,573¶	-
Difference	-29,165±42,766	-2,883±24,203	0,021 ‡

Note: p = Significance; ‡ = Mann whitney; ʷ = Wilcoxon; ¶ = Paired T Test; * = Independent T Test

Table 3 shows that there was a significant difference (p=0.001) in executive control pretest-posttest experimental group. Meanwhile, there was a declining score too in control group but it wasn't significant (p>0.005). There was a significant difference (p=0.021) in pretest and posttest between experimental and control group.

DISCUSSION

This study had no any sigificant difference between pretest-posttest in both groups. It could be influenced by some factors, for example mood. Subject's mood while doing the attention test would affect the results, the more positive the subject's mood, the results would be better.[14] Meanwhile, there was a fact that the development and improvement of alerting would be most significant in age 6-10 years old, especially in male.[15]

Teoritically, male have low alerting score. Alerting disorder, such as ADHD, was found 3 until 9 times higher in male than female.[15] It could be caused by low level of estrogen in male. Estrogen increased norepinephrine synthesis and

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inhibited norepinephine degradation.[16] Norepinephine is the neurotransmitter which has a role in alerting process.

Orienting score in this study had no any sgnificant difference between pretest-posttest in both groups. The difference in pretest-posttest between experimental and control group had no any significant difference too. Factor that caused these results is the subject's age. A study conducted by Marta et al, showed that orienting's development adn improvement would be most significant in age 6-10 years old, meanwhile the subject's age in this study was 18-22 years old.[15]

Insignificant results in this study could be caused by the fact that male tended to commit more false in the last 5 minutes. This can be explained by the nature of the test: simple and particularly monotonous, the worst performances of pupils can be caused by fatigue, and boredom.[15]

Executive function in this study shows a significant difference between pretest and posttest in experimental group. The difference of pretest-posttest between experimental and cotrol group showed a significant difference too. These results were supported by pevious study conducted by Hayley Guiney which stated that regular aerobic exercise could improve executive in children, young adult, or adult.[9] A study conducted by Yaakov Stern, stated that aerobic exercise could improve executive control as increasing age because there was an improvement in cortex thickness so that the brain function would be maintained in a good condition.[17]

Significant difference in executive control could be caused by increasing CBF which contains nutritions and oxygen.[18] Firthermore, aerobic exercise including skipping could improve releasing of BDNF which is good for brain plasticity. This would mantain brain structure so that it could maintain good bain function.[19]

Limitation od this study was that the reseacher couldn't control the subject's mood and couldn't provide a conductive environment while subjects were doing attention test.

CONCLUSION AND SUGGESTION

Conclusion

There was a significant difference of executive control in experimental group after skipping for 6 weeks, meanwhile there was no significant difference in control group. Furthermore, there was a significant difference in pretest-posttest between experimental and control group.

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Suggestion

Attention test should be done in a conducive environment. The next study need to be done in bigger amount of subjects and bigger population so there will be a more representative results.

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