RELATIONSHIP BETWEEN MALONDIALDEHYDA (MDA) CONDITIONS WITH NEUROTROPIC FACTORS OF FEATURED BRAIN CONTENT (BDNF) ON LANSIA THAT DOES PHYSICAL EXERCISES TERPROGRAM

Yusef Rusdi, Fauziah N Kurdi, Rostika Flora
Master Program in Sport Education
yuseprusdi78@gmail.com

Abstract

The purpose of this study was to investigate the relationship between MDA levels and BDNF levels in elderly who performed physical exercise terportgram. This research method uses laboratory experimental research with pree test and post test analysis. The object of research is elderly who are in healthy heart club of branch of sumsel which done in 60 years sempel as much as 20 elderly. Data filing, blood pressure, body tension, weight. MDA levels with TBARS method and BDNF content of information by ELISA method. Spearman rho test results indicate that there is a clear correlation between MDA and BDNF levels with very strong levels in physical exercise (r = 0.06) and (r = 0.42). The conclusion that exists between the levels of Malondialdehyda (MDA) and the Brain Derived Neuronthropic Factor (BDNF) level in the elderly performs preprogrammed physical exercise. This research can be used to train what can improve coqnitive function.

Keywords: Prepared physical programming, MDA, BDNF and Neurogenesis

1. INTRODUCTION

1.1 Background

In the aging process occurs physical, mental, psychosocial and spiritual changes that tend to decline. After reaching the age of 30 years there is a 1% decrease in lung heart fitness every age increases one year. Pulmonary heart fitness is an indicator of the use of oxygen by the heart and lungs, which at the age of 60 years of lung heart fitness will be reduced by 35%. Many factors that affect the heart rate of the lungs include: heredity, age, gender, nutrition, smoking, and physical activity (Ministry of Health, 2005)

Physical exercise is very important in helping elderly on the move. Exercise is one of the good activities for the elderly. Type of exercise that can be done on the elderly is gymnastics. Fit elderly gymnastics is a series of tone that regularly and purposefully planned and followed by the elderly are done with the intention of improving the functional ability of the body gradually and will have good impact if done programmed. (Batik A, 2008)

Prepared physical exercise is a physical exercise that is done regularly with a certain intensity, frequency, and duration, and has a specific purpose. (http://www.exrx.net/Testing/YMCATEesting.html). The intensity of fitness training is 60% -90% maximal heart rate. Beginner exercises <65% heart rate (DJM) and fat burning 65% -75% maximum heart rate. Heart-Lung Exercise 75% -85% maximal heart rate. The duration of exercise for good outcomes for cardiovascular function is to reach the zone of

exercise and endure up to 20-45 minutes. This does not include warm-up and cooling time. For the frequency of exercise should practice at least 3-7 times per week because the body requires adequate recovery to maintain physical freshness (Flora, 2015)

Physical exercise is good for all age groups including the elderly. In elderly there are changes in muscle and bone strength Muscle atrophy in the elderly occurs due to metabolic disorders, nerve defervation and decreased physical activity. In the central and autonomic nervous system there is a decrease in brain weight as much as 10% other conditions that change is the slowing of information process, decreased short-term memory, decreased ability of the brain to distinguish stimulus or stimulus that came. Often a middle-aged or elderly person with memory problems is considered senile (Denso) (Darmojo, 2009)

Physical activity is thought to stimulate nerve growth that may inhibit the decline in cognitive function in the elderly (Muzamil, Afriwardi & Martini, 2014). According to Kirk-Sanchez & McGough (2013) while doing physical activity, the brain will be distilarasi so that it can increase the protein in the brain called Brain Derived Neutrophic Factor (BDNF). This BDNF protein plays an important role in keeping nerve cells healthy and fit in the elderly. If BDNF levels are low then it can cause dementia disease.

Brain-Derived Neurotrophin Factor (BDNF) is a member of the neurotrophin family of growth factors, which is associated with NGF. In the brain, BDNF is active in the hippocampus, cortex, and basal forebrain that is the vital area for memory, learning and for thinking higher. BDNF itself is important for long-term memory retention of the highest concentrations of BDNF in the hippocampus and may affect protein synthesis in both transcription and translational stages (Bekinschtein et al., 2011). BDNF is believed to have a neuroprotective effect and is involved in synaptic plasticity and cognitive function. In brain ischemia, BDNF shows antiapoptosis, antiinflammatory, antiepileptic and neuroprotective effects (Chen et al., 2009). BDNF also plays a major role as a major mediator of synaptic efficacy, nerve cell connections and neural cell plasticity (Cotman et al, 2007).

Malondialdehyde (MDA) is a 3-carbon, low molecular weight aldehyde produced by a free radical-mediated-reaction chain and is largely used as a marker of lipid peroxidation. MDA is also one of the first products of membrane lipid peroxidation, while Cu, Zn-SOD and GSHPx enzymes belong to natural antioxidants. Oxidative stress during and after exercise only occurs when pro- posing Reactive Oxygen Species (ROS) caused by exercise exceeds the potential capacity of antioxidant defense of the body (Konig et al, 2000). During blood-transfer exercises to the skin and active muscles causing temporary tissue hypoxia and lack of coordination of oxygen and oxygen consumption of active requirements in active texture during high intensity exercise, although following the re-oxygenating of this texture and cut or decrease the intensity of activity, produce reactive oxygen species (ROS) will be provided with increased lipid peroxidation and cell function (Ogonovszky et al., 2005, Watson et al, 2005)

2. RESEARCH METHODS

2.1 Types and Research Design

The type of this research is laboratory experimental research with Post Test Control Group Design design to find out the relationship between the two variables and measure the strength of the relationship.

3. RESEARCH RESULTS

3.1 Research Results

The results of this study were obtained based on research in the laboratory located in Bio Science Research Palembang. Object researchers in this study is healthy Elderly, age above 60 years. Elderly who joined in healthy heart club branch of Sumsel. The number of samples used in this study is 20 all elderly who joined in healthy heart club made sempel.

Tabel 3.1. Characteristics of Research Subject

No	Variables	N	f(%)
1.	Height a. > 150 cm b. < 150 cm	 16 4	 80 20
	amount	20	100%
2.	Weight a. < 50 kg b. > 50 - 75 kg c. > 75 kg	 2 15 3	 10 75 15
	amount	20	100%
3.	Age a. < 60 – 70 b. > 70	 18 2	 90 10
	amount	20	100%
4.	Blood pressurea. Hipertensi = > 140/90 b. Normal = 140/90 c. Hipotensi = < 120/80	 13 7	 65 35
	amount	20	100%

Based on Table 4.1 It was found that almost the whole of the elderly (80%) had height> 150 cm, almost whole of the elderly (75%) had weight> 50-70 kg, elderly (90%) had age <60-70 and almost whole elderly (65%) normal 140/90.

Tabel 3.2 Correlation between MDA levels With BDNF levels in the elderly who perform physical exercise

Variables	n	p	r	Correlation Level

levels MDA levels BDNF	20	0,06	0,42	Very strong

* Spearman's test rho

Based on Table 4.8 shows that the correlation between MDA levels with BDNF in the elderly who performed the physical exercise programmed was significant (p = 0.06). Spearman's correlation value of 0.42 shows a positive correlation with a very strong correlation strength.

4.2 DISCUSSION

4.2.1. Research Characteristics

Based on the results of this study it was found that almost all of the elderly (80%) had a height of> 150 cm, almost full of elderly (75%) had weight> 50-70 kg, elderly (90%) had age <60-70 and almost keseluruan elderly (65%) normal 140/90. The results of Herman's (2009) study stated that, individuals who practice diligently will increase the strength, speed and mass of muscle. The change is heavily influenced by the type and duration of exercise as well as hormonal factors. The increase in muscle mass in physical exercise occurs due to increased muscle volume (hypertrophy). Increasing the volume of muscle fibers due to fine muscle fibers (myofibril) increases so that the muscle cells enlarge, called hypertrophy.

The characteristic data of the research subjects showed that, before performing the exercise process and the exercise effect performed programmatically on the elderly blood tension before was normal. Physical exercise will give rise to the body's physiological adaptation response. Physical exercise improves muscle work resulting in an increase in heat production 10-20 times compared to rest periods. The increase in body heat during physical exercise results in dilated skin vessels so that the return of venous blood to extremes through superficial veins and conducts is also increased. If the ambient temperature is lower than the temperature of the hot skin is removed by convection and radiation. If the heat gets bigger, sweat glands are activated (Flora, 2015).

In addition there are various factors in the formation of heat in physical exercise, among others, increased speed of metabolism at the time of muscle activity, hormontiroksin effect on increased cells, increased hormone noerpineprin. The increase in body temperature caused by these factors is eliminated by the expulsion of heat through the skin and the excessive increase of urine. Increased heat that occurs will cause stimulation of the hypothalamus resulting vasodilatation of blood vessels.

4.2.2 Average Malondialdehyda (MDA) and average rates

Brain-derived neurotrophic factor (BDNF) elderly

Based on the results of the average MDA examination in this study obtained, below average MDA levels in the elderly who do physical exercise pree test (0.67 ± 0.74 pg / ml) and also based on the results of research on average BDNF levels in elderly who do physical exercise 369.25 ± 77.814 pg / ml).

According to researchers this happens because the treatment of physical programmed exercise is good and depends on the use of the intensity of exercise, duration of exercise and recovery period of exercise. According to Shi et al, (2010) that acute and chronic stress, affect the synthesis of BDNF in the brain. In chronic stress conditions activation of the hypothalamus-pituitary-adrenocortical system (HPA). The HPA system plays a role in the immunological system and neural plasitisitas which affect cell survival. (De Kloet et al., 1998) Chronic physical exercise causes the body to experience stress in the long term. Long-term stress affects the atrophy of the dentus gland and the CA3 region of the hippocampus resulting in decreased memory function. To avoid a decrease in memory function, BDNF is produced in large quantities (Lupien & Lepage, 2001).

BDNF is a member of the neurotrophin family of growth factors, which is associated with NGF. In the brain, BDNF is active in the hippocampus, cortex, and basal forebrain that is the vital region for memory, learning as well as for higher thinking. BDNF plays a role in long-term memory retention (Bekinschtein et.al, 2011). BDNF is present in various tissues and cells, namely the retina, CNS, motor neurons, kidneys, and prostate, as well as human saliva. The highest concentrations of BDNF are in the hippocampus (Mandel, 2009). In addition BDNF is not only produced by neurons, but also by astrocytes, schwan cells and fibroblasts therefore BDNF is widely dispersed in the nervous system (Barbosa et al., 2010). Functionally BDNF is associated with synaptic nerve and plasticity, neurogenesis and LTP (Neurowiki, 2013).

4.2.3 Correlation Test of Malondialdehyda (MDA) Levels of Brain-derived Neurotrophic (BDNF) Levels in Elderly Performed Physical Exercises

Based on the results of the examination, it was found that the correlation between MDA and BDNF levels of elderly performing physical exercise showed that the correlation between MDA and BDNF levels in the elderly doing physical exercise was significant (p = .0,42). This is in accordance with the opinion of the study of Charles H. Hillman et al. (2009) mentions that the effects of acute exercise can improve neurocognitive function and have the intensity and duration of exercise that mapu improve cognitive function and nervous system in the brain. whereas in the treatment of physical activity showed that the correlation between MDA and BDNF levels in elderly significant (p = 0.42). Where Exercise is done every day without any recovery period causing fatigue, dehydration and will reduce the accuracy in doing physical activity (Flora, 2015: 43). The association between tive-oxide stress, nerve damage and cognitive dysfunction has been well documented (Gustaw-Rothenberg et al., 2010; Head, 2009; Jellinger, 2009). It also shows that oxidative stress and reactive oxygen species can lead to learning and memory disorders (Behl & Moosmann, 2002; Abidin et al., 2004; Khodabandehloo, et al., 2013).

CONCLUSION

Based on the results of the study with the title of the relationship between Malondialdehyda (MDA) and Brain-Derived Neurotrophic Factor (BDNF) in elderly who performed the programmed physical exercise get the conclusion that;

Physical exercise results in elevated levels of Brain-Derived Neurotrophic Factor (BDNF) brain tissue in mice given acute and chronic aerobic exercise

Physical exercise results in decreased levels of Malondialdehyda (MDA) in elderly people who perform preprogrammed physical exercise.

Based on Spearman's rho test showed that there was a significant relationship between Malondialdehyda (MDA) association and Brain-Derived Neurotrophic Factor (BDNF) level in elderly performing preprogrammed physical exercise, with Spearman's correlation level of 0.42 indicating positive correlation with very correlation strength strong

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