

Review Article:

EXERCISE AND BRAIN HEALTH IN ELDERLY

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ABSTRACT

In the elderly, physical ability and physiological function of organs will decrease and berbagai kinds of disease began to emerge. To handle the elderly to maintain their quality of life then do physical activity such as aerobic exercise. However, aerobic exercise began to be abandoned and shifted to the brain gym. This condition is skewed because the aim of improving brain health as well as efforts to improve the quality of life of elderly people become less optimal. So far, the benefits of aerobic exercise and sports mix of the brain that can empower the physical fitness and brain health in elderly has not been found. This paper aims to find a model combination of aerobic exercise and exercise the brain in order to further improve the physical fitness and brain health. The combination of aerobic exercise and exercise the brain in elderly is not only good for physical fitness, but also can improve brain health. Participation in the program of regular exercise on the elderly is a very effective modality to reduce and prevent a decline in function associated with aging problems. Potential benefits from a combination of aerobic exercise and exercise the brain that develops behind the marker of physical fitness at the same time may affect brain health.

Keywords: brain health, aerobic exercise brain exercise, elderly

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INTRODUCTION

The number of elderly people in the world, including Indonesia soared. National socioeconomic survey results show the number of elderly people around 16.02 million in 2003, rose to 16.80 million in 2005 and rose again to around 18.96 million in 2007 (BPS, 2007). In the elderly, physical ability and physiological function of organs will decrease and berbagai kinds of disease began to emerge. To handle the elderly to maintain their quality of life then do physical activity such as aerobic exercise. However, after being introduced a training model "Exercise the brain", then there arises a tendency that resulted in a shift in types of physical activity in elderly. This means that aerobic exercise began to be abandoned and shifted to the brain gym. This condition is skewed because the aim of improving brain health as well as efforts to improve the quality of life of elderly people become less optimal. So far, the benefits of aerobic exercise and sports mix of the brain that can empower the physical fitness and brain health of the elderly has not been discovered.

Brain exercise is good for the elderly because it can be used to maintain brain-body connection (Brain Body Connection). However, some sports movement can lead to brain injury due to falls caused by disturbance of balance and reduced muscle strength in elderly. Besides sporting the brain is not intended to improve physical

fitness in general (General Physical Fitness). Therefore, aerobic exercise is very necessary role to support the promotion of physical fitness because it has been shown to increase the resistance of the heart-lung and may also enhance endurance and muscle strength (muscle Endurance and muscle strength), so it can be used as capital to boost the body's equilibrium (balance), which in turn is important for physical activity in the brain gym. Besides aerobic exercise on the elderly can improve brain health by lowering the loss/ damage to brain tissue, once can also increase the volume of the brain. When aerobic exercise is given in conjunction with brain exercise will lead to more optimal effect. Model combination of aerobic exercise and the brain is more empowering sport and physical fitness brain health in elderly. This paper aims to find a model combination of aerobic exercise and exercise the brain in order to further improve the physical fitness and brain health, as well as a stimulus for researchers in the field of sports or neuro-science to study empirically. When studies that describe a combination of aerobic exercise and brain exercise can better empower the physical fitness and brain health and the future can be proved by data obtained through the research, the benefits of a combination of aerobic exercise and brain exercise is expected to improve physical fitness and brain with more optimal health.

PHYSICAL CONDITIONS IN GENERAL AND THE BRAIN IN ELDERLY

Manifestation of the effects of aging on the cardiorespiratory system can be seen through reduced respiratory function, due to decreased elasticity of lung tissue, chest wall stiffness, and decreased strength of respiratory muscles. In the cardiovascular system there is a decrease "stroke volume" and "maximal heart rate" with the consequent diminishing of "cardiac output". Increased blood pressure and blood lipid levels and decreased glucose tolerance, and decreased sensitivity to insulin leading to increased risk of atherosclerosis and diabetes mellitus type II (William, 1998; Van Norman, 1995).

Aging effects on the musculoskeletal system such as decreasing muscle strength and endurance due to the reduced number and size of muscle fibers, as well as a delay to respond to nerve stimulation with the result that many cases of "falling" in the elderly population (Cartee, 1998; Van Norman, 1995). Another factor related to the aging process is the reduction of the structural integrity of the musculoskeletal system that is influenced by bone mass and mineral content of bone. The high rate of this decline in bone mass (especially in women), leading to increasingly high number of fractures in elderly (Van Norman, 1995; Dembo & McCormick, 2000).

Aging effects on the nervous system causing the ability to receive, process and send messages of slowing down the effect of more than a reaction to the messages (Van Norman, 1995). Conduction velocity and reaction time slowed 15% at age 70 years (Williams, 1998). In addition there is a decrease of sensory perception, such as vision and hearing. Decrease in reaction time, movement time, predictive control, and sensory perception seems to be responsible for the decrease in coordination, balance and agility (Van Norman, 1995). Threshold increased perception of stimuli that cause increased (by 30-40%) cases of the fall of the elderly over the age of 60 years (Williams, 1998). In the course of normal aging, since the age of the third decade of the human brain begins to lose its network (Jernigan et al, 2001), also showed structural decline mainly dilobus frontal, parietal and temporal (Colcombe et al, 2006). This pattern is associated with extensive deterioration of cognitive performance (Park et al, 2001).

EFFECTS OF AEROBIC EXERCISE IN ELDERLY

Aerobic exercise performed on the elderly population will increase fitness in general (General Physical

Fitness), marked by cardiorespiratory endurance, muscle strength and muscle and improving flexibility and Endurance Body Composition (Kenney WL. 1992). While the effect of aerobic exercise on the brain positively affects cognitive ability (Kramer et al, 1999; Colcombe & Kramer, 2003). These effects include increased factor neutrofik, serotonin, capillary density (Cotman & Berchtold, 2002) and neurogenesis (van Prag, et al, 1999). Increased cognitive process characterized by increasing memory. In addition, regular aerobic exercise can also lead to growth of capillaries in the brain (Black et al, 1990), increases dendritic length and number of interconnections between neurons (Cotman & Berchtold, 2002), and even increased production of cells in the hippocampus (van Prag et al, 1999). This effect is the result of increased brain-derived neurotrophic factor (Cotman & Berchtold, 2002). The end result of these structural changes cause the brain interconnection well maintained, more plastic and easily adapt to change (van Prag et al, 1999). Maintenance of blood flow and cardiac keotak is a very critical task of the cardiovascular system. Aerobic exercise can increase cerebral blood flow. Changes in cerebral blood flow is dependent on exercise intensity, where increasing exercise intensity up to 60% of VO2max will improve cerebral blood flow (Ainslie et al, 2008). Aerobic sport that can stimulate the cardiovascular system in particular types of sport that uses large muscles, such as walking, cycling, swimming).

EFFECTS OF EXERCISE THE BRAIN (BRAIN EXERCISE) IN ELDERLY

PE & Dennison Dennison GE (2006) reveals that the brain is a series of motion exercise to enhance learning by using whole brain through renewal "motion pattern" so that it can control certain parts of the brain that previously hampered. Integration mechanisms of the brain that is needed must be run properly by way of receiving information and at the same time able to express ourselves. Information on the back of the brain received as a message (impressions) and expressed by forebrain (expression). Brain exercise can improve the "sensoric integrity" and "motor learning" by integrating the motion with sensory stimulation and movements that require attention and concentration. Brain-Body Connection concept signaled to always empower the brain to always activate the brain, in other words: Use if you do not want to lose. The loss of memory and motor skills at an advanced age caused by inaktivitas and lack of exercise and mental stimulation. Sports brain neurons and strengthen the connection even create new neurons. Alzheimer's Association conducted a study to prove the occurrence of Indonesia increased cognitive

performance after treatment was "brain movement and exercise" (Kusumoputro et al, 2003)

EFFECTS OF COMBINED AEROBIC AND BRAIN EXERCISE IN ELDERLY

Exercise can empower the brain in such a way that brain cells are always in a position to process the various information from the outside and able to respond in accordance with sections of brain function in coordination to a "corporate member" of his responsibility through the concept of "brain- body connection." Various types of "motion patterns" exercise the brain causes a different type of physical activity (some physical activity that requires heavy/ difficult for the elderly, some are lighter). In sports that require brain motion patterns of the elderly can be

difficult to drop due to decreased muscle strength, muscle endurance and joint flexibility, and neuromuscular coordination are weak. To that end, the necessary means of support in the form of aerobic exercise that can help heavy physical activity/ exercise is difficult in the brain, once can help determine the amount of blood flow through the mechanism of improvement keotak "intensity training" that might be difficult to apply in sports brain. Thus, in addition to aerobic exercise affect the "general physical fitness" and "brain fitness" can also support various kinds of "motion patterns" brain sport. Thus, with such a combination of aerobic exercise and brain exercise will greatly help the brain with more optimal health. However, so far the above description is still based on deductive assessment, and needs to be studied further in order to obtain empirical truth (correspondensive truth).

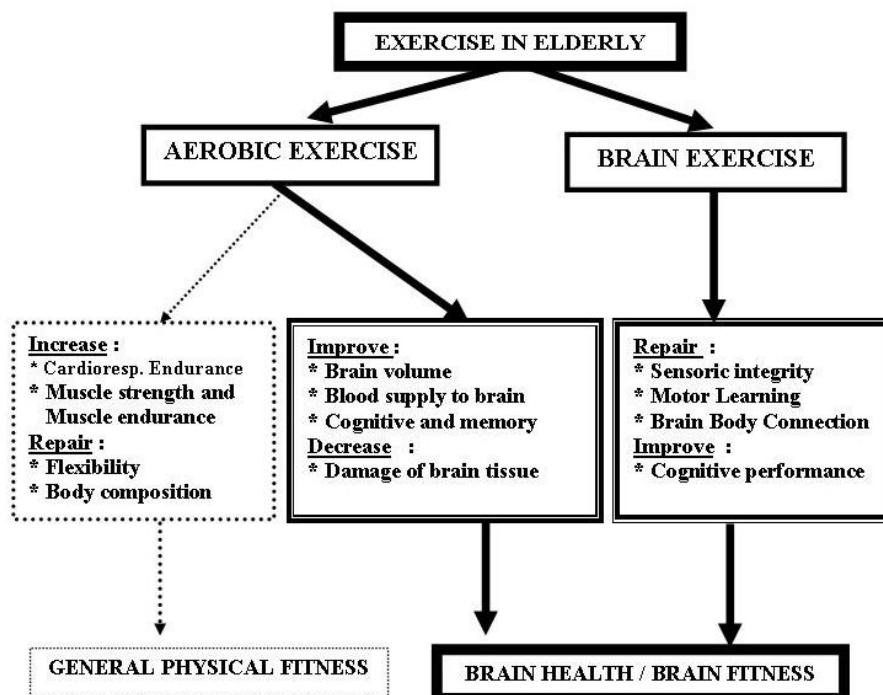


Figure 1. Combination of Aerobic Exercise and Brain Exercise in Elderly Brain Health

CONCLUSION

The combination of aerobic exercise and exercise the brain in elderly is not only good for physical fitness, but also can improve the health of the brain (Brain Fitness). Participation in the program of regular exercise on the elderly is a very effective modality to reduce and

prevent a decline in function associated with aging problems. Scientific findings are very important, therefore can provide empirical confirmation of the relationship of physical fitness with nerve degeneration. Thus, the role of physical fitness as protection and improvement of cognitive function and integrity of the central nervous system of the elderly appears to have

had a strong biological basis. Some results of the study reported here provides confirmation that the potential benefits from a combination of aerobic exercise and exercise the brain that develops physical fitness as well as behind the marker can affect brain health. Future research that studied the benefits of aerobic fitness mix and fitness of the brain in "elderly population" seems promising also very desirable addition.

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