

Prevention Of Degenerative Diseases Through Physical Activities In The Early Age

Liliana Puspa Sari¹, Heru Santosa², R. Kintoko Rochadi³, Rahayu Lubis⁴

^{1,2,3,4}Faculty of Public Health, Universitas Sumatera Utara, Indonesia

Abstract

Degenerative diseases are health problems that experience imbalances that cause stimulation or inflammation that has chronic effects. Degenerative diseases arise due to the main contributors such as regulating patterns of activity or health with habits of consuming excessive food, smoking, alcohol, stress, environmental pollution, and lack of physical activity. Symptoms of degenerative diseases based on Health Research data in 2018 show that since the age of 15 is early adulthood. Symptoms obtained by early adulthood are stroke, hypertension, diabetes mellitus, and obesity. The research method used is qualitative, meaning the problems discussed aim to describe a situation or phenomenon with naturalistic characteristics based on the actual setting. The results showed that physical activity contributes to the prevention of degenerative diseases by studying the creation of cardiac work influenced by the respiratory system (cardiovascular work). Cardiovascular work is trained through the work of the body (if the body), it will make the heart trained to drain blood normally and avoid damage to the respiratory system and body cells and can prevent the occurrence of degenerative diseases. The conclusion in this study is that physical activity in early adulthood as life expectancy if carried out regularly and systematically can provide stimuli for physical, spiritual, and social functional development, especially in anatomical-anthropometric structures and physiological functions so as to prevent the occurrence of degenerative diseases.

Keywords: Prevention, Degenerative, Physical Activity

Introduction

Health is a resource for everyday life that is a positive concept that emphasizes social and personal resources, as well as physical abilities [1]. Health is a healthy situation, both physical, mental, spiritual and social which allows every person to live productively socially and economically (RI Indonesia Law Number 36, 2009). Health problems are diseases of the interaction between the human body and causes (viruses, bacteria, lack of substances, or excess body substances). The natural process of occurrence of disease starts from the pre-pathogenesis period (before illness), that is if there is an imbalance of conditions between humans, causes, and the environment, giving rise to disease stimuli (stimulus).

The disease that resulted in the largest deaths in the world underwent changes from 1990 to 2014, and data obtained that diseases that cause death were 71% non-communicable diseases, 22% infectious diseases, and 7% injuries [2]. Data from the Republic of Indonesia Ministry of Health's Basic Health Research (Riskesda) in 2018 shows that increasing degenerative diseases such as stroke, diabetes mellitus, hypertension, and symptoms such as obesity begin at the age of 15 (> 15 years) [3]. Degenerative disease is a disease condition that arises as a result of the deterioration of the function of the body's cells, that is, from a normal condition, becomes worse and lasts chronically. The deterioration of the function of body cells is due to the low intensity of blood flow to the cells obtained from the heart rate as a supplier of blood

flow, so that it will result in the emergence of degenerative diseases such as coronary heart disease, hypertension, and diabetes mellitus (DM).

Degenerative chronic diseases that commonly occur in Indonesia and become the main source of knowledge of these degenerative diseases are heart rate calculation, hypertension examination, and diabetes (Handajani, Roosiermiatie, & Herti, 43: 2010). Degenerative diseases are currently a trend of disease chronic progression in the early adult age group of 15-25 years with the main contributors being unhealthy lifestyles such as smoking, drinking alcohol, diet and obesity, lack of physical activity, stress, and environmental pollution [4].

Degenerative deaths obtained from Auto Verbal (AV) 3 data Riskesdas for ages > 15 years (early adulthood) are classified into 3 namely: deaths due to Endocrin disease, nutritional, nutrition, and metabolic disease (ENMB), death cases of the disease of circulatory system (DCS), and other deaths besides ENMD and DCS. Data obtained from 3484 data were 7.2% due to ENMD disease, 37.1% due to DCS disease, and 55.7% due to others [5].

Current technological developments lead to increased behavioral behavior of minimal physical activity [6]. Minimal physical activity can lead to increased energy storage which is then stored as fat deposits and eventually lead to obesity [7]. Minimal behavior in early adulthood affects the condition of obesity which is the beginning of the emergence of degenerative diseases, 80% of these opportunities have the potential to affect adulthood later [4]. Degenerative diseases that are detected can be known, among others, heart disease and blood vessels (hypertension, heart stroke), endocrine (diabetes mellitus, thyroid, lack of nutrition, hypercholesterol), neoplasms (benign tumors, malignant tumors), osteoporosis, digestive disorders (constipation, hemorrhoids, colon cancer), and obesity.

Material and Methods

Method

Research using qualitative research methods means that the problems discussed aim to describe a situation or phenomenon with naturalistic characteristics based on the actual setting.

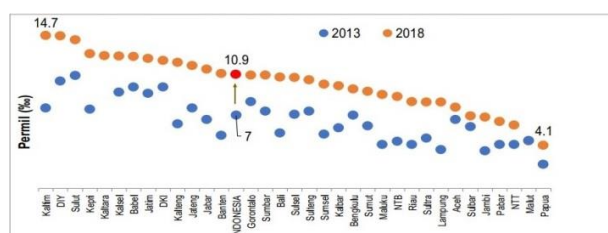
Data Analysis

Data collection tools use study materials in the form of material consisting of journals, articles, and textbooks in the field of degenerative diseases and physical activity. Analysis of theories relating to the number and type of fitness tests.

Result and Discussion

Data from the Republic of Indonesia Ministry of Health's Basic Health Research (Riskesda) in 2018 shows that there are increasing degenerative diseases such as stroke, diabetes mellitus, hypertension, and symptoms such as obesity that starts at the age of 15 (> 15 years).

Figure 1. Stroke population > 15 years

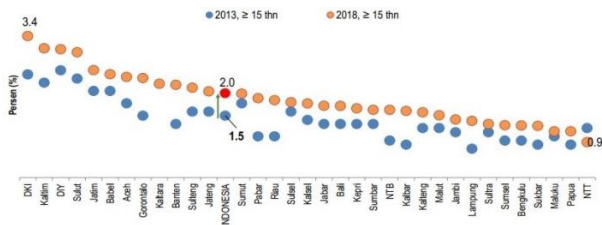


• RKD 2013: wawancara berdasarkan diagnosis nakes
 • RKD 2018: wawancara berdasarkan diagnosis dokter

Source:[3]

The Province of North Sumatra, based on Figure 1, the prevalence of stroke (peril) diagnosis in people aged > 15 years from 2013 to 2018 has increased by around 2-3%. The increase experienced by the North Sumatra Province illustrates that preventive handling to reduce the risk of stroke has not been implemented properly, so that North Sumatra residents are still detected having a stroke.

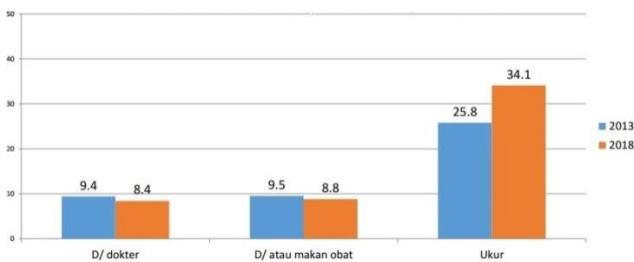
Figure 2. Population of Diabetes Mellitus > 15 Years



Source:[3]

The prevalence of diabetes mellitus in Figure 2 based on a doctor's diagnosis in residents aged > 15 years from 2013 to 2018 has increased from 6.9% to 8.5%. The increase experienced by the North Sumatra Province illustrates that preventive treatment to reduce the risk of diabetes mellitus has not been implemented properly, so that the population of North Sumatra is still detected as having diabetes mellitus.

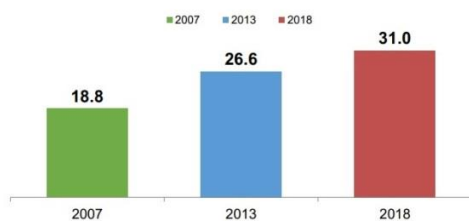
Figure 3. Population Hypertension > 18 years



Source:[3]

The prevalence of hypertension in Figure 3 according to the doctor's diagnosis, doctor's diagnosis or taking medication, and the results of measurements for residents aged > 18 years from 2013 to 2018 has increased from 25.8% to 34.1%. The increase experienced by the North Sumatra Province illustrates that preventive treatment to reduce the risk of hypertension has not been well implemented, so that North Sumatra residents are still detected to have hypertension.

Figure 4. Obesity population > 15 years



Source:[3]

Explanation of Figure 4 which is about the proportion of central obesity in adults > 15 years from 2007 to 2018 has increased from 18.8% in 2007, 26.6% in 2013, and increased again to 31.0 in 2018. The increase experienced The North Sumatra Province illustrates that preventive treatment to reduce the risk of obesity

has not been well implemented, so the population of North Sumatra is still detected to have increased obesity.

Analysis of the study of physical activity against the emergence of symptoms of degenerative diseases obtained by analysis data shows that the behavior of physical activity on average is at risk for degenerative diseases, namely having mild physical activity with Equivalent Metabolic Task (METs) 577.56 MET / week, and vice versa for activity physical risk of degenerative diseases is moderate and mild physical activity with METs 785.65 MET / week. The analysis study shows that risk factors for degenerative diseases with mild physical activity are 6.591 times more risky than moderate and mild physical activity [8].

Physical activity of a person always alternates between rest and movement, so that health can be distinguished between healthy in a state of rest (healthy static) and moving (healthy dynamic). Static health is the normal function of the body's instruments at rest, and healthy dynamic, which is the function of the body's instruments when working / exercising. Someone who has a good dynamic degree of good will certainly have a good degree of static health, but not necessarily the opposite. Healthy dynamic is a goal that must be achieved through sports activities, because exercising or exercising is actually training the body's instruments to keep functioning normally when working / exercising and that condition is definitely normal at rest [9].

Maintenance and improvement of health status are part of prevention efforts, which consist of efforts to prevent environmental factors and prevention efforts directly to human factors. Maintenance and prevention has the cheapest, and most functional element is found in sports physical activity (Giriwijoyo & Sidik, 2013: 24). Physical activity of exercise is the movement of the body due to the activity of the skeletal muscles which results in energy expenditure [10].

Epidemiologists divide physical activity into two categories, structured physical activity (exercise) and unstructured physical activity (daily activities such as walking, cycling, and working). Regular physical activity can have a positive impact on one's fitness, including: 1) increased ability to use oxygen and cardiac output, 2) decreased heart rate, decreased blood pressure, increased work efficiency of heart muscle, 3) prevention of mortality and morbidity due to heart problems, 4) remembering resilience during physical exercise, 5) increasing body metabolism (related to body nutrition), 6) increasing muscle ability, and 7) preventing obesity (Astrad, 1992 in Fatmah & Ruhayati, 2011).

Exercise is physical activity or movement of limbs that takes place continuously at certain times. The most active organ during activity is the skeletal muscle that can be improved in performance. Skeletal muscle activity will directly or indirectly affect the functioning of other organs. Improving the function and performance of the organs of the body will have an impact on improving the level of health and fitness caused by heart and circulation function, respiration function, blood and defense system, increased neuromuscular performance (muscle nervous system), spur bone development.

Impact of Physical Activity on FAAL

The words Physical Activity implies that there is something related to the event that is processing, namely processing the body or processing the body. The perspective of physiological science of motion, physical activity is a series of regular and planned physical movements carried out by people consciously to improve functional abilities, in accordance with the purpose of carrying out activities. Physical activity is divided based on the nature or purpose, namely (1) physical activity as an achievement sport as an activity that has a purpose, (2) recreational activities, health, and education is an activity as a tool to achieve goals[11].

Physical activity has a reaction to changes in the body according to type, duration, and intensity of the exercise performed. Physical activity carried out on a regular basis with sufficient measure will cause changes as follows:

1. Changes to the Heart

The heart will grow bigger and stronger so that the large capacity and throbbing are strong. Both of these will improve the work efficiency of the heart. High work efficiency will make the heart not need beats too often. The average resting heart rate is 80 times per minute, whereas in people who do regular exercise, the heart rate averages 60 times per minute. Thus in one minute 20 pulses are saved, and in one hour 1200s beats. These savings make the heart durable, and may be expected to live longer with high levels of productivity.

2. Changes to Blood Pembulu

Blood vessel elasticity will increase because of reduced fat deposits and the addition of contraction of the blood vessel wall muscles. The high elasticity of blood vessels will facilitate the flow of blood and prevent hypertension. Besides the elasticity of the blood vessels that increases, small blood vessels (capillaries) will also increase in density.

3. Changes in the Lungs

Lung elasticity will increase so that the ability to grow deflated will also increase. The number of active (open) alveoli will increase with regular exercise. Both of the above will increase the capacity of shelter and distribution of oxygen. Respiration increases with a smaller frequency. Along with changes in the heart and blood vessels, the three are responsible for delaying fatigue.

4. Changes in Muscles

Strength, flexibility, and muscle endurance will increase. This is caused by increased muscle fibers and increased energy supply system in the muscles. Moreover, changes in this muscle will support the agility of the movement and the speed of reaction.

5. Changes in bones

Addition of enzyme activity to the bone will increase the density, strength, and size of the bone, in addition to preventing bone loss. The surface of the bone will also be stronger with continuous muscle pull.

6. Changes in the Ligament and Tendo

The strength of the ligament and tendon will increase, so will the attachment of the tendon to the bone. This condition will make the ligament and tendo able to withstand the burden and not easily injured.

7. Changes in Joints and Cartilage

Regular exercise can cause the development of cartilage to become thicker, so it can dampen (shock absorber) and protect bones and joints from the danger of injury.

8. Changes to Heat Acclimatization

Acclimatization of heat involves physiological adjustments that allow a person to work in a hot place. The increase in acclimatization to heat is caused by the increase in heat on the body and skin during exercise. The same situation will occur if someone works in a hot place [12].

Physical activity is a series of regular and planned physical movements to maintain motion to maintain life and improve movement ability which means improving the quality of life[11]. Physical activity is a necessity

of life that is continuous as a means of maintaining and fostering health. Physical activity stimulates physical, spiritual, and social functional development especially in anatomical-anthropometric structures and physiological functions. Physical activity will form emotional stability and intellectual intelligence, the ability to socialize with the real environment.

Aerobic and Anaerobic Energy System

Physical activity has a relationship to the use and expenditure of energy for work so that energy availability is specifically needed [13]. Anaerobic and aerobic power is a mechanism for supplying power (energy / energy) to realize motion. Anaerobic power directly manifests motion and is the primary endogenous ergistima (work system) namely muscle. Aerobic exercise is also carried out by ergosystems of muscles but their intensity and duration of survival depend on the functional ability to supply oxygen [9].

Daily power (energy) needs consist of rest, work, domestic, recreational, and energy needs for physical activity and training. The use of energy through power will form an energy system (aerobic and anaerobic) which is a series of energy gains when carrying out motion and activity. The aerobic energy system is a support for the continuation of the anaerobic energy system that occurs in muscles. The energy system always starts with the use of muscle motion (anaerobic) and is followed by long (long) movements that require oxygen (aerobics). The aerobic and anaerobic energy systems must be in a balanced condition to reduce high levels of fatigue while moving.

Large anaerobic power shows the amount of oxygen demand / requirements that will be realized as the intensity of the motion being carried out. The inability of aerobic power to compensate for the use of anaerobic power will cause exercise to be stopped because all anaerobic capacity has been used up.

Principles of Physical Activity Exercise as Fitness

Habits of physical activity are certain ways and rules with the aim of increasing the efficiency of bodily functions, the result of which is to increase physical fitness. The quality of physical activity is an assessment of motion activities based on the frequency and duration of each activity in a week. Measurements of physical activity are carried out by classification of work, observation of behavior, use of motion sensor devices, physiological marking (heart rate) and calorimeter use. Physical activity can be described by using three aspects, namely work, sports, and leisure time so that by using these aspects will be known a description of one's physical activity (Baecke, et. Al., 1982 in (Fatmah & Ruhayati, 2011)).

Physical activity can improve fitness when meeting the requirements including: 1) the intensity of the exercise is a measure that shows the quality (quality) of an stimulus or imposition. The intensity of physical fitness should be between 60-80% of maximum aerobic capacity. The recommended exercise intensity for health sports is between 72% and 78% of the maximum pulse rate. 2) The duration of the exercise is the length of time you practice in one training session. The duration of the exercise must reach the training zone which is 15-25 minutes. 3) Frequency of exercise is the number of exercises carried out in 1 week. The frequency of exercise is closely related to the intensity and duration of the exercise. Physical activity is carried out regularly every day or 3 times a week for at least 30 minutes each exercise[3].

Physical activity is movement carried out by the body through utilizing the functions of the skeletal muscles resulting in energy expenditure [10]. A series of physical activity activities can affect all components of physical fitness and suppress degenerative diseases which are the current trend of the disease.

Implication for Future Direction

Handling the problem of degenerative diseases through physical activity is carried out as an effort to solve early adult behavior that is detected by the symptoms of degenerative diseases. Physical activity should have a goal starting from early adulthood (15 years) as life expectancy with a crucial phase in the developmental stage. Early adulthood is a significant starting point for individuals who are independent in determining the future and regulate life as social stimulation and a means to hone creativity[14]. The behavior of early adulthood must be addressed immediately, because in the next 20 years the situation that will be faced becomes more difficult because of the increasing number of people with degenerative diseases and will be increasingly difficult to overcome[5].

Conclusion

The results of the research obtained were a relationship between physical activity and degenerative diseases in prevention efforts. Physical activity in early adulthood as life expectancy if carried out regularly and systematically can provide stimulation to physical, spiritual, and social functional development, especially in anatomical-anthropometric structures and physiological functions so as to prevent the occurrence of degenerative diseases.

REFERENCES

- FAO/WHO/UNU Expert Consultation, Human Energy Requirements. London: Food and Nutrition Division WHO, 2001.
- Jemma, "RutinAktivitas Fisik, Keluarga Terhindar Penyakit Tidak Menular," Jemma Article, 2017. <https://womantalk.com/health-fitness/articles/rutin-aktivitas-fisik-keluarga-terhindar-penyakit-tidak-menular-DNEjN>.
- Kementerian Kesehatan RI, "HasilUtama Riskesdas 2018," p. 61, 2018, doi: 1 Desember 2013.
- K. Suryaputra and S. .Rahayu Nadhiro, "Perbedaan PolaMakandan Aktivitas Fisikantara Remaja Obesitasdan Non Obesitas," J. Dep. Gizi Masyarakat, Fak. Kesehat. Masy. , Univ. Airlangga, vol. 16, no. 1, pp. 45–50, 2012.
- A. Handajani, B. Roosiermiatie, and M. Herti, "Faktor-faktor yang berhubungandenganpolakematianpadapenyakitdegeneratif di indonesia," Bul. Penelit. Sist.Kesehat., vol. 13, pp. 42–53, 2010.
- R. Mandriyarini, M. Sulchan, and C. Nissa, "Sedentary Lifestyle sebagai FaktorRisiko Kejadian Obesitaspada Remaja SMA Stunted di Kota Semarang," J. Nutr. Coll., vol. 6, no. 2, pp. 149–155, 2017.
- I. Puspasari, M. Sulchan, and N. Widyastuti, "Journal of Nutrition College," J. Nutr. Coll., vol. 6, no. 4, pp. 307–312, 2017.
- W. N. Putra, "Hubungan Pola Makan ,Aktivitas Fisik Dan Aktivitas Sedentari Dengan Overweight Di Sma Negeri 5 Surabaya," J. Berk. Epidemiol., vol. 5, no. 3, pp. 298–310, 2017, doi: 10.20473/jbe.v5i3.2017.
- S. Giriwijoyo and D. Z. Sidik, Ilmu Kesehatan Olahraga. Bandung: Rosda, 2013.
- Fatmah and Y. Ruhayati, Gizi Kebugarandan Olahraga. Bandung: LubukAgung, 2011.
- S. Giriwijoyo and D. Z. Sidik, IlmuFaalOlahraga. Bandung. Bandung: Rosda, 2013.
- N. Anggriawan, "Peran Fisiologi Olahragadalam Menunjang Prestasi," J. OlahragaPrestasi, vol. 11, no. 2, pp. 8–18, 2015.
- Emal, Pengantar Teoridan Metodologi Pelatihan Fisik.Depok: Kencana, 2017.

D. Junaidy and E. R. Surjaningrum, "Perbedaan Kualitas Hidup pada Dewasa Awal yang Bekerja dan yang Tidak Bekerja," *J. Psikol. Ind. dan Organ.*, vol. 3, no. 2, pp. 120–107, 2014, doi: 10.1017/CBO9781107415324.004.