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# The Role of Cycling on Hypertense People Review Article

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#### Abstract

Cycling is an activity that people do every day, but in its development, cycling is not always done by most people. Cycling is carried out as a support for daily activities that have benefits for the health of the body such as reducing excessive blood pressure levels or can be referred to as preventing hypertension. Hypertension generally occurs in the elderly, but several studies have shown that hypertension also occurs in adolescence and is realized during the last decade. Through this literature review method by collecting several scientific articles or reference books as an understanding of a problem. From here, it is organized into four stages, namely: first, looking for scientific articles or reference books. Second, evaluate the literature review sources. Third, identify themes and theoretical gaps with existing conditions in the field. Fourth, namely the presentation and conclusion of the article review process. After doing this method, the author concludes that cycling has a pretty good role for people with hypertension, one of which is when after doing cycling, the body's health condition is controlled and makes excessive stress disappear, so cycling is recommended for people with hypertension.

Keywords: exercise physiology, cycling, hypertense

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### INTRODUCTION

Cycling is a sport that is practiced on a bicycle and in almost every occasion, it aims to cover a certain route in the shortest possible time, because that is the fastest to complete if you want to win the race. Cycling is an aerobic type of exercise that is very good for maintaining a healthy body and helping to overcome diseases such as hypertension, diabetes mellitus, body fat disorders, asthma. The condition is that cycling is carried out in the right program according to health conditions and abilities. People who cycle include exercising the arm muscles (biceps), thigh muscles (quadriceps, hamstring, adductor, and abductor), as well as the front and back muscles of the body. Some forms of exercise using a bicycle do not always have to be pedalling. Bicycles can be used as a substitute for weights, training the muscles of the body associated with movement while cycling, as well as stretching to relieve soreness after training.

There are so many types of recreational sports that can be done, one of which is cycling. A bicycle is a means of transportation that is pedalled using both feet that slides on the highway. Bicycles are an economical means of transportation. In addition, bicycles are also a tool for having fun, going on adventures, and maintaining health [1]. Cycling increases levels of Serotonin (happy hormone) which works to pump Norepinephrine to create feelings of joy and happiness. Whether pedalling on your favourite trail or downhill, cycling is great for stress relief and mood-boosting. Indonesians often use bicycles as a healthy lifestyle. From everyone's interest in cycling, a cycling community was formed, which is a collection of people who ride bicycles. Narrowly defined community refers to people residing in a particular geographic area. If explained in depth, the broader definition of community requires three other elements. First, the community is considered

a collection of people with a certain social structure. Second, there is a sense of belonging and enthusiasm in the community. Third, ongoing activities are non-work activities, but all of them occur in separate geographical areas [2].

Cycling activity is a type of activity that has been carried out by the community since ancient times until now, cycling activities are carried out as a support for daily activities, both for work, recreation, and exercise. Some of the benefits of cycling as follows: a.) Cycling is one of the least stressful ways to exercise and the best way to strengthen cartilage. Cycling can be done by anyone, both underweight and overweight or obese without fear of injury; b.) Cycling will improve overall blood circulation, the most important thing is that the heart will work more economically because the pumping performance becomes more efficient thereby reducing overall blood pressure and reducing heart disease. Cycling can improve the quality of the immune system and allow the body to protect itself from viruses and bacteria. Cycling is a method of exercise that has the most benefits for strengthening the immune system.

For now, cycling is generally done on national holidays and as a recreational sport, if every day there are a few people who cycle there must be a small number, both in big cities and in rural areas where bicycles used to be a popular mode of transportation but have also switched to motorbikes lately. Recently, cycling has become a trend for some people in the city of Semarang, as evidenced by the increasing number of bicycle users and the number of bicycle communities.

According to the World Health Organization (WHO) data in 2015 shows about 1.13 billion people in the world have hypertension. The number of people with hypertension continues to increase every year, it is estimated that by 2025 there will be 1.5 billion people affected by hypertension, and it is estimated that every year 10.44 million people die from hypertension and its complications. The high incidence of hypertension in the world is influenced by several factors, one of which is lack of physical activity or exercise. According to RISKESDAS Basic Health Research in 2013 showed that 48.2% of the Indonesian population lacked physical activity. Regular physical activity has a beneficial effect on health, namely avoiding heart disease, stroke, osteoporosis, cancer, high blood pressure, diabetes, and others. Lack of physical activity can cause various kinds of complaints, one of which is on the cardiovascular system, which is marked by a decrease in the maximum pulse rate and a decrease in the amount of blood pumped in each beat. Lack of physical activity can also increase blood pressure.

Hypertension is an increase in blood pressure, both systolic and diastolic, which is divided into two types, namely essential hypertension which is the most common and secondary hypertension caused by renal disease or other causes, while malignant hypertension is severe, fulminant hypertension and is often found in the two types of hypertensions [3]. Hypertension is a health problem that is quite dangerous worldwide because hypertension is a major risk factor that leads to cardiovascular diseases such as heart attack, heart failure, stroke, and kidney disease which in 2016 ischemic heart disease and stroke are the two main causes of death in Indonesia.

Hypertension is persistent blood pressure with systolic blood pressure above 140 mm/Hg and diastolic blood pressure above 90 mm/Hg. Hypertension is called the silent killer because it does not provide typical symptoms and can increase the incidence of stroke, heart attack, chronic kidney disease and even blindness if it is not controlled and controlled properly. Complications of hypertension cause about 9.4 deaths worldwide each year. According to data from the World Health Organization (WHO, 2013), hypertension is the cause of 45% of deaths from heart attacks and 51% due to strokes worldwide. Hypertension is one of the main non-communicable diseases in the world. The prevalence of hypertension in the population aged 18 years in Indonesia in 2013 was 25.8%. The incidence of hypertension worldwide reaches more than 1.3 billion people, which represents 31% of the world's adult population which has increased by 5.1% greater than the global prevalence in 2000-2010. In the same year, the incidence of hypertension was higher in people in developing countries than in developed countries, even nearly 75% of patients with hypertension lived in developing countries and an increase of 8.1%. Meanwhile, according to the

results of the 2013 RISKESDAS, the incidence of hypertension in Indonesia is ranked 6th out of 10 categories of chronic non-communicable diseases. The prevalence of hypertension in Indonesia obtained from the results of blood pressure measurements in people aged 18 years has decreased from 31.7% in 2007 to 25.8% (Kemenkes RI, 2013).

In general, the incidence of hypertension often occurs in the elderly population, but it is possible that the population aged teenagers to adults can also experience hypertension. Adolescents and young adults who are in the age range of 15-25 years have a hypertension prevalence rate of 1 in 10 people. The prevalence of prehypertension and hypertension in young adults (aged 20-30 years) was 45.2%. Hypertension has now become a degenerative disease that is passed down to family members who have a history of hypertension. Hypertension generally occurs in the elderly, but several studies have shown that hypertension can appear since adolescence and its prevalence has increased over the last few decades, but many are not aware that it is the cause of the emergence of hypertension in adults and the elderly. Hypertension is an important condition in children, with an estimated population prevalence of 1-2% in developed countries. Nutritional surveys in the US showed a significant increase in systolic blood pressure and diastolic blood pressure. The causes of increased blood pressure are associated with obesity, changes in diet, decreased physical activity and increased stress.

The mechanism of hypertension in adolescents is influenced by several factors related to lifestyle. These factors include being overweight or obese, a family history of hypertension or genetic factors, race or ethnicity, gender, low birth weight, high salt consumption, smoking, physical activity or sports and low knowledge. Risk factors for unhealthy lifestyles in adolescents are caused by many factors, one of which is knowledge. Knowledge or cognitive is a domain that is very influential on a person's actions or behaviour.

Hypertension has long been recognized as a health problem. Hypertension is also a problem in adolescents because adolescents with hypertension can survive into adulthood and have a higher risk of morbidity and mortality. Although the clinical prevalence in children and adolescents is very low compared to adults, there is sufficient evidence that essential hypertension in adults can begin in childhood and adolescence. The incidence of hypertension in children and adolescents is estimated to be 1-3%. 14,686 children aged 10-15 years that 4.2% of these children had high blood pressure. Less than five percent of children, with a greater proportion in teens, had high blood pressure when their blood pressure was measured. The incidence of hypertension increases with age, ranging from 15% in young adults to 60% in people aged 65 years and over. In Indonesia, the incidence of hypertension in children and adolescents varies between 3.11% and 4.6%. Incorporating blood pressure measurements into the routine assessment of adolescents will allow the detection of significant asymptomatic hypertension due to unknown disease and will support claims that mild elevations in blood pressure are common in adolescents. The aim of this paper is to discuss the definition, aetiology, pathogenesis, diagnostic assessment, and treatment of adolescent hypertension.

Based on the introduction above, high blood pressure is a disease experienced by many people. But they tend to ignore it and don't really care because they are too busy with their activities. In fact, high blood pressure can be lowered by doing simple activities, including cycling.

### **MATERIAL AND METHODS**

Literature review is one of the many techniques that can be used to conduct research activities. The literature review is at the very top of the hierarchy of evidence. This shows that literature review is a technique to prove or approach certain problems or it can be said that literature review is a scientific process that produces output in the form of reports intended to conduct scientific research or focus a study. However, the facts show that literature review is sometimes considered a difficult thing to do, considering that to compile a literature review, it requires an understanding from a researcher in conducting a study of a problem (theory, model, or method). The preparation of scientific literature review sources, identifying themes and gaps between theory and field conditions if any, making an outline structure and compiling a literature review.

Finding relevant literature is the initial stage of preparing a literature review. Use scientific articles or reference books to complete this initial stage. The more references that are used, the more the quality of the literature review that is carried out will improve. The second stage is to evaluate the literature review sources. Evaluation becomes the filter stage of the many literature review sources that will be used by a researcher. The nature of the literature review is to focus on a single topic or problem. Strive for the review literature that is used in accordance with the objectives in the preparation of the literature review so that the next process can be passed easily. The third stage is to identify themes and gaps between theory and field conditions, if any. Reinforcing a topic or problem and discussing any gaps will make knowledge grow. Basically, conducting a literature review is not a challenge for a researcher, but tends to be an opportunity considering that many scientific journals are willing to publish the results of a literature review conducted by a researcher. In this article, the researcher will try to explain a little about the literature review so that researchers can get interested and use the literature review as one of the scientific efforts in compiling a performance/final project.

This article uses the literature review method. The literature review contains a description of the theory, findings and other research materials obtained from reference materials to be used as the basis for research activities. The description in this literature review is directed to develop a clear framework of thought. The literature review contains reviews, summaries, and the author's thoughts on several library sources (can be articles, books, slides, information from the internet, etc.) about the topics discussed. The results of research conducted by other researchers can also be included as a comparison of the results of the research that will be tested here. All statements and/or research results that are not from the author are mentioned in their sources, and the procedure for referring to library sources follows the established rules.

The data used were obtained from various articles published in the last 10 years (2012 – 2022) with the topic of exercise for people with chronic diseases. The articles used for the data were obtained from the internet platform, namely Google Scholar. There are 4 stages that must be carried out to obtain appropriate data (Figure 1), namely 1. Stages of searching and collecting relevant materials about cycling and hypertension; 2. The stage of screening and classifying the material according to the discussion; 3. Analysis stage; 4. The stage of presentation and conclusion of the article review process.

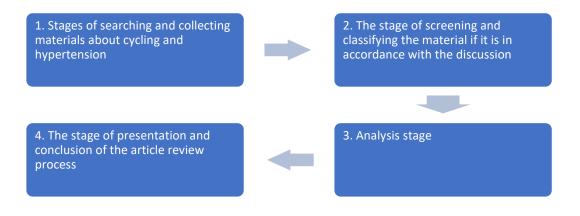


Figure 1. Article Review Steps

### RESULTS

Table 1. Data Tabulation of Articles with the Theme of Cycling and Hypertension Disease.

Num.	Tittle	Year of Publication	Source (s)
1	Description of the Blood Pressure Status of	2019	Journal Of Health
	Hypertension Sufferers in Karanganyar Village,		Science (Jurnal Ilmu
	Kalianget District, Sumenep Regency/Gambaran		Kesehatan)
	Status Tekanan Darah Penderita Hipertensi di		

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	Desa Karanganyar Kecamatan Kalianget Kabupaten Sumenep		
2	Counseling and Education about Hypertension/ <i>Penyuluhan dan Edukasi Tentang</i> <i>Penyakit Hipertensi</i>	2021	Jurnal Abdimas Saintika
3	Survey of Community Interest in Cycling Recreational Sports During the Covid 19 Pandemic in Demak Regency/Survey Minat Masyarakat Untuk Olahraga Rekreasi Bersepeda Pada Masa Pandemi Covid 19 di Kabupaten Demak	2020	Journal of Physical Activity and Sports (JPAS)
4	The Impact of Cycling to School on the Physical Fitness of Students in Public High Schools in Serang City/Dampak Bersepeda ke Sekolah Terhadap Kebugaran Jasmani Siswa di SMA Negeri Se-Kota Serang	2017	Jurnal Kependidikan Jasmani dan Olahraga
5	Benefits of Aerobic Exercise on Human Physical Fitness/Manfaat Latihan Olahraga Aerobik Terhadap Kebugaran Fisik Manusia	2015	e-Biomedik
6	Literature Review; Writing and Preparation Guide/Literatur Review; Panduan Penulisan dan Penyusunan	2019	Jurnal Keperawatan
7	Motivation and Community Interest in Cycling in Semarang City/Motivasi dan Minat Masyarakat dalam Berolahraga Sepeda di Kota Semarang	2016	ACTIVE: Journal of Physical Education, Sport, Health and Recreation
8	Description of the Lifestyle of Hypertension Sufferers in Coastal Communities/Gambaran Gaya Hidup Penderita Hipertensi pada Masyarakat Pesisir	2017	(Doctoral dissertation, Faculty of Medicine)
9	Cycling Sports Activities During the Covid-19 Pandemic in Tuban Regency/Aktivitas Olahraga Bersepeda Pada Saat Pandemi Covid-19 Di Kabupaten Tuban	2021	Jurnal Kesehatan Olahraga
10	Hypertension in the Productive Age Population (15-64 years)/Hipertensi pada Penduduk Usia Produktif (15-64 tahun)	2019	HIGEIA (Journal of Public Health Research and Development)
11	Description of Physical Activity in Patients with Hypertension: Literature Study/Gambaran Aktivitas Fisik Pasien Dengan Hipertensi: Studi Literature	2021	Jurnal Keperawatan Indonesia Florence Nightingale
12	Hypertension in Adolescents in Semarang Regency/Hipertensi pada Remaja di Kabupaten Semarang	2020	Jurnal Penelitian dan Pengembangan Kesehatan Masyarakat Indonesia
13	Cycling Efforts as a Transportation Capital and a New Lifestyle to Maintain Physical Fitness/Upaya Bersepeda Sebagai Modal Transportasi Serta Gaya Hidup Baru Menjaga Kebugaran Jasmani	2020	Prosiding Seminar Nasional Fakultas Ilmu Kesehatan dan Sains

### DISCUSSION

Physical activity is an important factor in maintaining overall good health. Being physically active has significant health benefits, including being able to reduce various chronic diseases, help control weight and improve mental health. Physical activity can also help manage long-term conditions, such as arthritis and type 2 diabetes, by reducing the effects of these conditions and improving the sufferer's quality of life [4]. Based on the theory of "moderate" physical activity, it is a physical activity that requires continuous strength, rhythmic muscle movements or flexibility, when doing moderate physical activity the body will sweat a little, heart rate and respiratory rate are slightly faster but can still talk, but not can sing. Examples include jogging, sweeping the floor, washing dishes, table tennis, swimming, playing with pets, cycling, playing music, walking briskly and washing clothes. In the opinion of researchers, doing daily physical activities such as sweeping, washing dishes, walking, cycling and brisk walking can lower blood pressure in people with hypertension.

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Cycling is included in one of the sports in the category of aerobic exercise, which is a sport activity with a gradual and continuous increase in load that uses energy from combustion using oxygen without causing fatigue. Cycling can train the arm muscles, thigh muscles, and the front and back body muscles. Bicycles can be used as a substitute for weights, training the muscles of the body associated with movement while cycling, as well as stretching to relieve soreness after training. Bicycles are often used as a tool to cool down after exercise, so that the heart rate decreases slowly. Cycling also has benefits for creating feelings of joy. This is because cycling increases levels of Serotonin or the happy hormone. This hormone works to pump norepinephrine so that feelings of joy and happiness are created. Cycling is a type of cardio exercise that functions to maintain a healthy heart, lungs, and blood circulation. With regular cycling, the level of fat in the blood decreases so it is good for those who have hypertension. Cycling regularly can reduce the risk of heart disease, because cycling can lower blood pressure so that blood pressure becomes stable and controlled.

- 1. Lose weight. Cycling can help you lose weight. Because this exercise can increase metabolism, build muscle, and burn fat. Cycling can also burn calories naturally. The number of calories burned according to the duration, distance, and speed when pedalling a bicycle. A study says that cycling for 30 minutes every day can burn 5 kg of fat in a year. 00:23 / 00:30 By doing this exercise on a regular basis coupled with the consumption of healthy foods, you can lose weight quickly.
- 2. Prevents the risk of high blood pressure. Another benefit of cycling for the body is that it can help lower high blood pressure. A study published in the British Journal of Sport Science Medicine states that exercise with a certain intensity can improve blood pressure. This sport can also improve blood circulation health.
- 3. Prevent heart disease. Cycling is also known to improve heart health and reduce the risk of cardiovascular disease. This exercise is believed to strengthen the heart muscle and reduce fat in the blood.
- 4. Prevent cancer. The next health benefit of cycling is that it can prevent cancer. These benefits can be obtained if balanced with the consumption of healthy and nutritionally complete foods. For cancer patients who are in the recovery phase, cycling can also reduce the side effects of cancer drugs. Thus, the quality of life can also be further improved.
- 5. Reduces the risk of diabetes. By regularly doing physical activity such as cycling, it can avoid the risk of diabetes. Cycling more than 30 minutes per day can help you avoid other risks and diseases.
- 6. Increase body strength, balance, and coordination. An upright posture during cycling can help increase strength, balance, and body coordination. The balance obtained is useful to avoid the risk of falls and fractures. Cycling activity is also useful for people with osteoarthritis. Because it can help put a little pressure on yourself.
- 7. Maintain joint health. The next benefit of cycling is that it can help maintain joint health. This sport is also safe for people with joint pain and lower body stiffness due to age. Cycling at a moderate to high intensity will not put a strain on the joints. Because when cycling, the weight rests on the pelvic bone. In contrast to jogging, which relies on both feet, it is more at risk of causing injury.
- 8. Overcoming mental health disorders. Cycling turns out to provide benefits for mental health. Because when cycling or other physical activities, the body will produce the hormone dopamine. These hormones are useful for generating feelings of happiness, relieving stress, overcoming depression, and preventing anxiety disorders. One study even found that people who cycled regularly experienced fewer mental health problems than people who did other sports.
- 9. Prevent Parkinson's disease. Parkinson's is a disorder of the nervous system that affects body movement. According to an explanation in the Journal of the American Medical Association, there is a relationship between exercise at a certain level and the risk of this disease. Exercise with moderate to high intensity can reduce the risk of Parkinson's disease in men. From here we can adjust the speed, duration, and distance travelled to reduce the risk of the disease.
- 10. Extend life. A survey of the Tour de France people said that the average age of former cyclists was 81.5 years. This age is 17% higher than the average human age which is only around 73.5 years. This is due to the activity of cycling can prevent aging to the cells. This

physical activity can also increase the capacity and function of mitochondria which keeps you young.

- 11. Relieves menstrual symptoms until menopause. The benefit of cycling for women is that it can relieve symptoms that appear before menstruation or menopause. When approaching menstruation or menopause women often feel some typical symptoms such as pain, abdominal pain, and mood swings. These symptoms make you feel uncomfortable.
- 12. Shrink stomach. Distended stomach is actually a problem for both men and women. The benefits of cycling for men can also help shrink the stomach. Because this one sport helps burn fat. For these benefits to be more effective, it is best not to consume food before cycling. Instead, you can eat after cycling so that the body does not lose energy drastically.
- 13. Preventing the risk of Alzheimer. It is a disease that interferes with brain function. A person who suffers from this disease can experience decreased memory and other cognitive functions. The health benefits of cycling can also prevent this disease. Because when you ride a bicycle, there is an increase in blood flow to the brain. It is useful for maintaining brain health.
- 14. Makes sleep more sound. Cycling is also useful for improving sleep quality. Physical activity can make the body healthier and fitter. Not only that, but this sport can also maintain emotional conditions. With a healthy body, fit, and emotional health is maintained, the quality of sleep will be better.
- 15. Make lungs healthier. Cycling is also good for maintaining lung health. When you do this exercise, you will usually feel breathless. But it turns out that this condition can train your breath to be stronger. If you cycle in green open spaces, the supply of fresh air to the lungs will be higher. Thus, the lungs become healthier.

Based on the research, it was found that there was a relationship between physical activity and the level of hypertension. Physical activity is defined as body movement produced by contraction of skeletal muscles and can increase energy. This physical activity includes various kinds of body movements, starting from sports that are contested, sports, hobbies, or daily activities in the household. Regular physical activity causes changes such as the heart will become stronger in its smooth muscles so that the capacity is large and the construction or pulse is strong and regular, besides that the elasticity of blood vessels will increase due to relaxation and vasodilation so that fat deposits will decrease and increase contraction. the muscle wall of the blood vessel.

The type of exercise that is recommended for people with hypertension is aerobic because aerobics is useful to help overcome blood sugar, cholesterol, triglycerides, obesity. Then walking, the strength of the leg muscles that increases when walking is useful for increasing the supply of oxygen to the heart and brain. In addition, cycling and swimming are useful for improving blood flow, increasing muscle strength, and making muscles flexible in activities [5].

To control hypertension, apart from a healthy diet, we must also adopt a healthy lifestyle, one of which is regular exercise. If you have tested positive for hypertension, choose light exercise such as walking, cycling, jogging, and swimming. Do it for 30 to 45 minutes a day 3 times a week (Susilo, 2011). Exercise helps improve the health of the heart and blood vessel system. By preventing the formation of arterial plaque. Deposits of fat, called plaque, can build up in the walls of arteries, restricting blood flow, a condition known as atherosclerosis, which can decrease blood flow to the heart. Exercise can help reduce these fat stores by increasing HDL and lowering triglycerides and LDL, when weight loss is followed [6].

Regular aerobic exercise specifically affects blood pressure. During aerobic exercise, the heart rate and blood pressure increase to meet the increased oxygen demand at the level of the working muscles. Exercise stress increases as your heart rate and stroke volume increase, or the amount of blood pumped with each beat. The impetus for each heart contraction also increases. Blood flow to active muscles increases taps, blood vessels widen to activate body tissues and narrow to inactivate body tissues [7].

In people with hypertension, there will be an impact that is felt when regularly doing bicycle sports. The most easily felt impact is the feeling of happiness when doing the sport. Then the impact on the body will also be felt over time. Like not getting tired easily in doing activities that are long, considering that cycling is one of the cardio sports. The impact on the muscles will also be experienced. By regularly cycling every day, the muscles used when cycling will also experience development. Not only in size, but also in terms of function and strength. As in the arm muscles,

thigh muscles, and the muscles of the front and back of the body. With the development of these muscles, daily activities that involve these muscles become easier. By cycling regularly, the heart will work more effectively in pumping blood, so blood pressure can decrease significantly. Weight will also be controlled to prevent the emergence of various diseases, one of which is hypertension.

This is in accordance with the existing theory that exercise affects the occurrence of hypertension. The benefits of exercise are to improve the work and function of the heart, lungs and blood vessels which are characterized by a decreased resting pulse rate, reduced lactic acid build-up, increased HDL cholesterol, and reduced atherosclerosis [8]. Epidemiological evidence shows that various cardiovascular risk factors can be suppressed by physical activity. This relationship between physical exercise and cardiovascular health applies to all ages and genders. The very good effects of dynamic training include isometric exercise with light weights and appropriate, generally aerobic exercise such as walking, jogging, or cycling. A significant decrease in blood pressure is seen after 2 weeks of exercise and will persist as long as the individual continues his habit. For patients who are known to suffer from hypertension, it is recommended to avoid strenuous anaerobic exercise. Patients who suffer from coronary heart disease, need guidance from a supervisor to assess the impact that may arise such as heart rhythm abnormalities or other abnormalities that may occur due to ischemia or lack of oxygen during exercise. In light exercise there was no significant change in plasma renin activity levels, changes in serum aldosterone concentration, or changes in angiotensin converting enzyme activity, so that through light exercise blood pressure could be decreased. In other words, the stimulatory effect of the renin-angiotensin system can be overcome with light exercise. The failure of exercise to lower blood pressure in some individuals may be due to differences in hemodynamic and neuroendocrine functions.

### CONCLUSION

Based on the discussion above, we can conclude that cycling has a pretty good role for people with hypertension. With regular cycling, the level of fat in the blood decreases so it is good for those who have hypertension. One of the benefits of cycling regularly is that the weight is controlled, which plays an important role for people with hypertension. Cycling is also a light exercise and is one of the recommended exercises for people with hypertension.

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### **CONFLICTS OF INTEREST**

**Conflict of interest** : Authors state no conflict of interest.

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