ORIGINAL ARTICLE

Physical Therapy Journal of Indonesia (*PTJI*) 2024, Volume 5, Number 1: 86-90
E-ISSN : 2722-6034 ; P-ISSN : 2722-0125

The correlation between physical activity and hypertension in menopausal women

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Received: 2024-01-30
Accepted: 2024-04-28
Published: 2024-05-31

ABSTRACT

Background: Hypertension is one of the deadliest diseases worldwide and ranks first among the most common diseases in Mengwi, Badung. Hypertension is characterized by persistently high blood pressure, with systolic blood pressure greater than or equal to 140 mmHg and diastolic blood pressure greater than or equal to 90 mmHg. Physical activity plays a crucial role in maintaining heart health. This research aimed to determine the relationship between physical activity and hypertension in menopausal women.

Methods: The research used an analytical observational method with a cross-sectional approach. This research was conducted in August–November 2023 at Desa Penarungan, Mengwi, Badung, Bali. Purposive sampling was used as the sampling method, resulting in 80 samples. Physical activity was measured using the Global Physical Activity Questionnaire (GPAQ), and blood pressure was measured using a sphygmomanometer. Data was analyzed using the Spearman rank statistical test.

Results: The statistical test showed a value of p=0.000 (p<0.005), indicating a significant relationship between physical activity and hypertension in menopausal women. The obtained correlation value was r=-0.479, which was negative and signified an inverse or opposite relationship with a relatively strong correlation level. This suggested that the lower the level of physical activity, the higher the degree of hypertension.

Conclusion: There was a significant relationship between physical activity and hypertension in menopausal women.

Keywords: hypertension, menopause, menopausal women, physical activity.
Cite This Article: Maharani, I.G.A.A.A., Saraswati, P.A.S., Artini, I.G.A., Utama, A.A.G.E.S. 2024. The correlation between physical activity and hypertension in menopausal women. *Physical Therapy Journal of Indonesia* 5(1): 86-90. DOI: 10.51559/ptji.v5i1.197

INTRODUCTION

Hypertension is still a health problem in the world. Someone who experiences hypertension has systolic blood pressure reaching ≥140 mmHg and diastolic blood pressure reaching ≥90 mmHg.[1] In 2017, according to the Bali Provincial Health Service report, 60,665 people in the region suffered from hypertension.[2] The prevalence of hypertension, especially in Badung Regency, in 2018 was 29.33% and was ranked 6th by the Badung Regency Health Service. Based on data obtained from preliminary research at UPT Puskesmas Mengwi II in Dewanti (2021), hypertension ranked first in 2020. It was one of the seven most common diseases last year, namely January to December.[3,4]

During menopause, blood pressure tends to increase significantly, and women are 41% more likely to experience hypertension than men. It occurs because the estrogen decreases, resulting in an increased risk of atherosclerosis, or the blood vessels harden, which causes hypertension.[5] Menopause is the period when menstruation stops for at least 12 consecutive months, which occurs due to the failure of the ovaries to produce the hormone estrogen in women aged 45–55 years.[6] Women who enter menopause will experience several complaints, starting with physical and psychological ones, such as being easily emotional, irritable, easily forgotten, having hot flashes, stress, heart palpitations, insomnia, and having libido disorders.[7]

Women going through menopause will endure a variety of physical and psychological changes, including urinary tract infections, diabetes, renal illness, hypertension, sleep issues, and depression.[8] Several factors cause hypertension, including a lack of physical activity. When an individual is inactive, body weight tends to increase, so blood pressure will also increase. Lack of physical activity can make blood vessels less flexible or stiff, which can cause an increase in blood pressure.[5] When they reach the age of more than 50 years, women in Indonesia tend to be less physically active and also cause serious problems, such as cardiovascular disease, stroke, and kidney failure.[9]

A study by Yulistian et al. (2017) showed that physical activity levels, stress levels, fat consumption, and sodium consumption are associated with the incidence of hypertension in menopausal women.[10] Another study by Sase and Pramono 2013 stated that physical activity and sodium consumption were not associated with blood pressure in menopausal women. It showed the opposite findings. This research noted that the duration of physical activity is not related to systolic and diastolic blood pressure, while sodium consumption is significantly related to systolic and diastolic blood pressure.[11]

Based on the explanation above, hypertension is still a health problem in Indonesia, so researchers are interested in knowing the correlation between physical activity and hypertension in menopausal women in Penarungan Village, Mengwi District, Badung Regency. This research differs from previous research; the difference lies in assessing hypertension classifications, prehypertension, level I, and level II hypertension, which are associated with each physical activity category. Research on the relationship between physical activity and hypertension has never been conducted in Bali. Judging from the high prevalence of hypertension in Bali, especially Badung Regency, it is necessary to carry out research to determine whether physical activity has an effect on hypertension in menopausal women.

METHODS

This research used an analytical observational method with a cross-sectional approach. This research was conducted in August–November 2023 at Desa Penarungan, Mengwi, Badung, Bali. Purposive sampling was used as the sampling method, resulting in a total of 80 samples of menopausal women that were selected based on the inclusion and exclusion criteria. The inclusion criteria in this study were menopausal women aged 45–55 years, respondents who did not have a disability on the lower extremity, had an average body mass index and were willing to complete informed consent as proof of their willingness to be the sample of research. The exclusion criteria were the individuals who had a history of stroke and had a blood pressure of less than 90/60 mmHg.

This study used the Global Physical Activity Questionnaire (GPAQ) to measure physical activity and a sphygmomanometer to measure blood pressure. The data was analyzed using the IBM SPSS Statistics 26 computer program with *Spearman Rho* correlation tests to determine the relationship between physical activity and hypertension in menopausal women. The Research Ethics Commission of the Faculty of Medicine, Universitas Udayana/Sanglah Hospital Denpasar, with the number 1124/UN14.2.2.VII.14/LT/2023 approved this study due to its ethical feasibility. Everyone in this study provided informed consent and agreed to participate.

RESULTS

Table 1 shows the age of menopausal women in this research was 45–55 years; 51–55 years had the highest number of samples, namely a total of 30 people (62.5%). Most of the subjects' jobs were homemakers, with 31 people (38.8%). All of the subjects (100%) had non-smoking status, and the majority of subjects took hypertension medication, with 46 people (57.5%). In this study, it can be seen that out of 80 menopausal women samples, 27 people (33.8%) had low physical activity, 27 people (33.8%) had moderate physical activity, and 26 people (32.5%) had high physical activity. Based on the results of this research on the value of the hypertension category, most subjects had the prehypertension category, with 35 people (43.8%).

Table 2 shows the cross-tabulation between characteristics and physical activity. The majority of subjects aged 45–50 years had low activity, with 11 people (13.8%), while the majority of subjects aged 51–55 had moderate and high physical activity with the same number, namely 17 people each (21.3%). Regarding job characteristics as housewives, the majority had low activity, 15 people (18.8%) and medium activity. The majority were among traders, 11 people (13.8%), and high activity, the majority belonging to farmers and laborers with the same number, seven people (8.8%). The smoking status of all subjects was non-smoking, with 27 people (33.8%) having low activity, 27 people (33.8%) having moderate activity, and 26 people (32.5%) having high activity.

Table 3 shows it can be seen that subjects aged 45–55 mostly had the prehypertension category. In terms of job characteristics as housewives, the majority were in the prehypertension category, 14 people (17.5%), while those with hypertension stages 1 and 2 were nine people (11.3%) and five people (6.3%), respectively. Most jobs as laborers and farmers were in the prehypertension category, with five people (6.3%) and four people (5%), respectively, but the subjects did not have stage 2 hypertension in both

Table 1. Characteristics of the menopausal women respondents

Characteristic	Frequency	Percentage (%)
Age		
45-50	20	37.5
51-55	30	62.5
Job		
Housewife	31	38.8
Trader	23	28.7
Laborer	10	12.5
Farmer	7	8.8
Others	9	11.3
Smoking status		
Smoker	0	0
Non-smoker	80	100
Medication for hypertension		
Yes	46	57.5
No	34	42.5
Physical activity		
Low	27	33.8
Moderate	27	33.8
High	26	32.5
Hypertension		
Normal	16	20
Prehypertension	35	43.8
Stage 1 hypertension	20	25
Stage 2 hypertension	9	11.3

Table 2. Cross table of characteristics and physical activity

Variable	Physical activity						Total	
	Low		Moderate		High			
	n	(%)	n	(%)	n	(%)	n	(%)
Age								
45-50	11	13.8	10	12.5	9	11.3	30	37.5
51-55	16	20	17	21.3	17	21.3	50	62.5
Job								
Housewife	15	18.8	13	16.3	3	3.8	31	38.8
Trader	6	7.5	11	13.8	6	7.5	23	28.7
Laborer	2	2.5	1	1.3	7	8.8	10	12.5
Farmer	0	0	0	0	7	8.8	7	8.8
Others	4	5	2	2.5	3	3.8	9	11.3
Smoking status								
Smoker	0	0	0	0	0	0	0	0
Non-smoker	27	33.8	27	33.8	26	32.5	80	100

Table 3. Cross table of characteristics and hypertension

Variable	Hypertension								Total	
	Normal		Prehypertension		Stage 1 hypertension		Stage 2 hypertension			
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Age										
45-50	6	7.5	12	15	7	8.8	5	6.3	30	37.5
51-55	10	12.5	23	28.7	13	16.3	4	5	50	62.5
Job										
Housewife	3	3.8	14	17.5	9	11.3	5	6.3	31	38.8
Trader	6	7.5	9	11.3	5	6.3	3	3.8	23	28.7
Labourer	2	2.5	5	6.3	3	3.8	0	0	10	12.5
Farmer	2	2.5	4	5	1	1.3	0	0	7	8.8
Others	3	3.8	3	3.8	2	2.5	1	1.3	9	11.3
Smoking status										
Smoker	0	0	0	0	0	0	0	0	0	0
Non-smoker	16	20	35	43.8	20	25	9	11.3	80	100
Medication for hypertension										
Yes	9	11.3	20	25	12	15	5	6.3	46	57.5
No	7	8.8	15	18.8	8	10	4	5	34	42.5

Table 4. Cross table of physical activity and hypertension

Physical Activity	Hypertension								Total	
	Normal		Prehypertension		Stage 1 hypertension		Stage 2 hypertension			
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Low	1	1.3	6	7.5	12	15	8	10	27	33.8
Moderate	9	11.3	13	16.3	4	5	1	1.3	27	33.8
High	6	7.5	16	20	4	5	0	0	26	32.5
Total	16	20	35	43.8	20	25	9	11.3	80	100

Table 5. Spearman's correlation results

Variable correlation	Correlation coefficient (r)	*p*-value
Physical Activity and Hypertension	-0.479	0.000

jobs. The smoking status of all subjects, namely non-smokers, was in the normal category with 16 people (20%), the prehypertension category with 35 people (43.8%), the stage 1 hypertension category with 20 people (25%), and the stage 2 hypertension category with nine people (11.3%). The majority of subjects taking hypertension medication were in the prehypertension category, with 20 people (25%), and those who did not take it were

also in the prehypertension category, with 15 people (18.8%).

Table 4 shows the majority of subjects with low activity had the stage 1 hypertension category, with 12 people (15%). Moderate and high activity dominate the prehypertension category, with moderate activity with 13 people (16.3%) and high activity with 16 people (20%). Based on the Spearman rho test results, as shown in Table 5, a *p*-value of 0.000 ($p<0.05$) was obtained, indicating that H_0 was rejected and H_1 was accepted, which means there was a significant relationship between physical activity and hypertension in menopausal women. The correlation coefficient value of $r = -0.479$, which was negative, means that there was a unidirectional or opposite relationship with a reasonably strong correlation level because this value was in the range of 0.26-0.50.

DISCUSSION

This research was in line with the results of research by Sagalulu et al. (2023), which stated that the systolic pressure would increase by 20 mmHg in women aged >50 years, where age-related changes in the vascular system can trigger an increase in vascular resistance and systolic hypertension. The low physical activity carried out by someone is related to daily activities, such as household activities, namely doing housework, and the rest is done for relaxing and sleeping, and moderate activity was carried out with household activities. It was related to activities outside, such as working as a trader. Then, high activity was associated with heavy activities carried out by a person, such as working as a farmer or laborer, which required more energy during physical activity. [12]

These results aligned with previous research by Sagalulu in 2023, where the results showed that the lower a person's activity level, the risk of experiencing hypertension would increase, while the higher the activity level, the risk of developing hypertension would decrease.[12] The research by Umedani (2020) showed a higher risk of experiencing hypertension in homemakers than in individuals who work outside. This was caused by the habits of homemakers, who tended to be less active because they spent a lot of time at home, which in turn could increase the risk of hypertension.[13] Khakim et al. (2022) suggested a correlation between work and physical activity in adults aged 20–39. Based on subjects who work in offices they had a lower level of activity compared to self-employed people who work outside.[14] However, there were differences in Fauzi et al.'s (2019) research, where employment status and activity level had no significant relationship. There were several other influencing factors, such as economic factors that influence nutrition, accompanied by a decrease in physical activity.[15]

The majority of subjects in the study took hypertension medication. This result was in line with research by Sumarta (2020), which stated that most of the research was during the period of hypertension treatment. It was very likely that the influence of consuming hypertension medication affected the blood pressure values of the subjects when blood pressure was measured.[16]

This study found that the majority of menopausal women who had low activity suffer from stage 1 hypertension and stage 2 hypertension, the majority of menopausal women who had moderate activity experience prehypertension, and the majority with high activity were routine and prehypertension. Research by Ajiningtyas et al. (2018) was in line with this research, showing that low physical activity had a high risk of developing hypertension and vice versa. Stiff arteries cause increased blood pressure in menopausal women due to hormonal changes during menopause, which could affect the elasticity of the arteries, thereby increasing blood pressure.[17]

Individuals with high physical activity tend to have regular blood pressure compared to those with low physical activity. A decrease in blood pressure tends to occur in individuals who engage in moderate to high-intensity physical activity; it causes a reduction in peripheral resistance while doing physical activity. Conversely, low physical activity could reduce overall heart efficiency. Systolic blood pressure also decreases if individuals engage in physical activity, which can prevent hypertension. Individuals with low physical activity cause the heart to work harder to pump blood, causing systolic blood pressure to increase. Apart from that, low physical activity also hurts excessive body weight or overweight, which causes an increase in systolic blood pressure, resulting in hypertension.[18] Research by Haqiqi et al. (2021) suggested a significant correlation between physical activity and the incidence of hypertension.[19] A survey by Lay et al. (2019) indicated that physical activity was related to hypertension. The results of the Spearman analysis test showed that the lower the physical activity carried out by the individual, the higher the blood pressure.[20]

In menopausal women, blood pressure increases due to stiff arteries caused by hormonal changes during menopause, which can affect the elasticity of the arteries, so that blood pressure increases.[17] Apart from that, menopausal women also experience a physiological decrease in body resistance, which can increase the risk of hypertension. Increased blood pressure in menopausal women can be prevented or minimized by physical activity. Arterial health, increasing elasticity, and reducing the risk of cardiovascular disease, including hypertension, could be maintained by engaging in physical activity. Physical activity is also linked to the body's metabolic processes. Active bodies in menopausal women could support their metabolic processes to maintain their body weight and prevent hypertension.[10] Someone with low physical activity tends to have a faster heart rate than someone with a high intensity of physical activity. It caused an increase in peripheral resistance, which made the heart muscle work harder to pump blood against the resistance. As a result, this condition increases the risk of hypertension. Peripheral resistance, which causes an increase in blood pressure, could be prevented by doing physical activity. Therefore, maintaining blood pressure within normal limits to support the cardiovascular system is important.[21]

Physical activity was one of the supporting factors for health to increase cardiorespiratory endurance. A moderate or high intensity of physical activity carried out by a person provides good cardiorespiratory endurance. O_2 energy is needed to support body movements,

so muscle contractions occur during physical activity. This happens because the incoming oxygen reaches the alveoli in the lungs, and then the oxygen is bound by hemoglobin in the blood and flows to the heart. During physical activity, a lot of muscle mass is involved, so the body's demand for oxygen increases because muscles need more oxygen to produce energy.[22]

Therefore, the higher the intensity of physical activity, the greater the body needs oxygen to support cell metabolism and provide the energy required for physical activity. Physical activity could also strengthen smooth muscles and increase capacity and heart rate. So, the elasticity of blood vessels increases due to the relaxation and vasodilation processes. Fat accumulation decreased due to this process, and the muscle contraction of the blood vessel walls increased. However, if fat settles in the blood vessels without vasodilation, the blood pressure increases.[22] Blood pressure can become a hypertensive crisis if it rapidly increases to 180/110 or higher. This should evaluate organ damage and rapid increase in blood pressure to prevent morbidity and death.[23]

The study's drawbacks were that the blood pressure readings were only taken once, and there was an influence from hypertension medication. Thus, the results may have had a pretty strong connection.

CONCLUSION

There was a significant relationship between physical activity and hypertension in menopausal women. The correlation value showed a unidirectional relationship with a reasonably strong correlation level. This showed that the lower the intensity of physical activity carried out, the higher the degree of hypertension suffered.

ETHICAL CLEARANCE

The Research Ethics Commission, Faculty of Medicine, Universitas Udayana, has assessed that this study is ethically feasible (1124/UN14.2.2.VII.14/LT/2023). Everyone in this study gave informed consent and agreed to participate.

CONFLICT OF INTEREST

This study has no conflict of interest.

FUNDING

This study did not receive specific funding from public, commercial, or non-profit funding agencies.

ACKNOWLEDGEMENT

The authors would like to thank all parties involved in this research.

AUTHOR CONTRIBUTIONS

IGAAAM prepared study designs, collected data, processed data, and drafted manuscript. PASS, IGAA, and AAGESU directed data collection and revised the manuscript.

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