Journal of Rural Community Nursing Practice (JRCNP)
Volume 1 Issue 1, March 2023, 102-111
https://ebsina.or.id/journals/index.php/JRCNP
eISSN 2986-7401

Relationship of Physical Activity and Blood Pressure: Data Analysis of the Integrated Non-Communicable Diseases Development Post (Posbindu PTM) Jenggawah Public Health Center in Jember Regency at 2020

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Article History
Submited: 25-02-2023
Revised: 12-03-2023
Acepted: 25-03-2023

ABSTRACT

Physical activity is one of the factors that can affect the incidence of hypertension. Individuals who lack physical activity will be at risk for hypertension. Therefore, this study aimed to identify the relationship between physical activity and blood pressure participants in non-communicable diseases of integrated development post (Posbindu PTM) Jenggawah Public Health Center, Jember. The retrospective case-control study design was used to analyze secondary data of Posbindu PTM registered from September to November 2020 among 126 participants. Characteristics of participants (age, gender, education, marital and occupational status), physical activity, and blood pressure were measured based on the health chart (KMS) of Posbindu PTM. Among 126 participants in Posbindu PTM identified 58% of having adequate activity and 60% of normal blood pressure. Meanwhile, there was a relationship between physical activity and the blood pressure of Posbindu PTM ($\chi 2=5.795$; p-value=0.016). Furthermore, Posbindu PTM participants who had enough physical activity were 0.4 times maintaining the blood pressure (OR: 0.411; 95% CI = 0.198-0.853). Physical activity is correlated with blood pressure among participants in Posbindu PTM. Therefore, the adequacy of physical activity should be improved to maintain blood pressure and prevent the risk of hypertension.

KEYWORDS

Physical activity, Blood pressure, Hypertension, Non-communicable diseases

1. BACKGROUND

There are 22.1% of people with hypertension globally, and Indonesia, which reaches 23.8%, has a higher incidence than other Asian countries (WHO, 2017). According to the Indonesian Ministry of Health (2019), the Institute for Health Metrics and Evaluation (IHME) stated that 1.7 million deaths in Indonesia were caused by several risk factors, including high blood pressure of 23.7% (Kemenkes RI, 2019). Non-communicable diseases can be caused by

several risk factors such as lack of eating fruits and vegetables, lack of physical activity, smoking, consumption of alcoholic beverages, body mass index (BMI), abdominal circumference, blood pressure, blood sugar, and blood cholesterol (Kemenkes RI, 2019). The case of hypertension is closely related to a person's blood circulation problems, especially blood pressure. An increase in systolic (>140 mmHg) and diastolic (≥90 mmHg) blood pressure is a symptom of hypertension (Amanda & Santi, 2018). According to Hardati and Riris (2017), the characteristics of a worker that can be a factor in the emergence of hypertension include age, stress, body mass index, gender, and physical activity. WHO (2017) states that 27.5% lack physical activity (WHO, 2017). From the 2018 Riskesdas data, between the population aged 15 years and over, it was found that the number of people who were lacking in physical activity was 35.5% (Kemenkes RI, 2019)

Physical activity is one factor that influences reducing the incidence of hypertension (Hasanudin & Perwiraningtyas, 2018). According to Maskanah et al (2019), physical activity will train the heart muscle and peripheral resistance to do vasodilation to prevent an increase in blood pressure and burn fat in the blood vessels so that blood circulation will be smooth (Maskanah, 2019). Therefore, people who do physical activity regularly generally have a normal blood pressure range (Iswahyuni, 2017). Furthermore, someone who has less physical activity will be at risk of obesity and cause hypertension because individuals who are not active in activities will tend to have a higher heart rate so that the heart muscle has to work harder which increases blood pressure (Musfirah & Masriadi, 2019).

Based on a preliminary study of the Posbindu performance report in the work area of the Jenggawah Health Center in August-December 2019, 604 people participated in the PTM Posbindu. The findings of hypertension in PTM Posbindu participants increased from October to December. In October, there were 67 people (11.09%), in November as many as 198 people (32.8%), and in December it rose again to 222 people (36.7%) posbindu participants who were indicated to have hypertension. According to research conducted by Karim, et al (2018), respondents who do moderate physical activity are more at risk of developing hypertension while respondents who do strenuous physical activity have only a small risk of developing hypertension

(Karim, 2018). Therefore, researchers want to identify further the relationship between physical activity and blood pressure that can cause hypertension.

2. METHODS

This research is analytic observational through a retrospective approach with a case-control design to examine the relationship between effects (hypertension) and risk factors (lack of physical activity). The analysis of this research is based on secondary data on performance reports on the implementation of Posbindu PTM in the work area of the Jenggawah Health Center from September-November 2020.

The population used were posbindu participants who visited PTM posbindu at three posbindu locations within the working area of the Jenggawah Health Center, including Cangkring, Jenggawah, and Wonojati Villages which were registered from September-November 2020 as many as 211 participants. Determination of the sample in this study using total sampling based on inclusion criteria, namely regular visits within three months and exclusion criteria for participants aged <15 and >59 years. So that the final sample counted as many as 126 Posbindu Integrated Disease Service Post (IDSP-NCD) participant data used in the study.

This study took data in the form of identity (age, gender, occupation, education, and marital status), interviews related to physical activity, and results of checking blood pressure. Assessment of physical activity on KMS by Posbindu officers is physical activity less if <150 minutes/week and sufficient physical activity if ≥150 minutes/week). Assessment of blood pressure measurement based on KMS Posbindu is divided into the good category if the blood pressure value is <140/90mmHg and in the bad category if blood pressure is ≥140/90mmHg.

The data processing in this study used the SPSS 26 program. It was presented as a frequency and percentage table (median/MD and Percentile 25-75/P25-P75) related to respondent characteristics, physical activity, and blood pressure. Bivariate analysis in this study used a chi-square analysis test (p-value > 0.05). Assessment of how significant the role of risk factors (lack of physical activity) in the incidence of disease (hypertension) using relative risk expressed in odds ratio (RO).

3. RESULTS

The characteristics of the research respondents are presented in Table 1. There were 99 (78.6%) female visitors and 27 (21.4%) male participants. The age range of posbindu participants ranged from 22-59 years with a median value of 48 years. The majority of Posbindu participants work as farmers, as many as 83 (65.9%) people with the most educational history being SD/SLTP 111 (88.1%) and the majority of participants with married status are 114 (90.5%) people.

Table 1. Characteristics of PTM Posbindu Participants in the Jenggawah Health Center Work Area, Jember Regency in September-November 2020 (n=126)

Characteristics of Respondents		Md (P25-P75)
Age		48 (41-54) years old
Characteristics of Respondents		**n(%)**
Gender	Male	27 (21.4)
	Female	99 (78.6)
Occupation	Housewife	27 (21.4)
	Trader/Entrepreneur	15 (11.9)
	Employee	1 (0.8)
	Farmer	83 (65.9)
Educational background	Elementary School/ Junior High School	111 (88.1)
	Senior High School	14 (11.1)
	Bachelor degree	1 (0.8)
Marital Status	Married	114 (90.5)
	Widow/widower	12 (9.5)

Md = median/middle value; P25-P75 = 25th-75th percentile; n(%) = total percentage of participants

Bivariate analysis using chi-square test showed a relationship between physical activity and blood pressure in PTM Posbindu visitors ($\chi 2$ = 5.795; p-value 0.016) presented in Table 2. Posbindu PTM visitors with sufficient physical activity can prevent 0.4 times to maintain normal blood pressure (OR = 0.411; 95% CI = 0.198 - 0.863).

Table 2. The Relationship of Physical Activity with Blood Pressure of Posbindu PTM Participants at Jenggawah Health Center, Jember Regency September-November 2020 (n=126)

Physical Activity	Blood Pressure (mmHg)				Total		χ^2 (p-value)	OR	95% CI	
	<140/90		≥140/90						Min	Max
	Amount	(%)	Amount	(%)	Amount	(%)				
Less	25	19.8	28	22.2	53	42	5.795 (0.016)	0.411	0.198	0.853
Sufficient	50	39.7	23	18.3	73	58				
Total	75	59.5	51	40.5	126	100				

4. DISCUSSION

The relationship between physical activity and blood pressure in this study (p-value 0.016) is in line with previous research conducted by Byambasukh et al (2020) which explained that doing strenuous physical activity is associated with lower blood pressure (Byambasukh, 2020). In conclusion, another study by Karim et al (2018) also stated that respondents who did moderate physical activity were more at risk of developing hypertension, while respondents who did strenuous physical activity had only a small risk of developing hypertension.

The results showed that as many as 50 (39.7%) PTM Posbindu participants who had sufficient activity had good BP measurement results (<140/90mmHg) and as many as 23 (18.3%) participants had a sufficient physical activity with poor BP/hypertension measurements (≥140/ 90mmHg). Measurement of poor BP/hypertension in PTM Posbindu participants could occur because the study sample was primarily female, where the prevalence of hypertension was 43 (34.1%) and male (6.3%). This is in line with research conducted by Hardati and Riris (2017) which states that the prevalence of hypertension in women (31.8%) is higher than in men (26.3%) (Hardati & Riris, 2017). Age characteristics of respondents with a median value of 48 years old can also affect blood pressure status. Al Amin (2017) wrote an age category based on the Ministry of Health that the age of 48 includes early old age (45-55 years). Another study also stated that age (p = 0.041) was a significant factor in diastolic hypertension in the elderly due to stiffness in the blood vessels (Kurdi, 2022).

In addition, the results of the BP measurement are good (<140/90mmHg) because the physical activity of the sample is at a sufficient level with the dominant characteristic of the sample working as a farmer. According to Hasanudin et al. (2018), physical activity is one factor that influences reducing the incidence of hypertension din & Perwiraningtyas, 2018). The results of other studies also show that type of work is a protective factor against hypertension, namely civil servants/ National Army /Police/ state-owned enterprises / regional owned enterprises, farmers, fishermen, laborers, entrepreneurs, and other occupational groups (Hardati & Riris, 2017). Besides, changes in blood pressure that can cause hypertension are influenced by several other factors such as smoking, an unhealthy diet, for example, lack of consumption of vegetables and fruit and consumption of

excess sugar, salt and fat, obesity, lack of physical activity, excessive alcohol consumption and stress (Kemenkes RI, 2019).

The OR value in this study was obtained at 0.411, meaning that visitors to Posbindu PTM who have sufficient physical activity prevent hypertension. This is in line with the research argument conducted by Harahap et al (2017) that lack of physical activity can increase the risk of hypertension because of the risk of being overweight. Less activity will cause the heart muscle to work harder with each contraction, so the pressure on the arteries will be even greater (Harahap, 2017).

Based on these findings, health institutions, including nursing can carry out screening programs and health education programs, including diet programs, physical and exercise programs, based on the PTM Posbindu guidebook in handling follow-up and occupational health nursing (OHN) programs to prevent and reduce health problems (Kemenkes RI, 2019). Physical activity programs can be in the form of anti-hypertensive exercise which has been proven to help lower blood pressure more quickly in hypertensive patients in addition to undergoing pharmacological treatment (Anwari, 2018). Families can also take advantage of maintaining family health, especially in the practice of exercise and recreation to improve family health (Subianto, 2023). If exercise and physical activity are included in family activities, it can develop important habits for life. Therefore families can add more physical exercise in recreational activities such as cycling, hiking, swimming, and physically active games (Friedman, 2010).

5. CONCLUSION

This study concludes a relationship between physical activity and blood pressure in PTM Posbindu participants in the work area of the Jenggawah Health Center. With this research, it is hoped that later health workers or local cadres can provide educational information, health promotion, and anti-hypertensive exercise programs that can increase respondents' physical activity under PTM Posbindu.

Further researchers can use primary data to calculate and determine the intensity of daily/weekly physical activity for each Posbindu participant in determining the adequacy of their activities. Future researchers can also consider other factors that may cause changes in blood pressure.

AUTHOR CONTRIBUTIONS

Substantial contributions to conception, data collection, data analysis, and writing: Alfin Maulana. Data analysis, and writing: Tantut Susanto and Hanny Rasni. Data collection: Sofiatul Ma'Fuah. Finishing manuscript: Fahruddin Kurdi.

ACKNOWLEDGMENT

The authors would like to thank the family and health studies research group for facilitating participation in the research group, the Faculty of Nursing at the University of Jember, and the Jenggawah Health Center for facilitating research data collection.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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