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# THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND THE DEGREE OF HYPERTENSION AT THE LONG HEALTH CENTER IN BANDAR LAMPUNG CITY

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**ABSTRACT**

In 2010, the World Health Organization identified hypertension as a major risk factor for disease worldwide and nearly half of all adults have hypertension. In 2016, hypertension was ranked in the top 10 disorders in Lampung Province, especially in Bandar Lampung. Hypertension has many risk factors, one of which is physical activity. Therefore, this study aims to examine the relationship between hypertension and physical activity at the Panjang Health Center in Bandar Lampung City. This study uses a cross-sectional analytic observational methodology. This study used the General Physical Activity Questionnaire (GPAQ) and medical records for data collection. 70 people filled out the questionnaire between December 2021 and April 2022. The results showed that 50 people (75.7%) had grade 1 hypertension, 11 (16.6%) had grade 2 hypertension, and 5 people (15.6%) suffered from grade 3 hypertension. Among the patients with hypertension, 18 people had light physical activity (27.2%). A total of 24 respondents who suffer from hypertension (36.4%) have moderate physical activity. A total of 24 respondents with hypertension (36.4%) were physically active in the heavy category. The Chi-Square statistical test found no significant relationship between the degree of physical activity and hypertension at the Panjang Health Center in Bandar Lampung City (p = 0.261).

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## 1. INTRODUCTION

High blood pressure or hypertension is a frequent health problem in developed countries. Hypertension, especially in Indonesia, cannot be left alone. This is evidenced by the increasing number of hypertension sufferers in the country. Hypertension is a common medical disorder that, if not treated immediately, can lead to significant complications, including involving the cardiovascular system.

In 2010, hypertension emerged as a major health problem impacting people everywhere. The current definition of hypertension is that systolic blood pressure that consistently exceeds 130 mmHg constitutes a medical emergency. As a result, hypertension affects about half of the world's adult population.

An estimated 95% of cases of hypertension have an unknown etiology. Yet, it affects as many as 74.5 million adults in the United States (those 20 years of age and older), according to the *American Heart Association* (AHA). Basic health research conducted in 2018 by the Indonesian Ministry of Health found that hypertension in the country was 34.1% based on blood pressure measurements, while hypertension based on medical diagnoses was 8.4%. This result is higher than Riskesdas (2013) results, which obtained a prevalence of hypertension of 25.8%.

Hypertension has recently been on the rise in younger age groups. This is based on the prevalence of hypertension in Indonesia's young population in 2013: 8.7% at ages 18-24, 14.7% at ages 25-34, and 24.8% at ages 35-44. According to a recent survey conducted in 2018, this figure increased significantly by 13.2% among those aged 18 to 24, 20.1% among those aged 25 to 34, and 31.6% among those aged 25 to 44.

Physical activity reduces the incidence of hypertension by 17%, according to data from the *Coronary Artery Risk Development in Young Adults Study* (CARDIA) based on observations > 15 years. According to the *Atherosderosis Chance In Communities* (ARIC) study, participants who engaged in moderate-intensity physical activity such as walking and cycling had a 34% lower risk of developing hypertension over a 6-

year period. That's why keeping moving is so important; it lowers blood pressure. Weight management is just one part of a larger risk mitigation process. Thirty studies on hypertension found that physical activity lowered blood pressure by an average of 7.1/4.9 mmHg, plasma norepinephrine by 29%, and plasma renin activity by 20%.

In 2016, as many as 230,670 people in Lampung Province were diagnosed with hypertension, making it one of the region's top 10 causes of death that year. The rate of hypertension in Bandar Lampung City is significantly higher than elsewhere in Lampung Province. There are 25,011 people in the city with hypertension; 15,502 of them were women and 9,509 were men. Puskesmas Panjang, Bandar Lampung has a high rate of hypertension, so researchers are interested in examining the relationship between physical activity and the disease.

## 2. LITERATURE REVIEW

### Cardiovascular Health Outcomes

Resting blood pressure and heart rate were measured using an Omron automated digital monitor after at least a 10-minute seated rest period, with measurements on the upper left, bared arm. At least two measurements were taken t 2 minutes, with additional measurements taken if a >5 mmHg difference occurred between the first and second reading in either systolic and/or diastolic blood pressure. Hypertension was defined as systolic or diastolic blood pressure ≥140/90 mmHg. Increased resting heart rate was defined as a heart rate ≥80 b/min based on studies indicating increased cardiovascular and all-cause mortality risks. Participants recruited in the local health clubs completed resting blood pressure and heart rate measures before their exercise in the health club.

Body mass index (BMI) was determined from measured weight and height (kg/m2) using a standard stadiometer and classified into 4 groups: underweight (<18.5 kg/m2), normal weight (18.5–24.9 kg/m2), overweight (25–29.9 kg/m2), or obese (≥30 kg/m2) Waist circumference (cm) was measured at the level of the umbilicus after exhalation. Abdominal obesity was defined as a waist circumference of >102 cm for men and >88 cm for women.

Cardiorespiratory fitness (maximal oxygen consumption in mL/kg/min) was estimated with a non-exercise algorithm incorporating age, BMI, waist circumference, resting heart rate, PA, and smoking status, based on a large longitudinal study in over 11,000 middle-aged adults [18]. This algorithm used to estimate a non-exercise testing cardiorespiratory fitness provides a valid indication of CVD and disease-specific mortality [19]. Low fitness was defined as <10 and <8 METs for 30–39 year old men and women, <9 and <7 METs for 40–49 years, <8 and <6 METs for 50–59 years, and <7 and <5 METs for ≥60 years, respectively, based on earlier studies indicating higher risks of CVD and mortality in people with the corresponding fitness levels. Demographic variables, smoking status, alcohol consumption, dieting for weight loss, and personal history of common chronic diseases were obtained from the medical history questionnaire.

### Physical Activity Measurement

Self-reported PA was assessed using a questionnaire developed based on the International Physical Activity Questionnaire (IPAQ). Using the basic IPAQ format, separate questions were developed to capture both the frequency and duration of moderate aerobic PA, vigorous aerobic PA, and muscle-strengthening PA. Because the goal was to capture the association between health club membership and activity patterns, distinctions were made about whether the activity was performed in a health club setting or as part of their lifestyle using two separate PA sections: 1) PA performed only in the health club and 2) lifestyle PA performed outside the health club. Participants with a health club membership answered both health club and lifestyle PA questions (including occupation, housework, transportation, and leisure-time activities) over the past 30 days. Participants without a health club membership answered only lifestyle PA questions. Examples of health club aerobic activities included treadmill running or cycling. Muscle-strengthening activities included weight lifting using free weights, weight machines, or body weight (e.g., chin-ups or sit-ups). Examples of lifestyle aerobic activities included outdoor running, sports activities, or house cleaning, and muscle-strengthening activities included push-ups, sit-ups, or carrying heavy loads. Additionally, two questions asked about total sitting time on a typical weekday and weekend day for all participants. On average, participants who spent ≥6 hours sitting per day were defined as sedentary, which has been identified as a CVD risk factor.

The items were scored as follows to compute overall activity levels and to determine compliance with the PAG. To calculate the total minutes of aerobic activities, the frequency was multiplied by the duration for each moderate and vigorous intensity activity and summed over all activities. The duration of the vigorous aerobic activity was multiplied by two based on the PAG, indicating that one minute equals

two minutes of moderate activity. The muscle-strengthening activity was calculated as sessions per week. Participants were classified as meeting or not meeting the aerobic and/or muscle-strengthening PAG based on their total minutes of aerobic activities (≥150 minutes/week) and frequency (≥2 days/week) of muscle-strengthening activities. The adaptations and scoring of the items are consistent with IPAQ applications. There were significant Spearman correlation coefficients between total minutes of PA from our questionnaire and estimated cardiorespiratory fitness ($r = 0.43$, $p<0.001$) and resting heart rate ($r = -0.32$, $p<0.001$). Significant relationships between PA levels and these variables are generally expected, thus providing some potential support for the validity of our PA questionnaire.

**Statistical Analyses**

This was a cross-sectional study conducted between April and August 2013. All statistical analyses were conducted using SAS software (version 9.3, SAS Institute Inc; Cary, NC). Descriptive statistics for the two groups were compared using $\chi 2$ tests or t-tests. Multivariable logistic and linear regression analyses were used to evaluate the associations of health club membership with PA and cardiovascular health outcomes and are reported as the odds ratios or beta coefficients (95% confidence intervals). Cardiovascular health outcome analyses were adjusted for age, sex, dieting for weight loss, BMI, disease presence (COPD, asthma, arthritis, diabetes, hypercholesterolemia, or depression), smoking status (current or non-smoker), and heavy alcohol consumption (>14 drinks/week for men, >7 drinks/week for women). All statistical tests were two-sided; $p <0.05$ was accepted to indicate statistical significance.

## 3. METHOD

The research design carried out was observational analytic with a cross sectional approach.

## 4. RESULT AND DISCUSSION

**Characteristics of Respondents**

The total number of respondents who filled out the questionnaire was 70 respondents. A total of 4 respondents did not meet the inclusion criteria and did not fill out the questionnaire completely, so the total sample in this study was 66 respondents.

Table 1. Characteristics of Research Respondents

| Characteristic | Frequency | Percentage (%) |
|---|---|---|
| **Age** | | |
| 30-40 years | 23 | 34,8 |
| 41-50 years | 16 | 24,2 |
| 51-60 years | 15 | 22,7 |
| 61-70 years old | 8 | 12,1 |
| 71-85 years old | 4 | 4 |
| **Gender** | | |
| Woman | 41 | 62,1 |
| Man | 25 | 37,9 |
| **Work** | | |
| Laborer | 15 | 22,7 |
| Self employed | 8 | 12,1 |
| Private Employees | 8 | 12,1 |
| Housewives | 35 | 53 |
| **Education** | | |
| SD | 16 | 24,2 |
| JUNIOR | 18 | 27,3 |
| SMA | 28 | 42,4 |
| D3 | 3 | 4,5 |
| S1 | 1 | 1,5 |
| **History of chronic renal failure** | | |
| Yes | 1 | 1,5 |
| Not | 65 | 98,5 |
| **History of coronary heart** | | |
| Yes | 4 | 6,1 |
| Not | 62 | 93,9 |

| | | |
|---|---|---|
| **History of sleep apnea** | | |
| Yes | 24 | 36,4 |
| Not | 42 | 63,6 |
| **Smoking habits** | | |
| Yes | 15 | 22,7 |
| Not | 51 | 77,3 |
| **Alcohol consumption habits** | | |
| Yes | 1 | 1,5 |
| Not | 65 | 98,5 |
| **Caffeinated drinking habits** | | |
| Yes | 44 | 66,7 |
| Not | 22 | 33,3 |
| **Junkfood consumption habits** | | |
| Yes | 15 | 22,7 |
| Not | 51 | 77,3 |
| **Consumption of hypertension drugs** | | |
| Yes | 17 | 25,8 |
| Not | 49 | 74,2 |
| **Physical Activity** | | |
| Light | 18 | 27,2 |
| Keep | 24 | 36,4 |
| Tall | 24 | 36,4 |
| **Degree of Hypertension** | | |
| Degree of Hypertension 1 | 50 | 75,7 |
| Degree of Hypertension 2 | 11 | 16,6 |
| Degree of Hypertension 3 | 5 | 15,6 |

High activity level 36.4% (n=24), medium level 36.4% c(n=24), mild level 27.2% (n=18). Hypertensive degree 1 75.7% (n = 50). Hypertension degree 2 16.6% c(n=11), hypertension degree 3 15.6% (n=5).

**Relationship between Physical activity with Degree Hypertension**

Table 2 Results Analysis Relationship between Physical Activity with Degree Hypertension in Puskesmas Panjang City Bandar Lampung

| Activity | Grade Hypertension | | | | | | | | P |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | Total | | |
| | N | % | n | % | n | % | n | % | value |
| Light | 14 | 21,2 | 2 | 3,0 | 2 | 11,1 | 18 | 27,2 | |
| Keep | 15 | 22,7 | 7 | 10,6 | 2 | 3,0 | 24 | 36,4 | 0,261 |
| Tall | 21 | 31,8 | 2 | 3,0 | 1 | 1,5 | 24 | 36,4 | |
| Total | 50 | 75,7 | 11 | 16,6 | 5 | 15,6 | 66 | 100 | |

The result of statistical test obtained value p = 0.261 c> 0.05, then can be concluded that does not there is relationship significant between physical activity with degree hypertension in Puskesmas Panjang City Bandar Lampung.

## 5. CONCLUSION

Level activity which is carried out by respondent in Puskesmas Panjang City Bandar Lampung majority level high as much 24 respondents (36.4%), level medium as many as 24 respondents (36.4%), while level Light as much as 18 respondents (27.2% ). Respondent sufferers hypertension in Puskesmas Panjang City Bandar Lampung majority hypertension degree 1 as much 50 respondents (75.7%), hypertension degree 2 as many as 11 respondents (16.6%), and hypertension degree 3 as many as 5 respondents (15.6%). No there is relationship between physical activity with degree hypertension in Puskesmas Panjang City Bandar Lampung.

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