Journal of Epidemiology and Public Health (2024), 09(04): 407-415
Masters Program in Public Health, Universitas Sebelas Maret

Research
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Is Social Capital Associated with Hypertension in Adults Visiting Integrated Health Posts for the Elderly?

Nathanael Aditya Santoso[1)], Argyo Demartoto[2)], Bhisma Murti[1)]

[1)]Master's Program in Public Health, Universitas Sebelas Maret
[2)]Faculty of Social and Political Sciences, Universitas Sebelas Maret

Received: 25 July 2024; Accepted: 15 August 2024; Available online: 16 October 2024

ABSTRACT

Background: Social capital has been shown to play an important role in influencing an individual's health, including the incidence of hypertension in adulthood. Adults with hypertension who usually receive services at elderly posyandu with high strata are less likely to develop hypertension than posyandu with low strata. This study aims to determine the relationship between social capital and hypertension in adults in elderly posyandu.
Subjects and Method: This study is an observational analytical study with a cross-sectional approach conducted in 25 Posyandu Elderly from May 2024 to July 2024 A total of 200 adult research subjects were selected using stratified random sampling and simple random sampling. The independent variable in this study is social capital and the dependent variable is hypertension. Data collection was carried out using a questionnaire. The analysis test in this study is a multilevel model double logistic regression analysis test conducted using the STATA 13 model.
Results: Each increase in one unit of the social capital score will be followed by a decrease in systolic blood pressure of 0.94 mmHg (b= -0.94; 95% CI = -1.48 to -0.40; p= 0.001) and a decrease in systolic blood pressure of 0.32 mmHg (b= -0.32; 95% CI = -0.56 to -0.08; p= 0.008). Each one-year increase in age will be followed by an increase in systolic blood pressure of 0.43 mmHg (b = 0.43; 95% CI = 0.16 to 0.70; p = 0.002) and an increase in diastolic blood pressure of 0.14 mmHg (b = 0.02; 95% CI = 0.26 to 0.70; p = 0.018). There was no difference in systolic blood pressure between men and women (b= -2.84; 95% CI = -8.04 to 2.36; p= 0.284).
Conclusion: Individuals who have good social capital lower the risk of hypertension. Increasing age and gender of women increases the risk of hypertension.

Keywords: Social capital, hypertension, adults

Correspondence:
Nathanael Aditya Santoso. Master's Program in Public Health, Universitas Sebelas Maret. Jl. Ir Sutami 36A, Surakarta, Central Java. Email: nathanaditya111@gmail.com. Mobile: +628585462444.

Cite this as:
Santoso NA, Demartoto A, Murti B (2024). Is Social Capital Associated with Hypertension in Adults Visiting Integrated Health Posts for the Elderly?. J Epidemiol Public Health. 09(04): 407-415. https://doi.org/10.26911/jepublichealth.2024.09.04.01.

BACKGROUND

Hypertension is one of the most important causes of mortality and morbidity that can be treated in the elderly population. In the future, high blood pressure is a risk factor for cardiovascular disease that can be modified. Data from the Framingham Heart Study shows an increase in cardiovascular morbidity due to an increase in systolic or

diastolic pressure in those aged 65 years and older (Renta et al, 2022).

The data on the number of adults in the world is increasing every year. According to data from the United Nations (2020), the world's population of adult communities has touched 727 million people, of which 9.3% of the world's population in 2020, it is estimated that the number of adult populations in 2050 will double to reach 16% of the world's population which is equivalent to 1.5 billion people in the world. In 2021, Indonesia has entered the phase of adult and aging population structure, the adult population in Indonesia touched 29.3 million people, equivalent to 10.82% (BPS Indonesia, 2021). This figure is predicted to continue to increase to 19.9% in 2045 (BPS Indonesia, 2021). In 2020 (Central Java BPS, 2020), the population aged 60 years and above in Central Java Province was 12.22%.

The WHO (2023) states that hypertension or high blood pressure is a serious medical condition that significantly increases the risk of heart, brain, kidney, and other diseases. The incidence of hypertension in the world in 2021 is estimated at 1.28 billion adults aged 30-79 years worldwide suffering from hypertension, most (two-thirds) living in low- and middle-income countries. According to Riskesdas in (Ministry of Health of the Republic of Indonesia, 2021), the prevalence of hypertension in Indonesia is 34.1% and has increased compared to the prevalence of hypertension in the 2013 Riskesdas data of 25.8%. In Central Java, the prevalence of hypertension in 2021 reached 37.57%, in women it was 40.17% higher than in men by 34.83%. In urban areas, the figure is 38.11%, slightly higher than in rural areas, which has a data figure of 37.01% (Central Java Provincial Health Office, 2021).

According to data from the Surakarta Health Profile in 2021, the prevalence of hypertension was found to be 34,917 cases and there has been an increase compared to the number of cases in 2020 of 26,870 cases. Of the 17 health centers in Surakarta, the 3 highest cases of hypertension were obtained at the Sibela Health Center, Gambirsari Health Center, and Nusukan Health Center. High blood pressure often has no signs or symptoms that can make it difficult for individuals to realize that they have it. High blood pressure that is not controlled for a long period of time can lead to serious medical conditions such as heart failure or heart attack, stroke, vision problems, and kidney disease (Alpino and Mehlum, 2023). One of the factors that affect hypertension is social capital. After adjustment, individuals with low social capital have a 35% higher chance of developing hypertension (Renta et al, 2022).

Soemanto et al (2017) said that social capital is a characteristic or resource of society that includes social organization, citizen participation, mutual norms, and mutual trust between community members that facilitate cooperation to achieve mutual benefits in the development of social determinants in the health sector. Social capital has been shown to play an important role in influencing an individual's health, including the incidence of hypertension in adulthood. Adults with hypertension who usually receive services at elderly posyandu with high strata are less likely to develop hypertension than posyandu with low strata. This study aims to determine the relationship between social capital and hypertension in adults in elderly posyandu.

SUBJECTS AND METHOD

1. Study Design

This study is an observational analytical study with a cross-sectional approach, which is observing something in the population at the same time.

2. Population and Sample

The population in this study is adults aged 40-90 years who experience hypertension and are not hypertensive in 25 elderly Posyandu. The sample that will be used in this study is adults in Surakarta with inclusion and exclusion criteria determined by the researcher. Inclusion criteria in the study. The sample was taken from the Puskesmas in Surakarta and for the number of respondents of 200 adults at the Surakarta Posyandu Elderly where 1 Posyandu Elderly took 8 respondents. The sampling technique was simple random sampling. Simple random sampling is a random sampling method from all adults aged 40-90 years who are assumed to have the same chance of being a research sample.

3. Study Variables

The independent variable in this study is social capital and the dependent variable is Hypertension.

4. Operational Definition of Variables

Social capital: The network of relationships, beliefs, norms, and values that exist among individuals, groups, and societies that enable cooperation, interdependence, and the achievement of common goals. Social capital includes various aspects, such as cognitive social capital, relational social capital, structural social capital, communication social capital, bounding capital, bridging social capital, linking social capital.

Blood pressure: Persistent blood pressure where the systolic pressure is >140 mmHg and the diastolic pressure is >90 mmHg.

Stratification of Posyandu: The level of Posyandu is based on the activeness of cadres, health workers, completeness of facilities and infrastructure. The lowest levels in order are, primary, intermediate, full, and independent.

5. Study Instruments

The data collection technique will use a questionnaire given to respondents containing questions to be answered. Data collection was carried out by researchers and researcher enumerators. The researcher enumerator has received an explanation regarding the filling out of the research questionnaire, The instrument to be used is the social capital questionnaire and high blood pressure.

6. Data Analysis

The data were analyzed by univariate, bivariate, and multivariate analysis. The multivariate analysis used in this study is a multilevel analysis. Multi-level analysis is an advanced statistical technique which is an analysis to estimate the factors of variables involving more than one level. Multilevel analysis is useful for improving conclusion drawing and can also be used to study the influence of factors at different levels with the STATA 13 model.

7. Research Ethics

Research ethics include informed consent, anonymity, and confidence. The researcher has received a letter of ethical eligibility from the Ethics Commission of the Yogyakarta Ministry of Health Polytechnic No. DP.04.03/e-KEPK.1/785/2024

RESULTS

The research was conducted on 200 research subjects consisting of adults at the Surakarta Posyandu for the elderly. The results of the study were analyzed using univariate analysis, bivariate analysis, and multivariate analysis. The results of the analysis are as follows

1. Univariate Analysis

Univariate analysis is describing the general data of each variable studied without paying attention to the relationship with other variables. The purpose of univariate analysis is to understand and describe the variables being studied. The results of the analysis are as follows.

Table 1. Univariate analysis of numerical data on the distribution of characteristics of adult age samples in elderly posyandu (continuos data)

Variabel	Mean	SD	Min	Max
Age	67.42	9.40	43	90
Weight	58.71	10.38	35.1	88
Systole	133.99	18.85	95	202
Diastole	79.04	7.99	57	105
Social Capital	22.26	4.80	12	31

Table 1. shows that the average age of respondents was 67.42 years with a minimum age of 43 years and a maximum age of 90 years. The average weight is 58.71 kg with the smallest body weight being 35.1 kg and the largest body weight being 88 kg. Based on the systole variable, the average systole value is 133.99 with a minimum value of 95 mmHg and a maximum value of 105 mmHg. Based on diastole, the average diastole is 79.04 mmHg with a minimum value of 57 mmHg and a maximum of 105 mmHg. Social capital variable, the average is 22.26 with a minimum value of 12 and a maximum of 31.

Table 2. Univariate analysis of categorical data of gender and strata of posyandu (dichotomy data)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	82	41.00
	Female	118	59.00
Integrated Service Post	Madya	15	7.50
Strata	Purnama	87	43.50
	Mandiri	98	49.00

Table 2. showed that the majority of respondents were female as many as 118 people (59%) and most of them were in Posyandu Mandiri as many as 98 people (49%).

2. Bivariate Analysis

Bivariate analysis was carried out to determine the influence of one independent variable with the dependent variable using a correlation test. The relationship is said to be significant if the value of p<0.050. The relationship between risk factors and their impact is seen through the calculation of the Odd Ratio (OR) with a confidence level of 95% in the Confidence Interval (CI). Table 3 shows the results of the analysis of social capital bivariates, sex, and age with systolic and diastolic blood pressure.

Table 3. Results of bivariate analysis of social capital, gender, age with systolic and diastolic blood pressure

Independent Variables	Systolic				Diastolic			
	OR	CI 95%		p	OR	CI 95%		p
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Social capital	-1.19	-1.71	-0.67	<0.001	-0.35	-0.58	-0.12	0.002
Gender	-6.58	-11.86	-1.30	0.015	-0.31	-2.58	1.95	0.786
Age	0.55	0.28	0.82	<0.001	0.17	0.05	0.28	0.004

Table 3 shows that high social capital lowers systolic blood pressure by 1.19 times compared with low social capital (OR: -1.19; 95% CI: -1.71 to -0.67; p<0.001) and high social capital lowers diastolic blood pressure by 0.35 times compared with low social capital (OR: -0.35; 95% CI: -0.58 to -0.12; p: 0.002).

The female gender lowered systolic blood pressure by 6.58 times compared to the male sex (OR: -6.58; 95% CI: -11.86 to -1.30; p: 0.015) and the female sex lowered diastolic blood pressure by 0.31 times compared to the male sex (OR: -0.31; 95% CI: -2.58 to 1.95; p: 0.786).

Older age increases systolic blood pressure by 0.55 times compared with younger age (OR: 0.55; 95% CI: 0.28 to 0.82; p<0.001) and older age increases diastolic blood pressure by 0.17 times compared with younger age (OR: 0.17; 95% CI: 0.05 to 0.28; p: 0.004).

3. Multivariate Analysis

Multivariate analysis to find out which factors have the most influence on systolic and diastolic. Table 4 shows the results of a double linear regression analysis of the relationship between social capital and systolic and dystomy blood pressure, by controlling for the influence of age and gender in adults.

Table 4. Results of multiple linear regression analysis on the relationship between social capital and blood pressure, controlling the influence of age and gender

Independent Variables	Systolic Blood Pressure				Diastolic Blood Pressure			
	Coef. (b)	CI 95%		p	Coef. (b)	CI 95%		p
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Social Capital	-0.94	-1.48	-0.40	0.001	-0.32	-0.56	-0.84	0.008
Gender	-2.83	-8.04	2.36	0.284	0.96	-1.33	3.25	0.410
Age	0.43	0.16	0.70	0.002	0.14	0.02	0.25	0.260
N observation = 200					N observation = 200			
Adjusted R Square = 13.14%					Adjusted R Square = 5.97%			
p = <0.001					p = 0.002			

In Table 4, it shows that there is a negative relationship between social capital and systolic blood pressure which is statistically significant. This means that the higher the social capital score of the community where the adult lives, the lower the systolic blood pressure. Each increase in one unit of social capital score will be followed by a decrease in cytolic blood pressure by 0.94 mmHg (b = -0.94; 95% CI = -1.48 to -0.40; p = 0.001).

There was a positive association between age and systolic blood pressure which was statistically significant. This means that the older you get, the more systolic blood pressure increases. Each one-year increase in life expectancy will be followed by an increase in cytosolic blood pressure by 0.43 mmHg (b = 0.43; 95% CI = 0.16 to 0.70; p = 0.002).

Table 4. showed that women had lower blood pressure on average than men, but the difference was not statistically significant. That is, the probability to conclude that there is no difference in systolic blood pressure between men and women is large (b= -2.84; 95% CI = -8.04 to 2.36; p= 0.284) and also table 4. showed a negative relationship between social capital and diastolic blood pressure which was statistically significant. This means that the higher the social capital score of the community where the adult lives, the lower the systolic blood pressure. Each increase in one unit of social capital score will be followed by a decrease

in systolic blood pressure by 0.32 mmHg (b= -0.32; 95% CI = -0.56 to -0.08; p= 0.008).

The results of this research analysis show that there is a positive relationship between age and diastolic blood pressure which is statistically significant. This means that the older you get, the more systolic blood pressure increases. Each one-year increase in life expectancy would be followed by an increase in diatolic blood pressure by 0.14 mmHg (b = 0.02; 95% CI = 0.260 to 0.70; p = 0.018) and also showed that women had lower blood pressure on average than men, but the difference was not statistically significant. This means that the probability of concluding that there is no difference in systolic blood pressure between men and women is large (b = 0.96; 95% CI = -1.33 to 3.25; p = 0.410).

The suitability of the linear regression analysis model for the sample data of this study is quite low. The independent variables in this double linear regression analysis model together were only able to explain the variation of systolic blood pressure by 13.14% (Adj R-squared = 13.24%). However, the three dependent variables together showed a statistically significant relationship with systolic blood pressure (p <0.001).

The suitability of the linear regression analysis model for the sample data of this study is quite low. The independent variables in this double linear regression analysis model together were only able to explain the variation of diatolic blood pressure by 5.97% (Adj R-squared = 5.97%). However, the three dependent variables together showed a statistically significant relationship with diastolic blood pressure (p= 0.002).

DISCUSSION

The results of the analysis showed that there was a relationship between social capital and systolic blood pressure. Social capital can increase the social support that individuals receive. Strong social support has been shown to reduce stress and lower blood pressure. Social capital can provide a sense of social and psychological stability that can reduce stress factors that contribute to increased blood pressure. In his research, Inoue et al. (2023) There are significant results that show that social capital is closely related to systolic blood pressure in terms of hypertension management, systolic blood pressure control, and even hypertension prevention. The important aspects of social capital are trust, personal empowerment, a strong sense of community and safety, and cooperation. If the social capital aspects are met and run well, it will make it easier for health workers and the community to create a hypertension management program that can control systolic blood pressure in adulthood.

The results of the analysis showed that there was a negative relationship between social capital and diastolic blood pressure which was statistically significant. This means that the higher the social capital score of the community where the adult lives, the lower the systolic blood pressure. Social capital can improve a healthy lifestyle and healthy behaviors that can reduce and prevent hypertension and reduce the number of hypertension cases. In line with research from Harding et al. (2022) that social capital and diastolic blood pressure are related to each other, especially in individuals with hypertension. Individuals with good social capital are also well controlled.

Strong social support can reduce psychological stress that often contributes to increased diastolic blood pressure. Individuals with good social networks tend to have lower levels of stress, which can help control diastolic blood pressure. Involvement in community or social activities can improve

mental and physical health. Research shows that socially active individuals have a lower risk of developing hypertension. Therefore, it is concluded that if a person's social capital value is poor, then systolic blood pressure increases, and vice versa. According to research conducted by Yan et al. (2023) support from the individual's immediate environment can encourage individuals to live a healthy lifestyle and comply with medication. Social capital also contributes to individual resilience. Those who have strong social connections are better able to cope with the challenges associated with hypertension, so they can keep diastolic blood pressure within normal limits.

The results of the analysis showed that women had lower blood pressure on average than men, but the difference was not statistically significant. That is, the probability to conclude that there is no difference in systolic blood pressure between men and women is large. The results of this analysis are not in line with other studies. In the study of Everett and Anna (2015) that gender differences are one of the factors in the incidence of hypertension, it was found that men are statistically higher than women, but there is still a possibility that the opposite can occur where the gender number of women is higher, the systolic blood pressure reaches the hypertension category. Therefore, in Tarik the conclusion is that gender is not a determinant of a person's increased systolic blood pressure.

The results of this study showed that women had lower blood pressure on average than men, but the difference was not statistically significant. That is, the probability to conclude that there is no difference in systolic blood pressure between men and women. The results of this study showed a small and insignificant effect between sex and diastolic blood pressure. Research from Fadlilah et al (2020) revealed, where it appears that those who have an increased risk of diastolic blood pressure are more common in women and women will experience an increased risk of hypertension after menopause, namely over the age of 45 years. Therefore, it is concluded that there is no relationship between sex and blood pressure, the results of the study support the research conducted by Arifin et al. (2016), but there is no meaningful relationship between sex and the incidence of hypertension. This means that the female sex is not a risk factor for hypertension, but a protective factor.

The results of this study showed that there was a positive relationship between age and systolic blood pressure which was statistically significant. This means that the older you get, the more systolic blood pressure increases. Each one-year increase in life expectancy will be followed by an increase in systolic blood pressure. This study is in line with a study conducted by Rockwood et al (2011) which showed a relationship between blood pressure and age for individuals with and without a history of hypertension who did not use blood pressure-lowering drugs. Systolic and diastolic pressure is higher in individuals with a history of hypertension. In untreated hypertensive people, systolic systolic blood decreases with age in those over 85 years of age but increases again above 93 years. In contrast, systolic blood pressure does not show a relationship with age in individuals without hypertension.

According to Aristotle's (2018) research, there is a relationship between age and hypertension. This is because individuals are old and have hypertension since the age of 30 years and above because usually the function of human organs if they get older, their function will weaken and be susceptible to diseases. While only a few young respondents experienced hyperten-

sion, young people can also suffer from hypertension due to a bad diet such as often consuming high-fat foods, genetic factors, obesity, stress and a lifestyle that is not good for health such as rarely exercising can also be the cause of hypertension at a young age.

The results of this study show that there is a positive relationship between age and diastolic blood pressure which is statistically significant. That is, the older you are, the more systolic blood pressure increases. Every one-year increase in life expectancy will be followed by an increase in diastolic blood pressure. This study is in line with research conducted by Zhou et al. (2019) which showed that age has a very significant relationship with diastolic blood pressure. Strengthened by research from Wang et al. (2020) which states that with individuals reaching adulthood where the age is more than 45 years old, they will be more at risk of experiencing an increase in diastolic blood pressure. Therefore, it is concluded that age has a significant relationship with diastolic blood pressure because as individuals get older, the elasticity of blood vessels will decrease and will be more stiff, which will play a role as one of the factors causing increased diastolic blood pressure.

According to Sudaryanto et al (2019), there is a significant relationship between age factors and the incidence of hypertension. Based on the results of data analysis with logistic regression in Sulawesi, it shows that the risk factors related to hypertension are age, gender, occupation, and economic status.

AUTHOR CONTRIBUTION

Nathanael Aditya Santoso is the main researcher who plays a role in collecting study data, formulating articles, and processing data. Argyo Demartoto played a role in the background of its formulation. Bhisma Murti assists in data processing, reviewing articles, formulating learning and discussion frameworks.

ACKNOWLEDGMENT

The researcher would like to thank all parties who have contributed to the preparation of this article, as well as to the database providers Google scholar, PubMed, JEPH, Research gate, Scopus, and ProQuest.

FUNDING AND SPONSORSHIP

This study is self-funded.

CONFLICT OF INTEREST

There was no conflict of interest in this study

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