

The Effect of Hypertension Grade to Cognitive Function in Elderly

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Abstract: **Background:** The incidence of hypertension is found with increasing age. Changes in the structure of blood vessels in hypertension will have an impact on nerve cell function. The degree of hypertension effect in increasing the impaired cognitive function needs to be known. **Objectives:** This study aims to analyze the effect of the degree of hypertension on cognitive function. **Methods:** A cross-sectional study design on 63 elderly people was used in this study. Cognitive function was measured using the Mini-Mental State Examination (MMSE). Univariate and bivariate (chi-square) analyses were used to analyze the effect of blood pressure on impaired cognitive function. **Result:** The results showed that the most of hypertensive patients were male (65.1%), had grade I hypertension (57.1%) and the majority did not have cognitive dysfunction (54%). Analysis of the relationship between the degree of hypertension and cognitive function obtained a significant relationship ($p < 0.05$). **Conclusion:** Based on these results, it can be concluded that there is an effect of the degree of hypertension on cognitive function in the elderly. Further research in other locations needs to be done to get a full picture of the relationship.

Keywords: hypertension, degree, cognitive function, elderly.

INTRODUCTION

Hypertension or high blood pressure is a condition when a person experiences an increase in blood pressure either slowly or suddenly. Persistent hypertension (high blood pressure that does not decrease) is a risk factor for stroke, coronary heart disease, heart failure, and kidney failure. Although the increase in blood pressure is relatively small, it can reduce life expectancy.¹

According to Yugiantoro (2017), 60% of all deaths in the world are caused by hypertension. With increasing age, the incidence of hypertension also increases, so that over the age of sixty the prevalence reaches 65.4%.²

It is estimated that 20% or one in five people in developed countries, such as America, has hypertension. This situation reflects that hypertension in developed countries is the most dominant health problem and requires serious treatment. The high mortality rate due to hypertension has also caused a number of developed countries to be wary of the disease.³

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Based on research conducted by Amalia in 2014 on patients with hypertension at the Internal Medicine Polyclinic, dr. Zainoel Abidin Banda Aceh obtained data for patients with stage 1 hypertension, which was 59,5% higher than those with stage 2 hypertension, which was 40,5%.⁴

Hypertension is one of the risk factors for cardiovascular disease that causes a decrease in cognitive function.⁵ This can occur either with or without a stroke. Hypertensive patients who have had a stroke should be monitored more closely because the risk of causing impaired cognitive function in stroke patients is greater than those who have not had a stroke.

The process of cognitive decline in patients with hypertension begins with the occurrence of pathological changes in the blood vessels of the brain. As a result of these pathological changes, blood perfusion to the brain will be disrupted and will cause abnormalities in brain tissue. In the end, cerebral hypoperfusion will cause a decrease in cognitive function.⁴

Cognitive function is the ability to think rationally, including the process of learning, remembering, assessing, orienting, perceiving and paying attention.⁵

In a study conducted by Pandean & Surachmanto (2016) on hypertensive patients aged 25-75 years at the Internal Polyclinic of RSUP Prof. Dr. R. D. Kandou Manado showed that there was no severe cognitive function impairment. There are only 4.44% who have a moderate cognitive impairment, 35.56% have mild cognitive and as many as 60.00% do not experience cognitive impairment. From all patients in this study, the results were not significant, but when measuring cognitive function in subjects suffering from hypertension for 5 years or more, significant results were obtained for impaired cognitive function.³

Research conducted by Hariadi & Descha (2016) on hypertensive patients found that there was a relationship between the length of time suffering from hypertension and impaired cognitive function in hypertensive patients. In this study, it was found that there were hypertensive patients who had suffered from hypertension for more than 5 years and had cognitive impairment as many as 57 people. Among all hypertensive patients with cognitive impairment, 56 people have probable cognitive impairment and 1 person has definite cognitive impairment.⁶

Some of the studies above focus on the length of time suffering from hypertension on cognitive function disorders. However, based on the theory, it is also found that impaired brain perfusion that occurs due to impaired blood pressure to the brain can also cause impaired cognitive function. For this reason, in this study, the researcher wanted to analyze how the influence of the degree of hypertension in influencing cognitive function disorders.

The correlation test between the degree of hypertension and the respondent's cognitive function through the Chi-Square test found that there was a significant relationship with the value of $p = 0.04$ ($p < 0.05$). This means that there is a relationship between the degree of hypertension with impaired cognitive function.

METHOD

This research is quantitative research with a cross-sectional design. Research respondents were hypertensive patients at the Medan Denai Health Center, totaling 63 people. Respondents taken in this study were required to suffer from hypertension grade 1 and above, have no chronic disease, and be over 60 years old.

Measurement of cognitive function was carried out using a Mini-Mental State Examination (MMSE) questionnaire. The results of the measurement of cognitive function are grouped into 2 categories, namely normal and abnormal cognitive functions. The results of blood pressure measurements are grouped into 2 categories, namely Hypertension Grade 1, and Grade 2.

Relationship analysis was carried out using the Chi-Square test with an acceptable error rate of less than 5% ($p < 0.05$).

RESULT

Univariate analysis was carried out on each research variable to describe these variables. Table 1 shows that of the 63 respondents, 41 people (65.1%) were male, while 22 were female (34.9%). Based on the degree of hypertension category, 36 people (57.1%) suffered from hypertension grades I, and 27 people (42.9%) suffered from hypertension grade II. Of all research respondents, there were 29 respondents (47%) with cognitive impairment and 34 (53%).

The cross table (table 2) shows that the largest group is respondents who suffer from hypertension grade I with normal cognitive function. The second largest group is the group with respondents who suffer from hypertension grade II and have moderate or severe cognitive function disorders.

Table 1. Respondent Characteristic

Variabel (n=63)		f (%)
Gender	Male	41 (65,1)
	Female	22 (34,9)
Hypertension	Grade 1	36 (57,1)
	Grade 2	27 (42,9)
Cognitive Function	Normal	34 (54,0)
	Abnormal	29 (46,0)

DISCUSSION

Gender is thought to influence the incidence of hypertension.⁷⁻¹² Several factors were presented to explain the influence of gender in causing hypertension. Factors of the renal renin-angiotensin system that differ between sexes are believed to cause hypertension.¹⁰ Hormonal factors are also believed to cause differences in the incidence of hypertension in men and women.¹² In women, especially during

menopause, there is a decrease in hormone levels in the body which can increase the risk of occurrence of hypertension. Therefore, in the elderly or at the age of over 60 years the incidence of hypertension is higher in

women compared to men.^{8,11} Even socioeconomic factors and education are believed to influence the incidence of hypertension based on gender.¹²

Table 2. Cross Table of Relation Between Hypertension Grade with Cognitive Function

Variable	Cognitive Function		Total (%)	p*
	Normal (%)	Abnormal (%)		
Hypertension Grade I	23 (36,5)	13 (20,6)	36 (57,1)	0,04
Grade II	11 (17,5)	16 (25,4)	27 (42,9)	
Total	34 (54,0)	29 (45,9)	63 (100)	

*) Chi Square Test

In this study, male patients were taller than females. When looking at the prevalence of hypertension by gender, men have a greater risk of suffering from hypertension than women under 60 years of age. Meanwhile, at the age above 60 years, women have a higher risk of suffering from hypertension than men.¹¹ However, in this study, the majority of patients were male. This could be due to the characteristics of the research location where the most of hypertension sufferers were male.

Patients with grade 1 hypertension were generally found to be more than grade 2, as well as the number of grade 2 patients was higher than grade 1.¹³ The same results were also found in this study, where grade 1 hypertension patients were more numerous than grade 2 hypertension. The progression of hypertension is rare as long as there are no organ disorders that can increase the progression of hypertension.¹⁴ Hypertension that appears at a young age can increase the risk of progression of hypertension. Therefore, if a person is diagnosed with grade 1 hypertension in adulthood, the chances of him developing grade 2 hypertension are very small. But if he suffers from hypertension grade 1 at a young age, then the possibility of hypertension increasing to hypertension grade 2 is very high.

Impaired cognitive function can occur in patients with hypertension.¹⁵⁻¹⁸ The explanation of the process of cognitive impairment in hypertensive patients can be caused by many factors. Age, smoking, diabetes, and stress are believed to cause cognitive dysfunction.¹⁶ These four factors cause hypertension which in turn can interfere with cognitive function.

Impaired cognitive function in hypertensive patients is thought to be due to disturbances in the blood supply to the brain.¹⁷ Deficit of blood flow to the brain triggers neuroinflammation so that it will result in neurodegenerative changes.¹⁸ These changes will eventually disrupt the function of nerve cells. This is what causes the emergence of cognitive dysfunction in patients with hypertension.

In this study, the number of hypertensive patients with impaired cognitive function was not higher than those who did not have cognitive dysfunction. The explanation for this can be obtained from the possibility of controlling blood pressure in patients with hypertension. The use of antihypertensive drugs earlier since the diagnosis of hypertension can reduce the risk of impaired cognitive function.¹⁵

However, the higher the grade of hypertension suffered by a person, the higher the incidence of impaired cognitive function.¹⁹ As was also found in this study, where patients with grade II hypertension will suffer from cognitive dysfunction compared to patients with grade I hypertension. The higher grade of hypertension a person has, then the abnormality in the blood vessels will be higher, so it will cause the possibility of cognitive function impairment will also be higher.

Prevention or treatment of hypertension can reduce the possibility of impaired cognitive function. Blood pressure control and regular consumption of antihypertensive drugs can help prevent cognitive dysfunction.

CONCLUSION

Patients with grade 1 hypertension have a lower probability of experiencing cognitive dysfunction than patients with grade 2 hypertension. Early detection and control of pharmacological and non-pharmacological blood pressure are needed to prevent cognitive dysfunction. Further studies that analyze changes in cognitive function related to increased blood pressure in other health care locations need to be carried out to confirm the results of this study.

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