

## The Relationship Of Hypertension With Increased Intraocular Pressure In Glaucoma Patients In Polyclinics Ambon Vlissingen Eye

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| ARTICLE INFO   | ABSTRACT  |
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| <p><b>Keywords:</b><br/>           Glaucoma,<br/>           Hypertension,<br/>           Increased<br/>           Intraocular Pressure</p> | <p><i>Glaucoma is a progressive optic neuropathy that characterized by optical nerve damage and loss function were of visual field. This is the second leading cause of blindness worldwide. statistic showed 0.5% of Indonesian people suffering from glaucoma and one of the factors that cause glaucoma is hypertension. The purpose of this study was to determine the correlation of hypertension with increased intraocular pressure in glaucoma patients at Ambon Vlissingen Eye Polyclinic, on January of 2018 using analytical descriptive with cross sectional approach. The number of samples were 38 respondents. Data collection was done through observation sheet and interview guide. Data were analyzed by using chi square test. This study shows the value of <math>p = 0.000 &lt; \alpha = 0.05</math> which means that there was a relationship between hypertension with an increasing in intraocular pressure in Ambon Vlissingen Eye Polyclinic. conclusion there was a relationship between hypertension with increased intraocular pressure on Eye Polyclinic Ambon Vlisingen. It is expected that health officer of Eye Polyclinic Ambon Vlisingen in order to improve the quality of service so that morbidity and mortality due to glaucoma and hypertension can be reduced.</i></p> |

### INTRODUCTION

Glaucoma is a progressive optic neuropathy characterized by optic nerve damage and loss of visual field. It is the second leading cause of blindness worldwide and it is estimated that there will be 60.5 million Global people with glaucoma in 2013, rising to 79.6 million by 2020 (Wang et al., 2014a). It has also been predicted that by 2020, 80 million people will have glaucoma, and about 11 million of them will be blind in both eyes. Visual impairment and blindness are still health problems in Indonesia. Based on the results of the World Health Organization (WHO) survey, the main causes of blindness are cataracts (47.8%), glaucoma (12.8%), degenerative-related diseases (8.7%), corneal opacities (5.1%), diabetic retinopathy (4.8%), trachoma (3.6%) and others (17.6%) (Resnikoff et al., 2004).

Asia is estimated to hold nearly half of glaucoma cases worldwide and the number affected is projected to increase considerably over the next 20 years. This is due to the presence of a number of densely populated countries including the two most populous, namely China (estimated population 1.3 billion) and India (estimated population 1.1 billion), which make up a third of the world's population. Indonesia (245 million) is another densely populated and densely populated country in the region that also contributes to Asian glaucoma cases (Shaarawy et al., 2015). The national prevalence of glaucoma is 0.5% (based on respondents' complaints).

Based on the results of a World Health Organization survey (WHO, 3.2 million Indonesians are affected by glaucoma and make this disease the main cause of preventable blindness. Glaucoma can not only be caused without being accompanied by other diseases but can also be caused by local diseases of the eye and systemic diseases. In particular, some epidemiological studies suggest that high systemic blood pressure is associated with a slight elevation of intraocular pressure (Costa et al., 2015). Based on the results of the Rikerdas of Maluku Province on eye diseases showed that the percentage of glaucoma sufferers in Maluku Province was 0.9%, low vision was 2.7%, blindness was 0.5%,.

Hypertension is a condition in which increased blood pressure that gives symptoms that will continue for a target organ such as stroke in the brain, coronary heart disease in the blood vessels of the heart and hypertensive ventricles in the heart muscle (Guyton & Hall, 2014). Every year, 7 million people die from hypertension. Global health problems related to hypertension are felt to be worrying and cause high health costs. In 2000 alone nearly 1 billion people in the world suffered from hypertension and this number is expected to jump to 1.5 billion by 2025. The prevalence of hypertension in Indonesia is around 31.7%, meaning that almost 1 in 3 people aged 18 years and over suffer from hypertension. Based on the Dasaar Health Research of Maluku Province Based on the results of blood pressure measurements, the prevalence of hypertension in residents aged 18 years and over is 29.5%. While hypertension based on the diagnosis of Nakes is 4.1%.

Hypertensive conditions lead to increased sodium retention. Increased sodium retention will cause fluid buildup in the eye that also presses on the optic nerve. This can trigger an increase in intraocular pressure due to fluid buildup and cause loss or visual impairment due to compression of the optic nerve (Langman et al., 2005). Hypertensive conditions caused by changes in epithelial sodium transport in the distal kidney and ciliated epithelium which eventually lead to excessive sodium retention. Increased ciliated epithelial sodium transport causes sodium extrusion toward aqueous humor. This will cause obstruction in the flow of aqueous humor resulting in fluid buildup which will cause an increase in intraoculi pressure (Langman et al., 2005).

Conditions of increased blood pressure will increase blood flow in the eyes (assuming that the patient has experienced hypertension for a long time). After the increase in blood pressure lasts for a long time, there is damage to small blood vessels and increased resistance of flow and reduction of blood flow in the eye accompanied by loss of ganglion cells which will result in flow retention and fluid buildup resulting in an increase in intraoculi pressure (Fraser et al., 2012). Based on research conducted (Manurung et al., 2023) at DR. Soetomo General Hospital Surabaya, found that patients who have suffered from hypertension  $\geq 5$  years are at risk of developing glaucoma by four times greater.

From the results of initial data collection at the Ambon Vlissingen Eye Polyclinic, 55 patients visited in 2014, in 2015 there were 60 people and in 2016 there were 70 people. While the last 6 months data obtained by glaucoma patients who visited as many as 61 people. From interviews with 20 patients, 11 patients claimed to suffer from hypertension. Based on the description above, the researcher wanted to conduct a study to determine the relationship between hypertension and increased intraoculi pressure in Glaucoma patients at the Ambon Vlissingen Eye Polyclinic.

From the background description above, one question can be concluded in this study, namely: Is there a relationship between hypertension and increased intraoculi pressure in Glaucoma patients at the Eye Polyclinic Ambon Vlissingen. The purpose of this study was to determine the relationship between hypertension and increased intraoculi pressure in glaucoma patients at the Ambon Eye Polyclinic Vlissingen. Knowing the frequency of glaucoma sufferers caused by hypertension at the Ambon Vlissingen Eye Polyclinic. Knowing the frequency of increased intraoculi pressure at the Eye Polyclinic of Ambon Vlissingen. Knowing the relationship of hypertension with increased intraoculi pressure in glaucoma patients at the Eye Polyclinic Ambon Vlissingen. The benefits of the results of this study can be used as input and information to optimize measures to prevent glaucoma in patients with a history of hypertension in an effort to prevent blindness.

## METHOD

This study is a descriptive-analytical study with a *cross-sectional* study where this study aims to determine the relationship between hypertension and intraoculi pressure in glaucoma patients by observation and data collection carried out simultaneously or at the same time (*point time approach*) (Notoatmodjo, 2005). This research was conducted at the Ambon Vlissingen Eye Polyclinic This research was carried out from January 23 to February 23, 2018. A population is a group of subjects who share the same traits or characteristics that distinguish them from other groups of subjects. The population in this study is

all patients diagnosed with glaucoma at Ambon Eye Polyclinic Vlissingen. The affordable population of this study is patients who are at least 18 years old who were diagnosed with glaucoma when they came to the Eye Polyclinic Ambon Vlissingen 2017. The population in this study was all glaucoma patients at the Ambon Vlissingen Eye Polyclinic, which was 61 patients.

The sampling method in this study uses purposive sampling techniques, namely the sampling method by selecting samples among the population according to the wishes of researchers who meet the inclusion criteria

based on predetermined characteristics. The sample size in this study is calculated using the minimum sample size formula, as follows:

$$n = N / (1 + N \cdot \text{moe})$$

$$n = 61 / (1 + 61 \cdot 0,01)$$

$$n = 61 / 1,61$$

$$n = 37,8 = 38 \text{ Respond}$$

Information:

n : Sample size

N : Number of population

Moe : Maximum tolerable margin of error (0.01)

Based on the calculation above, the number of samples in this study was 38 respondents. Before taking samples, researchers first carry out inclusion and exclusion criteria that will be used in determining the sample.

**Inclusion Criteria.**

Patients diagnosed with glaucoma, whether they have a history of hypertension or not, by medical personnel at the Ambon Vlissingen Eye Polyclinic. Respondents are aware and can be communicated, for respondents with limited communication can be represented by family who often accompany patients based on patient recognition. Patients aged at least 18 years who were diagnosed with Glaucoma by medical personnel at the Ambon Eye Polyclinic Vlissingen.

**Exclusion Criteria**

Pediatric patients or patients under the age of 18 years who are diagnosed with glaucoma or congenital glaucoma by medical personnel at the Ambon Eye Polyclinic Vlissingen. Patients who have a history of other systemic diseases (example: diabetes mellitus, cataracts and others) and have a history of eye injury. Patients who are not willing to be respondents.

Independent (free) variables are variables that affect or cause changes or the emergence of dependent variavels. The independent variable in this study was hypertension. Dependent variables are variables that are affected or that are consequential. The dependent variable in this study was intraoculi pressure in glaucoma.

Research instruments are tools used by researchers to measure and assess a phenomenon (Dharma, 2014). Obtaining information from respondents, researchers use research instruments in the form of observation sheets by observing and recording blood pressure and intraocular pressure. Researchers also used interview guidelines consisting of 10 questions to find out the patient's condition. Primary data were obtained using the observation sheet provided. This observation is directly by researchers on each patient. Secondary data was obtained from the part of the institution related to the research, namely the Ambon Vlissingen Eye Polyclinic.

Statistical methods for data analysis conducted for this study are:

**1. Statistics Univariate**

The data included in the univariate study are data on the relationship between hypertension and increased intraoculi pressure in glaucoma patients at the Eye Polyclinic Ambon vlissingen. To analyze the data used a computerized program and will be displayed in frequency distribution and in percentage.

**2. Statistics Bivariate**

Knowing the relationship between hypertension and increased intraoculi pressure in glaucoma patients, the selection of statistical tests is determined based on the purpose of analysis and the data scale of each variable. The test used is a chi-square test with a meaning level of 95% ( $\alpha=0.05$ ), so that the statistics  $\rho < 0.05$  then the variable is stated to be significantly related (Dahlan Sopiudin, 2011).

**RESULTS AND DISCUSSION**

The results showed the relationship between hypertension and increased intraoculi pressure in glaucoma patients at the Eye Polyclinic Ambon Vlissingen 2018 presented in table 4.7 below.

Table 1. Relationship of hypertension with increased intraoculi pressure in glaucoma patients at Ambon Eye Polyclinic Vlissingen 2018

| Hypertensive | Increased intraoculi pressure |    | Total | P value |
|--------------|-------------------------------|----|-------|---------|
|              | The                           | No |       |         |
|              |                               |    |       |         |

|       | n  | %    | n  | %    | n  | %    |       |
|-------|----|------|----|------|----|------|-------|
| The   | 18 | 47.4 | 3  | 7.9  | 21 | 55.3 | 0.000 |
| No    | 5  | 13.2 | 12 | 31.6 | 17 | 44.7 |       |
| Total | 23 | 60.5 | 15 | 39.5 | 38 | 100  |       |

Source : Data Primer 2018

In table 4.7 above, based on the results of statistical tests using the chi square test, Ho was rejected with a p value of < 0.05 (P = 0.000), which means that there is a relationship between hypertension and increased intraoculi pressure in Glaucoma patients at the Eye Polyclinic Ambon Vlissingen. This can also be seen from the distribution of respondents who experienced an increase in intraoculi pressure by a percentage (60.5%) and also had hypertension. While 17 respondents did not have hypertension.

**The relationship of hypertension with increased intraocular pressure**

Based on the results of the study, it was found that more respondents were male with a percentage (65.8%). This is in accordance with the results of research conducted by (Zarei et al., 2011) and Souza (2011) which also in his research found more respondents who were male. Based on age, almost all respondents are over 40 years old, namely in the age range of 60-74 years. The same is true for other studies, namely (Chopra et al., 2008), (Zarei et al., 2011), Souza (2011) and Uhm, et al. (2001). This similarity is because according to epidemiological data found more glaucoma sufferers in patients over 40 years (Perdami).

Based on the results of the study showed that the distribution of respondents who experienced an increase in intraoculi pressure with a percentage (60.5%) also experienced hypertension (55.3%). It was found that the number of glaucoma respondents who had increased intraoculi pressure and had a history of hypertension amounted to 18 people (47.4%) while respondents who did not experience an increase in intraoculi pressure and did not have a history of hypertension amounted to 12 people (31.6%). Then as many as 3 people (7.9%) had a history of hypertension but did not experience an increase in intraoculi pressure while respondents who experienced an increase in intraoculi pressure but did not have a history of hypertension as many as 5 people (13.2%).

This is evidenced by the results of the chi square test which shows a p value of < 0.05 (P = 0.000) which means H0 is rejected and Ha is accepted, thus there is a relationship between hypertension and increased intraoculi pressure in glaucoma patients at the Ambon Eye Polyclinic Vlissingen. The same is the case with research conducted by (Leske et al., 2002) It was found that the value of p = 0.01 and the value showed a relationship between hypertension and increased intraoculi pressure in glaucoma patients. During this study, it was found that on average all respondents who experienced increased intraocular pressure carried 5 years and on average all respondents who had hypertension over 5 years. This is also the same as research conducted by Christina Magdalena at DR. Soetomo General Hospital Surabaya also found that patients who have suffered from hypertension ≥ 5 years are at risk of experiencing glaucoma by four times greater. Hypertensive conditions not only increase the risk for heart attack or stroke but can also cause glaucoma. The Baltimore study also showed small-positive results related to glaucoma and systolic-diastolic blood pressure.

Hypertensive conditions caused by changes in epithelial sodium transport in the distal kidney and ciliated epithelium which eventually lead to excessive sodium retention. Increased ciliated epithelial sodium transport causes sodium extrusion toward aqueous humor. This will cause obstruction in the flow of aqueous humor resulting in fluid buildup which will cause an increase in intraoculi pressure (Langman et al., 2005). Conditions of increased blood pressure will increase blood flow in the eyes (assuming that the patient has experienced hypertension for a long time). After the increase in blood pressure lasts for a long time, there is damage to small blood vessels and increased resistance of flow and reduction of blood flow in the eye accompanied by loss of ganglion cells which will result in flow retention and fluid buildup resulting in an increase in intraoculi pressure (Fraser et al., 2012).

Based on hypertension, it shows that respondents in this study who experienced hypertension amounted to 21 people (55.3%) and respondents who did not experience hypertension amounted to 17 people (44.7%). This is different from research conducted by Souza (2010) and Uhm, et al. (2008) which found a greater number of glaucoma sufferers who did not have a history of hypertension. According to (Langman et al., 2005) Hypertensive conditions lead to increased sodium retention. Increased sodium retention will cause fluid buildup in the eye that

also presses on the optic nerve. This can trigger an increase in intraocular pressure due to fluid build-up and cause loss or visual impairment due to compression of the optic nerve.

Based on the increase in intraocular pressure, it showed that respondents in this study who experienced an increase in intraocular pressure amounted to 23 people (60.5%) and respondents who did not experience an increase in intraocular pressure amounted to 15 people (39.5%). Some patients with glaucomatous abnormalities in the optic disc or field of view have intraocular pressure that remains below 21 mmHg. Possible pathogenesis is abnormal sensitivity to intraocular pressure due to vascular or mechanical abnormalities in the caput nervi optici or it could be purely due to vascular disease. Glaucoma with normal intraocular pressure is common in Japan and is genetically related to abnormalities in the optineurin gene on chromosome 10. Studies in glaucoma patients in other countries have shown an association with vasospasm and more common disc hemorrhage and progression of decreased field of view (Vaughan, 2015).

## CONCLUSION

According to the results of the analysis and discussion in answering the objectives and hypotheses of the study, the conclusions that can be drawn in this study are: The frequency of intraocular pressure at the Ambon Vlissingen Eye Polyclinic 23 (60.5%) people increased and 15 (39.5%) people did not increase. The frequency of glaucoma sufferers caused by hypertension at the Ambon Vlissingen Eye Polyclinic was 18 people (47.4%). There is a relationship between hypertension and increased intraocular pressure in glaucoma patients at the Ambon Vlissingen Eye Polyclinic with a p value of  $< 0.05$  ( $P = 0.000$ ).

Based on the results of the research conducted, several suggestions can be given in the form of polyclinics in order to improve the quality of service so that the number of pain and blindness due to glaucoma and hypertension can be reduced. For Educational Institutions, this research is expected to be an input material about hypertension with increased intraocular pressure. For research subjects, this study is expected to improve patient knowledge about Glaucoma and Hypertension. For future researchers This research should be used for insight and knowledge of researchers and can be developed for further research and can be used as a reference in the same research.

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