



Factors Related to Glaucoma Patients at the Main Outpatient Clinic of Medan Eye Center

Okkis Razuansyah Siregar¹, T. Indra Azrial¹

¹Main Outpatient Clinic Medan Eye Center

*Corresponding Author: Okkis Razuansyah Siregar

E-mail: okkis.razuansyah@gmail.com



Article Info

Article history:

Received 19 February 2024

Received in revised form 25

March 2024

Accepted 1 April 2024

Keywords:

Related Factors

Glaucoma

Eye

Abstract

Glaucoma is a condition where eye pressure damage the optic nerve. Usually, high eye pressure will gradually damage the optic nerve fibers, resulting in disruption of the field of vision. Galucoma is the second most common cause of blindness in the world after cataracts. This study aims to determine the factors associated with glaucoma sufferers. The research conducted is analytic in nature with a case control study design that aims to see the relationship of the independent variables. Data obtained from medical records that met the inclusion criteria were 55 medical record data. Because it met the inclusion criteria, all data was used as a research sample (total sampling). The result of this study show that of the 4 risk factors for glaucoma patients, all have a relationship of the occurrence of glaucoma. Calculated Chi-Square value with $p=0,05$, this shows that there is a significant relationship between risk factors for glaucoma sufferers. It is hoped that every health service center will routinely provide education to patients about the importance of regular eye health checks. In order to be able to detect more quickly if you have early symptoms of eye disorders.

Introduction

Glaucoma is the second leading cause of blindness in the world after cataracts. In 2013, the prevalence of blindness in Indonesia at the age of 55-64 years was 1.1%, the age of 65-74 years was 3.5% and the age of 75 years and over was 8.4%. Unlike cataracts, blindness caused by glaucoma is permanent or *irreversible*. This is a challenge in preventing and handling glaucoma cases. Based on data from the *World Health Organization* (WHO) in 2010, it is estimated that as many as 3.2 million people experience blindness due to glaucoma (Okoye, 2021; Senjam, 2020).

Based on sensory health surveys in 1993-1999, it shows that 1.5% of the Indonesian population experiences blindness caused by cataracts (52%), glaucoma (13.4%), refractive errors (9.5%), retinal abnormalities (8.5%), corneal abnormalities (8.4%) and other eye diseases. Based on Basic Health Research in North Sumatra Province, the percentage of glaucoma incidence in 2016 was 0.66%.

Glaucoma is the second leading cause of blindness after cataracts with 60.5 million cases in 2010, estimated to increase to 76.6 million by 2020. Among the number of blindness sufferers, as many as 74% come from the acute primary angle-closure glaucoma form. If early symptoms are known, blindness can be prevented (Stahl, 2020).

Glaucoma is an acquired chronic optic neuropathy characterized by *cupping of the optic disc* and narrowing of the field of view, usually accompanied by increased intraocular pressure. In

most cases, glaucoma is not accompanied by other eye diseases (primary glaucoma) (Jayaram et al., 2023). Increased intraocular pressure is a major risk factor for glaucoma (Jayaram, 2020). Primary angle-closure glaucoma is more common in women than men.

Aquos humor is a clear fluid that fills the front chamber of the eye and the chamber of the back eye. Its volume is about 250 μL , and its formation speed has a variation in journals called 2.5 $\mu\text{L}/\text{min}$. Aquos humor is produced by a ciliary body. After entering the back chamber of the eye, aquos humor through the pupil and into the front chamber of the eye, then to the periphery to the corner of the front eye chamber (Arlt, 1885).

Intraocular pressure is determined by the speed of formation of aquos humor and resistance to its outflow from the eye (Costagliola et al., 2020). The mechanism of increased intraocular pressure in glaucoma is impaired flow of aquos humor due to abnormalities in the drainage system of the front chamber of the eye (open-angle glaucoma) or impaired access of aquos humor to the drainage system (angle-closure glaucoma). Therapy is aimed at lowering intraocular pressure and correcting the underlying cause (Sharif, 2021; Schuster et al., 2020).

Intraocular pressure is lowered by reducing the production of aquos humor or by increasing its outflow, using drugs, lasers, or surgery. Medications, which are usually administered topically, are available to decrease the production of aquos humor or increase the outflow of aquos humor. Surgical creation of drainage system shortcuts in most forms of glaucoma when there is a failure of therapeutic response with drugs (Elwehidy et al., 2022).

Primary open-angle glaucoma, high eye pressure, accompanied by impaired field of vision. Angle-closure glaucoma, attachment of the iris to the peripheral cornea. Chronic angle-closure glaucoma, attachment to the peripheral iris and cornea (*synecia*) with high eyeball pressure. Acute glaucoma, high eye pressure and sudden visual disturbances (Sharif, 2023; Jain et al., 2021).

Based on a preliminary survey at the Medan Eye Center Outpatient Main Clinic, the number of data on glaucoma patients in the period July – December 2023 was 55 patients.

Based on the background above, the author wants to prove how Risk Factors Associated with Glaucoma Sufferers.

Methods

The research conducted is analytical by design *Case Control Study* which aims to see the relationship between independent variables (age, sex, IOP (Intraocular Pressure), previous disease history) with dependent variables (glaucoma) at the Medan Eye Center Outpatient Main Clinic in 2023.

The study was conducted at the Medan Eye Center Outpatient Main Clinic in 2023, Jl. Ir. H. Juanda No.1, Kel. Anggrung, Medan Polonia District, Medan, North Sumatra. The study was conducted from July to December 2023.

The case population in this study was all glaucoma sufferers who visited the Medan Eye Center Outpatient Main Clinic Eye Center from July to December 2023, totaling 55 people. The control population in the study was all patients who visited the Medan Eye Center Outpatient Main Clinic Eye Poly from July to December 2023, which was 2,951 people.

The sample cases in this study were glaucoma patients who visited the Eye Poly of the Medan Eye Center Outpatient Main Clinic from July to December 2023 as many as 55 people (total sampling). The control sample in this study was patients who did not suffer from glaucoma who visited the Medan Eye Center Outpatient Main Clinic Eye Poly from July to December 2023 as many as 55 cases taken by simple random sampling technique.

Operational Definition

Table 1. Characteristics and Measurement Scales of Glaucoma Patients

Variable	Operational Definition	Tools and Ways of Measurement	Measurement Results	Measurement Scale
Glaucoma	Eye damage conditions experienced by outpatients diagnosed with glaucoma based on the results of the doctor's diagnosis recorded on the medical record card.	Medical Record Observation	a. Yes b. Not	Nominal
Age	The patient's age is measured by date, month, year of birth expressed in years and recorded in the status card.	Medical Record Observation	a. <40 years b. ≥ 40 years	Nominal
Gender	The gender of glaucoma sufferers as stated in the medical record.	Medical Record Observation	a. Man b. Woman	Nominal
IOP (Intraocular Pressure)	The pressure produced by the contents of the eyeball against the wall of the eyeball.	Medical Record Observation	a. < 20 mmHg b. ≥ 20mmHg	Nominal
History of the disease	History of previous diseases that have been suffered by glaucoma sufferers so far who are at risk of causing glaucoma.	Medical Record Observation	a. Exist b. None	Nominal

Data Collection Methods

The data used is in the form of secondary data which includes: age, sex, IOP (Intraocular Pressure), and disease history obtained from medical records of glaucoma patients at the Medan Eye Center Outpatient Main Clinic from July to December 2023. The data collected is using secondary data from medical records of glaucoma patients at the Medan Eye Center Outpatient Main Clinic for the period July to December 2023. The data collected is then carried out manual data processing with the following steps:

Checking the completeness of the data that has been collected from medical records, if there are errors and errors in data collection, the data will be checked and corrected. The data is edited, then converted in the form of numbers (certain codes), the response name is converted into a medical record number to facilitate data processing. The cleaned data is then fed into the *Statistical Package for Social Science* (SPSS) computer program. Checking all data that has been entered into the computer avoids errors in data entry. Data storage ready for analysis.

Data Analysis

Data obtained from medical records are displayed in tabular form and arranged based on: Univariate: frequency distribution based on age, sex, occupation and history of the disease in people with glaucoma.

Bivariate: With *chi square* test using analytical statistics and processed with the help of SPSS (*Statistical Package for Social Science*) 22.0 program with interpretation, if $p \leq \alpha(0.05)$ then H_0 is rejected which means there is a relationship between characteristic factors and the incidence of glaucoma, if $p > \alpha(0.05)$ then H_0 is accepted which means there is no relationship between characteristic factors with the incidence of glaucoma and interpretation of OR (*Odds Ratio*), if the OR=1 value, then the characteristic factor is not a risk factor for glaucoma, if the $OR \leq 1$ value, then the characteristic factor is a protective factor for glaucoma and if the $OR \geq 1$ value, then the characteristic factor is a risk factor for glaucoma.

Result and Discussion

Research Results

During the research period from July to December 2023, data were obtained from medical records that had met the inclusion criteria of 55 medical record data. Because it has met the inclusion criteria, all data is used as a research sample.

Univariate Analysis Results

Analysis is carried out for each variable from the results of the study, both *dependent* variables and *independent variables*. The results of each of these variables are displayed in the form of the following frequency distribution table.

Overview of respondents' characteristics by age

The description of the characteristics of respondents based on age in this study is shown in the following table:

Table 2. Overview of respondents' characteristics by age

Age	Frequency (person)	Percentage (%)
<40 years	7	12.7
>40 years	48	87.3
Total	55	100

Based on table 2 above, it shows the distribution of respondents based on age, <41 years old amounted to 7 respondents (12.7%), and >41 years old amounted to 48 respondents (87.3%).

Overview of respondents' characteristics by gender

The description of the characteristics of respondents based on gender in this study is shown in the following table:

Table 3. Overview of respondents' characteristics by sex

Gender	Frequency (person)	Percentage (%)
Man	30	54.5 %
Woman	25	45.5 %
Total	55	100

Based on table 3 above shows the distribution of respondents by gender, men amounted to 30 respondents (54.5%), and women amounted to 25 respondents (45.5%).

Overview of respondent characteristics based on IOP (intraocular pressure)

The description of respondents' characteristics based on work in this study is shown in the following table:

Table 4. Overview of respondent characteristics based on IOP (intraocular pressure)

Intraocular Pressure (IOP)	Frequency (person)	Percentage (%)
< 20 mmHg	18	32.7 %
≥ 20 mmHg	37	67.3 %
Total	55	100

Based on table 4 above, the distribution of respondents based on Intraocular Pressure < 20 mmHg amounted to 18 respondents (32.7%), and intraocular pressure ≥ 20 mmHg amounted to 37 respondents (67.3%).

Description of respondent characteristics based on disease history

The description of respondents' characteristics based on work in this study is shown in the following table:

Table 5. Overview of respondent characteristics based on disease history

History of the disease	Frequency (person)	Percentage (%)
Exist	40	72.7 %
None	15	27.3 %
Total	55	100

Based on table 5 above shows the distribution of respondents based on disease history, there were 40 respondents (72.7%), and there were no 15 respondents (27.3%).

Bivariate Analysis Results

This analysis was used to look at factors associated with glaucoma patients at Medan Eye Center Outpatient Main Clinic in 2023. The statistical test used in this bivariate analysis is *Chi-square* with a 95% confidence degree ($\alpha=0.05$). Based on the results of statistical tests, a probability value (*p-value*) of ≤ 0.05 (at CI: 95%) will be obtained then H_0 is rejected and H_a is accepted which means there is a meaningful relationship and if the probability (*p-value*) > 0.05 then H_0 is accepted and H_a is rejected which means there is no meaningful relationship.

Age Relationship with Glaucoma Sufferers

Table 6 The relationship between age and glaucoma sufferers at Medan Eye Center Outpatient Main Clinic.

Table 6. The relationship between age and glaucoma sufferers

	Glaucoma	Non Glaucoma	Sum	<i>p-value</i>	<i>Odd-Ratio</i>
Risk Factors	N	n	N		
≥ 40	38	10	48	0,000	0
<40	0	7	7		
Total	38	17	55		

Based on table 6 above, it can be concluded that the results of the analysis there is a relationship between the age variable and the glaucoma variable, obtained the *Chi-Square* value calculated with ($p = 0.000 < p = 0.05$), this shows that there is a significant relationship between age and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023 while the OR data obtained a value of 0, this shows that age is a risk factor in people with glaucoma.

Sex relationship with glaucoma sufferers

Table 7. The relationship between sex and glaucoma sufferers at Medan Eye Center Medan Outpatient Main Clinic in 2023.

Table 7. Relationship between sex and glaucoma sufferers

	Glaucoma	Non Glaucoma	Sum	<i>p-value</i>	<i>Odd-Ratio</i>
Risk Factors	N	n	n		
Woman	25	5	30	0,012	4,615
Man	13	12	25		
Total	38	17	55		

Based on table 7 above, it can be concluded that the results of the analysis there is a relationship between the sex variable and the glaucoma variable, obtained a calculated Chi-Square value

with ($p = 0.012 < p = 0.05$), this shows that there is a significant relationship between sex and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023, while the OR data obtained a value of 4.615, This shows that gender is at 4 times the risk of glaucoma.

The Relationship of Intraocular Pressure with Glaucoma Patients

Table 8 Relationship between work and glaucoma sufferers at Medan Eye Center Outpatient Main Clinic in 2023.

Table 8. Relationship between IOP and Glaucoma Patients

	Glaucoma	Non Glaucoma	Sum	p-value	Odd-Ratio
Risk Factors	n	n	N		
< 20 mmHg	32	5	37	0,000	12,800
≥ 20 mmHg	6	12	18		
Total	38	17	55		

Based on table 8 above, it can be concluded that the results of the analysis there is a relationship between the IOP variable and the glaucoma variable, obtained the *calculated Chi-Square* value with ($p = 0.000 < p = 0.05$), this shows that there is a significant relationship between IOP and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023, while the OR data obtained a value of 12,800, this shows IOP is at 12 times greater risk of developing glaucoma.

Relationship of Disease History with Glaucoma Incidence

Table 9 The relationship between disease history and glaucoma incidence in Medan Eye Center Medan Outpatient Main Clinic in 2023.

Table 9. The relationship between disease history and glaucoma sufferers

	Glaucoma	Non Glaucoma	Sum	p-value	Odd-Ratio
Risk Factors	n	n	n		
Exist	32	8	40	0,004	6,000
None	6	9	15		
Total	38	17	55		

Based on table 9 above, it can be concluded that the results of the analysis there is a relationship between the variable history of disease and the variable glaucoma, obtained the *calculated Chi-Square* value with ($p = 0.004 < p = 0.05$), this shows that there is a significant relationship between the history of disease and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023. OR (*Odd Ratio*) data obtained 6,000 with this shows a history of disease at 6 times greater risk of developing glaucoma.

This study was conducted at the Medan Eye Center Outpatient Main Clinic, where research on Factors Associated with Glaucoma Patients at the Medan Eye Center Outpatient Main Clinic in 2023, is still rarely carried out in this area so that it can be a reference basis for other researchers to be used as comparison material in the next study.

The results of univariate data are the distribution of respondents based on age, <40 years old amounted to 7 respondents (12.7%), and >40 years old amounted to 48 respondents (87.3%). The results of univariate data are the distribution of respondents by gender, men amounted to 30 respondents (54.5%), and women amounted to 25 respondents (45.5%). The results of univariate data are the distribution of respondents based on Intraocular Pressure, < 20 mmHg amounted to 18 respondents (32.7%), and > 20 mmHg amounted to 37 respondents (67.3%). The results of univariate data, namely the distribution of respondents based on disease history, there were 40 respondents (72.7%), and there were no 15 respondents (27.3%).

The results of bivariate data can be concluded that there is a relationship between age variables and glaucoma variables obtained by *Chi-Square* calculated values with ($p = 0.000 < p = 0.05$), this shows that there is a significant relationship between age and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023, while the OR data obtained a value of 0, this shows age is a factor in the occurrence of glaucoma.

The results of bivariate data can be concluded that there is a relationship between sex variables and glaucoma variables obtained by *calculating Chi-Square* values with ($p = 0.012 < p = 0.05$), this shows that there is a significant relationship between sex and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023, while the OR data obtained a value of 4.615, this shows that gender is only 4 times the risk of glaucoma.

The results of bivariate data can be concluded that there is a relationship between IOP variables to glaucoma variables obtained by *Chi-Square* values calculated with ($p = 0.000 < p = 0.05$), this shows that there is a significant relationship between intraocular pressure and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023, while the OR data obtained a value of 12,800, this shows IOP is 12 times more likely to develop glaucoma.

The results of bivariate data can be concluded that there is a relationship between the variable history of disease and the variable of glaucoma obtained the *calculated Chi-Square* value with ($p = 0.004 < p = 0.05$), this shows that there is a significant relationship between disease history and glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023.

OR (*Odd Ratio*) data obtained 6,000 with this shows a history of disease at 6 times greater risk of developing glaucoma.

Conclusion

Based on the results of the above research, the following conclusions can be drawn: (1) The average age of glaucoma patients >41 years was 48 (87.3%). Respondents aged <41 years were 7 (12.7%); (2) Most of the respondents were men, amounting to 30 respondents (54.5%), while women amounted to 25 respondents (45.5%); (3) The distribution of respondents who had IOP < 20 mmHg amounted to 18 (32.7%) while IOP > 20 mmHg amounted to 37 (67.3%); (4) The distribution of respondents based on disease history amounted to 40 respondents (72.7%), and none amounted to 15 respondents (27.3%); (5) Of the 4 risk factors for glaucoma patients, all have a relationship, for the occurrence of glaucoma. *Chi-Square* value calculated with ($p = 0.05$), this shows that there is a significant relationship between risk factors for glaucoma patients at the Medan Eye Center Outpatient Main Clinic in 2023.

Suggestion

For the General Public

Attend counseling events to increase knowledge about glaucoma. Grow awareness to control your own health. Control *life style* to avoid glaucoma.

For Health Facilities and Related Agencies

Make approaches to the community to want to control their health regularly. Provide education to every patient who checks health at each health facility to transmit health awareness to the surrounding environment.

For Researchers

Further research needs to be done on the risk of blindness in people with glaucoma.

References

Arlt, F. (1885). *Clinical Studies on Diseases of the Eye: Including Those of the Conjunctiva, Cornea, Sclerotic, Iris, and Ciliary Body*. Blakiston.

- Costagliola, C., Dell’Omo, R., Agnifili, L., Bartollino, S., Fea, A. M., Uva, M. G., ... & Mastropasqua, L. (2020). How many aqueous humor outflow pathways are there?. *Survey of Ophthalmology*, 65(2), 144-170. <https://doi.org/10.1016/j.survophthal.2019.10.002>
- Elwehidy, A. S., Bayoumi, N. H. L., Abdelkader, A., & Badawi, A. E. (2022). Viscotrabeculotomy with anterior chamber irrigation versus Ahmed glaucoma valve implantation for silicone oil glaucoma in the pseudophakic eye. *Arquivos Brasileiros de Oftalmologia*, 86, 223-231. <https://doi.org/10.5935/0004-2749.20230042>
- Jain, N. S., Ruan, C. W., Dhanji, S. R., & Symes, R. J. (2021). Psychotropic drug-induced glaucoma: a practical guide to diagnosis and management. *CNS drugs*, 35, 283-289. <https://doi.org/10.1007/s40263-020-00790-w>
- Jayaram, H. (2020). Intraocular pressure reduction in glaucoma: Does every mmHg count?. *Taiwan Journal of Ophthalmology*, 10(4), 255-258.
- Jayaram, H., Kolko, M., Friedman, D. S., & Gazzard, G. (2023). Glaucoma: Now and beyond. *The Lancet*, 402(10414), 1788-1801. [https://doi.org/10.1016/S0140-6736\(23\)01289-8](https://doi.org/10.1016/S0140-6736(23)01289-8)
- Okoye, R. (2021). *Exploring public health intervention strategies to address barriers and challenges in the prevention of avoidable blindness due to glaucoma in Anambra State, Nigeria* (Doctoral dissertation, Middlesex University).
- Schuster, A. K., Erb, C., Hoffmann, E. M., Dietlein, T., & Pfeiffer, N. (2020). The diagnosis and treatment of glaucoma. *Deutsches Ärzteblatt International*, 117(13), 225. <https://doi.org/10.3238/arztebl.2020.0225>
- Senjam, S. S. (2020). Glaucoma blindness—A rapidly emerging non-communicable ocular disease in India: Addressing the issue with advocacy. *Journal of Family Medicine and Primary Care*, 9(5), 2200-2206.
- Sharif, N. A. (2021). Therapeutic drugs and devices for tackling ocular hypertension and glaucoma, and need for neuroprotection and cytoprotective therapies. *Frontiers in pharmacology*, 12, 729249. <https://doi.org/10.3389/fphar.2021.729249>
- Sharif, N. A. (2023). Identifying new drugs and targets to treat rapidly elevated intraocular pressure for angle closure and secondary glaucomas to curb visual impairment. *Experimental eye research*, 109444. <https://doi.org/10.1016/j.exer.2023.109444>
- Stahl, A. (2020). The diagnosis and treatment of age-related macular degeneration. *Deutsches Ärzteblatt International*, 117(29-30), 513. <https://doi.org/10.3238/arztebl.2020.0513>