Research Article

Incidence of Glaucoma and Diabetes Mellitus at KMU Madura Eye Clinic

Arif A. Al-Qassar[1], Abdulkareem Sh. Mahdi Al-Obaidi[2]

Stikes Ngudia Husada Madura.

I N F O

Corresponding Author:
Arif A. Al-Qassar, Stikes Ngudia Husada Madura.
E-mail Id:
arifaalqassar@gmail.com

A B S T R A C T

This study examined the relationship between glaucoma incidence and diabetes mellitus in 557 patients at KMU Madura eye clinic. The results showed that 36.44% of patients had glaucoma with a diabetes mellitus history, while 63.56% had glaucoma without a history. The Chi-square test showed a significant relationship between glaucoma prevalence and diabetes mellitus, while Fisher test showed a relationship only with Primary Open Angle Glaucoma. The study concluded that diabetes mellitus is a systemic disorder that can trigger glaucoma.

Keywords: Glaukoma,Diabetes Mellitus

Introduction

Glaucoma is derived from the Greek word glaukos meaning bluish green, which gives the impression of this colour in the pupils of glaucoma patients. Glaucoma is a common group of diseases characterised by a characteristic optic neuropathy, which is associated with visual field loss. Very high intraocular pressure is one of the primary risk factors. (Risky N Allorerung, 2015) Glaucoma is the second leading cause of blindness after cataract. Unlike cataracts,

glaucoma is a permanent or irreversible cause of blindness. According to WHO, there were approximately 60.7 million people suffering from glaucoma in 2010, which is estimated to be 79.4 million people by 2020 (KEMENKES, 2015).

Primary glaucoma is divided into two, namely primary open-angle glaucoma and primary closed-angle glaucoma. Primary open angle glaucoma is usually chronic

glaucoma, while primary angle closure glaucoma can be acute or chronic angle closure glaucoma (Yulianti, 2013). Secondary glaucoma is divided into pigmentation glaucoma, exfoliation syndrome, glaucoma due to lens abnormalities, glaucoma due to uve tract abnormalities, glaucoma due to trauma, postoperative, neovascular glaucoma (i.e. due

to diabetes mellitus, retinal central vein occlusion, and intraocular tumours), increased episclera vein pressure, and steroid-induced (Risnandya primanagara, 2016).

One classification of glaucoma is primary open-angle glaucoma. Primary open-angle glaucoma is associated with various vascular and endocrine disorders such as Diabetes Mellitus. This is associated with the blood supply to the optic nerve making it more susceptible to glaucomatous damage (Mitakhur, 2007).

Diabetes Mellitus (DM) is a group of metabolic diseases characterised by excessive blood glucose levels (hyperglycaemia) that occur due to abnormalities in insulin secretion, insulin action, or both. Chronic hyperglycaemia in diabetes is associated with long-term damage, dysfunction or failure of several organs, especially the eyes, kidneys, nerves, heart, and blood vessels (Sumangut, 2013). Diabetes mellitus if not managed properly will cause various chronic complications, both microangiopathy and macroangiopathy. Abnormal cell growth and cell death are the basis of vascular endothelium, vascular smooth muscle cells and renal mesangial cells, all of which cause diabetic vascular complications (Tanoto, 2011). One of the chronic complications of diabetes mellitus is microangiopathy,

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one of which is in the eye. This disorder is associated with blood supply to the glaucomatosus. The blood supply decreases due to blockage in the capillaries which then causes ischaemia in the eye area and optic nerve (Risnandya primanagara, 2016). Based on the description above, the problem found is; Is there a relationship between the incidence of glaucoma and the history of Diabetes Mellitus at KMU Madura Eye Clinic, Bangkalan Regency? The purpose of this study was to determine the relationship between the incidence of glaucoma and Diabetes Mellitus at KMU Madura Eye Clinic, Bangkalan Regency.

Method

(metode ditulis populasi dan sampel serta cara pengambilan dan uji statistic)

This study was conducted with an analytical observational method using a retrospective approach. The study used was a case-control by taking secondary data from the medical records of the KMU Madura Eye Clinic and questionnaires to assess the relationship of diabetes mellitus history to the incidence of glaucoma.

This study was conducted with the Quota Sampling technique which means that the sample is taken on certain considerations made by the researcher himself, based on the characteristics or properties of the population that are already known beforehand until the desired number is met. The total number of respondents was 557 patients. Patient data was taken within a 12- month period starting January 2022 - December 2022. The research data was then analysed using Chi - Square and Fisher's exact statistical tests.

Results

The results of the study based on age frequency obtained glaucoma patients with age ≤ 40 years as many as 98 patients (17%), age 41 - 59 years as many as 176 patients (32%) and age ≥ 60 years as many as 283 patients (51%) as shown in Table 1.

Table 1.Frequency Distribution Based on Age

Age Group (Years)	Frequency	Percentage (%)
≤ 40	98	17
41 – 59	176	32
≥ 60	283	51
-	557	100

The three age groups that the researcher determined were all in the case group, which was glaucoma positive (+). Both in absolute glaucoma, secondary glaucoma, open-angle primary glaucoma, and angle-closure primary glaucoma. However, in secondary glaucoma and primary angle-closure glaucoma, there were no patients in the age group below or equal to 40 years.

Age is associated with tissue ageing, duration of exposure to other risk factors, and duration of illness that can lead to eye problems. This is in accordance with the Canadian Glaucoma Study which found that older age is associated with a risk of worsening visual field with a hazard ratio of 1.04.

The results of the observational analysis showed that 203 patients (36.44%) had glaucoma with a history of diabetes mellitus while 354 patients (63.56%) had glaucoma without a history of diabetes mellitus as shown in Table 2.

Table 2.Frequency Distribution at glaucoma patients with Diabetes Mellitus

Category	Frequency	Percentage (%)
With Diabetes Mellitus	203	36.44
Without Diabetes Mellitus	354	63.56
-	557	100

Based on the results of bivariate analysis to determine how the relationship between the prevalence of glaucoma and history of Diabetes Mellitus, the results of Chi-Square statistical test obtained p value = 0.000 (p<0.05). This indicates statistically that there is an association between the prevalence of glaucoma and the history of Diabetes Mellitus.

The results of the analysis of the type of galucoma of 203 galucoma patients with a history of diabetes mellitus showed that the most commonly experienced galucoma was open-angle glaucoma with 88 patients (44%), the second was closed-angle glaucoma with 57 patients (28%), then absolute glaucoma with 32 patients (16%) and the least was secondary galucoma with 26 patients (12%) as shown in Table 3.

Table 3.Frequency Distribution of Glaucoma Patients with Diabetes Mellitus by Type

Jenis Glaukoma	Frekuensi	Persentase (%)
Open corner	88	44
Closed angle	57	28
Absolute	32	16
Secondary	26	12
-	557	100

From the results of statistical test analysis on the four types of glaucoma, there is only one type of glaucoma that has a p value <0.05, namely Primary Open Angle Glaucoma with Fisher's test, the result of p value = 0.004 (p<0.05) which means that there is an association between Primary Open Angle Glaucoma with a history of Diabetes Mellitus.

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This is in accordance with previous research which states that there is an association between Diabetes and Primary Open Angle Glaucoma. Glaucoma occurs more frequently in patients with diabetes than in the general population. The risk of glaucoma has been reported to be 1.6-4.7 times higher in individuals with diabetes than in non- diabetic individuals. According to the Blue Mountains and Beaver Dam Eye studies, respondents with diabetes had twice the chance of developing glaucoma compared to those without.

In another reference, the prevalence of primary open-angle glaucoma increased 1 to 4 times in patients with a history of diabetes mellitus compared to patients without a history of diabetes mellitus (Supriandi, 2011). Glaucoma prevalence also increases due to age and duration of diabetes mellitus. In a previous study, diabetes mellitus was said to have no significant association with blindness in new primary glaucoma patients. Diabetes mellitus was only associated with primary open-angle glaucoma, not with angle-closure glaucoma (Allorerung, 2015). Pathophysiologically, the mechanism of glaucoma in patients with a positive history of diabetes mellitus is associated with the occurrence of microaneurysms in the retinal blood vessels that will further reduce blood supply, capillary occlusion, angiogenesis, bleeding, and fibrotic tissue formation. Furthermore, it will affect the flow of aquous humour which will gradually increase intraocular pressure and cause glaucoma (Risnandya primanagara, 2016).

Conclusions

The Fisher test results between each type of glaucoma and the history of diabetes mellitus found only Primary Open Angle Glaucoma alone to have a relationship with a p value of 0.004 ($p < 0.05$). The Chi-Square test results between the prevalence of glaucoma and the history of diabetes mellitus showed results of p value = 0.000 ($p \leq 0.05$). Based on the study's findings, it can be said that a history of diabetes mellitus and the prevalence of glaucoma are significantly correlated, with open-angle glaucoma having the highest incidence.

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