JNK

JURNAL NERS DAN KEBIDANAN
(JOURNAL OF NERS AND MIDWIFERY)
http://ojs.phb.ac.id/index.php/jnk

The Duration of Suffering from Diabetes Mellitus did not Correlate with the Occurrence of Cataract

[CA]Ulfa Husnul Fata[1], Shinta Wulandari[2], Anita Rahmawati[1], Wahyu Wibisono[1]
[1]STIKes Patria Husada Blitar, Indonesia
[2]Medika Utama Hospital Blitar, Indonesia
[CA]Corresponding Author

Article Information

History Article:
Received, 03/12/2024
Accepted, 17/04/2025
Published, 22/04/2025

Keyword:
Diabetes Mellitus, Cataracts

Abstract

People with diabetes mellitus are five times more likely to develop cataracts. High blood sugar levels over a long period of time can be one of the complications of cataracts. This was a correlational study with the purpose to determine the correlation between the duration of diabetes mellitus and the occurrence of cataracts in patients with diabetes mellitus at the Internal Medicine Polyclinic of Medika Utama Hospital, Blitar. The population in this study was patients with diabetes mellitus who visited the Internal Medicine Polyclinic of Medika Utama Hospital, Blitar. The sample in this study was patients with diabetes mellitus who visited the Internal Medicine Polyclinic of Medika Utama Hospital within a period of 2 weeks, totaling 56 people. The sampling used an accidental sampling technique. The statistical test used was *chi-square*. The results of this study showed that the p-value was 0.449, which meant that there was no correlation between the duration of diabetes mellitus and the incidence of cataracts. Several actions that can be taken to prevent cataracts are controlling blood glucose levels by obediently taking medication and following a diet. In addition, routine eye checks are useful in preventing cataracts in people with diabetes mellitus.

✉Correspondence Address:
STIKes Patria Husada Blitar – Indonesia
Email: ulfaners@gmail.com
P-ISSN: 2355-052X
E-ISSN: 2548-3811
DOI: https://doi.org/10.26699/jnk.v12i1.ART.p090-097

INTRODUCTION

Visual impairment is a significant global health problem and has a serious impact on human life. Cataracts are one of the main causes of visual impairment in people with diabetes mellitus (DM) (Praja & Machmud, 2023). Cataract disease is a pathological causal factor of the disease process suffered by individuals who have a history of diabetes mellitus (Saherna et al., 2021). The most common cause of blindness and visual impairment worldwide is cataracts, with a percentage of 51% or affecting around 20 million people (Harun et al., 2020). Cataracts are the cause of blindness in Indonesia. Around 77.7% of blindness is caused by cataracts (Kamil et al., 2022). Cataracts are one of the main causes of visual impairment in people with diabetes mellitus (DM). People with DM are five times more likely to develop cataracts due to DM. High blood sugar levels over a long period of time can be a complication of other organs, such as the eyes (F. Damayanti et al., 2024). High blood sugar levels over a long period of time in people with diabetes can be one of the things that influences the emergence of further complications in other organs, such as the eyes. Cataracts are a cloudy lens disorder in the eyeball that causes blurred vision and can eventually lead to blindness (Sari et al., 2018). World Health Organization (WHO) data in 2020 estimated that at least 2.2 billion people have visual impairment or blindness. Cases of blindness in the world as much as 48% are caused by cataracts (Aini & Santik, 2018). The incidence of cataracts in Indonesia is 0.1%/year, which means that every year there are new cataract sufferers among 1000 people (Sari et al., 2018). Every year, visual impairment and blindness in Indonesia increase with a prevalence of 1.5% and make Indonesia the country in Southeast Asia with the highest blindness rate. Indonesian people tend to suffer from cataracts 15 years earlier than people in subtropical areas, around 16 – 22% of patients who undergo surgery are under 55 years old (Virgo, 2020).

Based on the results of the Rapid Assessment of Avoidble Blindness (RAAB) survey in 2014-1016, East Java was declared as the highest contributor to blindness with a value of 4.4% from the age of >50 years, while cataract cases showed a figure of 81.1%. Cataract cases in Blitar showed a total of 708 people. Cases of blindness and cataracts in East Java are in first place in cases of blindness in Indonesia. The percentage of cataract incidence in patients suffering from DM for less than 10 years is 45%, while for DM sufferers for more than 10 years the percentage of cataract incidence increases to 64.5% (Natasia et al., 2024). The prevalence of eye patients with cataracts who come to the Eye Clinic of Medika Utama Blitar Hospital shows an increase. The increase in the number of patients is supported by data from 2022 of 156 patients and data from January to September 2023 of 209 patients. Of these 209 patients, around 106 patients or 50% were cataract patients with type 2 diabetes mellitus.

People with diabetes mellitus have impaired glucose metabolism, which can cause a buildup effect of sorbito lens of the eye. This can cause osmotic changes to hyperosmotic which are water-increasing. This process can increase the risk of cataracts. In patients with a history of diabetes mellitus, it is known that there is an increased incidence of cataracts and people with diabetes mellitus also have a tendency 25 times higher than in patients who do not have a history of diabetes mellitus (Norsela et al., 2023).

It is generally believed that hyperglycemia can stimulate risk factors to accelerate the development of diabetes complications, so the longer the duration of diabetes mellitus in patients, the more progressive the occurrence of cataracts. Uncontrolled blood sugar for 5 years while suffering from diabetes mellitus will increase complications such as cataracts. This means that the cloudiness of the eye lens will occur due to chronic hyperglycemia and can cause cataracts. Another study showed a two-fold increase in the risk of cataract diagnosis as the duration of diabetes also increased. Damage to various organs can be caused by chronic hyperglycemia. In the biochemical process, cell damage occurs as a side effect of hyperglycemia in the retinal nerve tissue, lens and blood vessels (Novia et al., 2023). Until now, there has not been much research on the duration of

diabetes mellitus with the occurrence of cataracts. Therefore, this study is expected to provide information on the correlation between the duration of diabetes mellitus with the occurrence of cataracts.

METHODS

This was a correlational study with the aim to determine the correlation between the duration of diabetes mellitus and the occurence of cataracts in patients with diabetes mellitus at the Internal Medicine Polyclinic of Medika Utama Blitar Hospital. The population in this study were patients with diabetes mellitus who visited the Internal Medicine Polyclinic of Medika Utama Blitar Hospital. The sample in this study was patients with diabetes mellitus who visited the Internal Medicine Polyclinic of Medika Utama Hospital within a period of 2 weeks, totaling 56 people. The sampling technique was accidental sampling. The inclusion criteria used in this study were (1) Type 2 DM patients with eye disease other than cataracts, (2) Patients with physical, mental and cognitive limitations. Data analysis using the *Chi square* test in the SPSS program. Early research was conducted in February - March. This study has passed the ethical feasibility test from STIKes Patria Husada Blitar with No: 06 / PHB / KEPK / 19 / 01.24.

RESULT

Table 1. Distribution of respondents in the Internal Medicine Polyclinic, Medika Utama Hospital, Blitar, February – March 2024.

Variable		Frequency	Percentage
Age	Non risk age (46 – 55 th)	17	30,4
	Risk Age (≥ 35 th)	39	69,6
	Total	**56**	**100**
Gender	Male	23	41,1
	Female	33	58,9
	Total	**56**	**100**
Education	Not graduated from elementary shcool	13	23,2
	Elementary school/equivalen	15	26,8
	Junior high school/equivalen	17	12,5
	Senior high school/equivalen	19	16,1
	Academik/college	12	21,4
	Total	**56**	**100**
Work	Not working	27	48,2
	Laborer	2	3,6
	Farmer	7	12,5
	Self employed/trader	4	7,1
	Privat employee	9	16,1
	Civil servant	2	3,6
	Military	2	3,6
	Others	3	5,4
	Total	**56**	**100**
DM control	Routine	8	14,3
	Not routine	48	85,7
	Total	**56**	**100**
Concumption of DM medication	Disobidient	23	41,1
	Obidient	33	58,9
	Total	**56**	**100**
Dietary compliance	Obidient	35	62,5
	Disobidient	21	37,5
	Total	**56**	**100**

Based on Table 1, it shows that most respondents are at risk age groups, namely 39 respondents (69.6%). Almost half of the respondents are female, namely 33 respondents (58.9%). As many as 19 respondents have a high school education/equivalent with almost half of the respondents not working, namely 27 respondents (46.2%). Some respondents carry out routine diabetes mellitus control, namely 48 respondents (85.7), most are compliant in taking diabetes mellitus medication, namely 33 respondents (58.9%), and most respondents are compliant in carrying out a diet, namely 35 respondents (62.5).

Table 2. Distribution of respondents based on the occurence of cataracts and Long Time Suffering of DM in patients with Diabetes Mellitus at the Medika Utama Hospital, Blitar, February - March 2024.

No	Cataract Incident	Frequency	Percentage
1	Not cataract	29	51,8
2	Cataract	27	48,2
	Total	**56**	**100**
No	**Long Time Suffering of DM**	**Frequency**	**Percentage**
1	**≤ 5 years**	**38**	**67,9**
2	**> 5 years**	**18**	**32,1**
	Total	**56**	**100**

Table 2 shows that almost half of the respondents had cataracts with the number of 27 respondents (48.2%). It also shows that most of the respondents suffered from cataracts for ≤ 5 years, with the number of 38 respondents (67.9%).

Tabel 3. Cross-tabulation of cataract occurence with duration of Diabetes Mellitus at Medika Utama Hospital, Blitar, February – March 2024.

No.	Long Time Suffering of DM	Cataract Incident		Total (%)
		No (%)	Yes (%)	
1	≤ 5 years	21 (72,4)	8 (27,6)	**29 (100)**
2	> 5 years	17 (63,0)	10 (37,0)	**27 (100)**
Total		**38 (67,9)**	**18 (32,1)**	**56 (100)**
Chi-Square Tests				
Exact Sig. (2-sided)		**0,449**		

Table 3 shows that almost half of the respondents are DM sufferers for less than 5 years. The results of the chi square statistical test show a p-value of 0.449 greater than alpha, which means there is no correlation between the duration of DM and the occurence of cataracts in diabetes mellitus sufferers.

DISCUSSION

The results of the statistical test shown in Table 3 with a p-value of 0.449, which means there is no correlation between the duration of diabetes mellitus and the occurence of cataracts. The tabulation results show that 21 respondents with a duration of diabetes mellitus ≤ 5 years did not experience cataracts. Meanwhile, 17 respondents (63%) of patients with a duration of diabetes mellitus more than 5 years also did not suffer from cataracts. Other data in Table 3 shows that most respondents suffer from diabetes ≤ 5 years, namely 38 respondents (67.9%) and most respondents do not suffer from cataracts, namely 29 respondents (51.8%).

The increasing number of diabetes mellitus sufferers has caused an increase in the occurence of diabetic cataracts. The results of a study with 53

diabetic cataract patients at the Gunung Pati Semarang Health Center showed that there was a significant correlation between the duration of diabetes mellitus and the occurence of cataracts. The group of respondents who suffered from cataracts had suffered from cataracts for an average of 9 years, while the average duration of diabetes mellitus for the group who did not suffer from cataracts was around 6 years. Previous research also stated that suffering from diabetes mellitus for ≥ 5 years increases the risk of developing cataracts up to 3.5 times greater than respondents who suffered from diabetes mellitus <5 years. Previous research also stated that the occurence of cataracts in people with diabetes mellitus increased with increasing duration of diabetes ≥ 10 years compared to <2 years with OR = 5.14 (Dhaniswara et al., 2024).

A person's vision can be disturbed if they have high blood sugar levels, especially in people with diabetes mellitus. This is because when a person's blood sugar levels are high, there is a buildup of sorbitol and protein accumulation in the lens of the eye which eventually becomes increasingly cloudy and interferes with vision. where the results showed a significant correlation between blood sugar levels and a person's visual acuity. In addition to high blood sugar levels in people with diabetes mellitus, the use of oral hypoglycemic drugs has been shown to play a role in the formation of cataracts, especially posterior subcapsular cataracts. The use of oral hypoglycemic drugs does not show any correlation with the formation of cortical cataracts. In contrast to oral hypoglycemic drugs, the use of insulin for diabetes mellitus actually has protective properties against posterior subcapsular cataracts but not cortical cataracts. The use of insulin can cause an increase in the occurence of cortical cataracts in people with diabetes mellitus although there is no explanation of the pathophysiology of the correlation between these drugs and cataract formation (Dhaniswara et al., 2024).

People with diabetes mellitus experience impaired glucose metabolism, which causes the accumulation of sorbitol in the lens. This causes changes in the lens osmotic to hyperosmotic and water-binding. This process increases the risk of cataracts (Sumiyati et al., 2017). When viewed from the age data, the majority of respondents, namely 39 respondents (69.9%) are at risk (≥ 35 years). As a person gets older, lens proteins undergo non-enzymatic processes, genetic development that can increase susceptibility to oxidation, changes in the molecular structure of the lens and increased light scattering (Aini & Santik, 2018). The human lens that grows throughout life causes the lens nucleus to be exposed to these influences for a long time and is at risk of oxidative damage. As a result, the transparency of the lens decreases and the lens nucleus becomes stiffer, causing difficulty in the eye's accommodation ability which can worsen the formation of cataracts (Puspitasari et al., 2024). Age can affect a person's health status, where there is a tendency for diseases or health problems at certain ages such as cataracts (Pamungkas et al., 2024).

The results of this study indicate that there is no correlation between the duration of DM and the occurrence of cataracts. The study states that there are several influencing factors, including the majority of respondents are compliant in taking DM medication, and the majority of respondents are routine in following a diet. The study assumes that this can reduce the risk of cataracts in DM sufferers. The data shows that the majority of respondents are in the high-risk age group, namely 39 respondents (69.6%). Age factor cannot be avoided. About 50% of people who reach the age of 60 years have cataract layers in their eyes. Cataracts are the result of the aging process, and aging plays a significant role in decreasing regeneration. As we get older, regeneration becomes more difficult and it can be interpreted that age factor is correlated with the occurrence of cataracts (Dedi et al., 2024). Researchers argue that although the majority of respondents are in the high-risk age category, there are other things that can reduce the risk of cataracts in respondents, namely compliance in taking DM medication and adherence to the DM diet. The majority of respondents were female, namely 33 respondents (58.9%). The estrogen hormone in women affects cataract formation. Ovarian hormones increase radiation-induced cataracts. The

estrogen hormone is responsible for cataract formation (A. E. Damayanti & Christina, 2023). Gender can affect a person's health status, because there are diseases that occur more in certain genders, for example cataracts which often occur in women (Pamungkas et al., 2024).

Researchers argue that there are several research data that may be able to help in increasing the risk of cataracts in DM sufferers, including the fact that most respondents are in the high-risk age category, most respondents are not routinely in DM control, and also most respondents are not working which may lead to reduced activity of the respondents.

A history of diabetes mellitus is considered to have an effect on the occurrence of cataracts, the anaerobic glycolysis pathway is rapidly saturated and glucose chooses the sorbitol pathway. In the sorbitol pathway, glucose is converted into sorbitol by the aldose reductase enzyme (Gapopin, 2017). Sorbitol should be broken down into fructose by the polyol dehydrogenase enzyme, but in diabetes mellitus the levels of this enzyme are low so that sorbitol accumulates in the lens (Maswa et al., 2024). This causes an increase in osmotic pressure which draws aqueous fluid into the lens, thereby damaging the lens structure and causing cloudiness (osmotic theory of cataracts in diabetes mellitus) (Putri et al., 2023). Researchers argue that long-term diabetes mellitus affects the visual acuity of diabetes mellitus patients due to the accumulation of ketones in the blood which causes atherosclerosis, and long-term diabetes mellitus also causes damage to eye vascularization and disruption of cell metabolism and disorders of body organs over a long period of time which results in the accumulation of calcium in the eyes, this calcium is the main cause of cataracts.

CONCLUSION

The results of statistical tests showed that there was no correlation between the duration of diabetes mellitus and the occurrence of cataracts in diabetes mellitus sufferers.

SUGGESTION

The results of this study are expected to be used as study material related to complications in diabetes mellitus patients, namely cataracts. This study can be used as a reference for health workers in hospitals in providing education related to cataract complications that often occur in diabetes mellitus patients

ACKNOWLEGGEMENT

We give our great appreciation to all academicians of STIKes Patria Husada Blitar who have provided support in the implementation of this research, Director of Medika Utama Hospital who has given permission to conduct the research, all respondents who have participated in this research., research team who have assisted in the implementation of the research, and all parties who have assisted in the implementation of this research.

FUNDING

This study used personal funds to cover all of the requirements started from the research until the publication.

CONFLICT OF INTEREST

The authors have no conflict of interest in publishing the article.

AUTHOR CONTRIBUTIONS

The first, second, and third authors contributed in conceiving and designing the analysis, collected the data, performed the data analysis, and writing the paper.. The fourth author responsible in the translation and proof reading the article until publication.

REFFERENCE

Aini, A. N., & Santik, Y. D. P. (2018). Kejadian Katarak Senilis Di RSUD Tugurejo. *HIGIEA*, *2*(2), 295–306, https://doi.org/10.15294/higeia.v2i2.20639

Damayanti, A. E., & Christina, Y. (2023). Hubungan Umur dan Jenis Kelamin Dengan Angka Kejadian Katarak Senilis Di RS Camatha Sahidya. *Zona Kedokteran*, *13*(2),

https://doi.org/10.37776/zked.v13i2.1182

Damayanti, F., Hutaperi, B., Jelmila, S. N., & Ashan, H. (2024). Hubungan Diabetes Melitus Terhadap Penderita Katarak. *Scientific Journal*, *III*(4), 209–220. https://doi.org/10.37776/zked.v13i2.1182

Dedi, Muflih, Maulidan, & Azkar. (2024). Faktor-Faktor Yang Memengaruhi Tingkat Terjadinya Kejadian Katarak Di Rumah Sakit Khusus Mata. *Jurnal Ilmiah Permas: Jurnal Ilmiah STIKes Kendal*, *14*(1), 347–358. https://doi.org/10.32583/pskm.v14i1.1581

Dhaniswara, A., Saubig, A., Nugraheni, A., & Pramono, D. (2024). Hubungan Antara Tingkat Pengerahuan dan Perilaku Tentang Katarak Diabetika Penderita Diabetes Mlitus dengan Kejadian Katarak di Puskesmas Gunung Pati Semarang. *Jurnal Epidemologi Kesehatan Komunitas*, *9*(2), 146–152. https://doi.org/10.14710/jekk.v9i2.16396

Gapopin, A. (2017). HUBUNGAN KEJADIAN KATARAK DENGAN DIABETES MELITUS DI PUSKESMAS TANJUNG HARAPAN , MARGA TIGA , LAMPUNG TIMUR. *Jurnal Mata Optik*, *3*(2), 2022. https://doi.org/doi.org/10.54363/jmo.v3i2.86

Harun, H. M., Abdullah, A. Z., Salmah, U., Epidemiologi, B., Masyarakat, F. K., & Hasanuddin, U. (2020). *Pengaruh Diabetes , Hipertensi , Merokok dengan Kejadian Katarak di Balai Kesehatan Mata Makassar*. *5*(1), 45–52. https://doi.org/10.22146/jkesvo.52528

Kamil, B. I., Wardani, I. S., & Nasrul, M. (2022). Hubungan Diabetes Mellitus Dengan Kejadian Katarak di Poli Mata Rumah Sakit Universitas Mataram Pada Tahun 2020. *Jurnal Kedokteran Unram*, *11*(4), 1153–1156. https://doi.org/10.29303/jk.v11i4.4759

Maswa, U. K., Martiningsih, W. R., & Novitasari, A. (2024). Hubungan Antara Riwayat Diabetes Melitus Degnan Kejadian Katarak Dan Miopia Di RS Panti Rahayu "YAKKUM" Purwodadi. *Medika Kartika: Jurnal Kedokteran Dan Kesehatan*, *7*(2), 188–197. https://doi.org/10.35990/mk.v7n2.p188-197

Natasia, K., Tukan, R. A., Najihah, Wijayanti, D., & Ose, M. I. (2024). Analisis Faktor-Faktor Yang Berhubungan Dengan Kejadian Katarak. *Jurnal Berita Kesehatan*, *17*(1), 1–13. https://doi.org/10.58294/jbk.v17i1.158

Norsela, Faisal, M. A., & Asnawati. (2023). Hubungan Diabetes Melitus Dengan Katarak Pada Pasien Di Poliklinik Mata Rsud Ulin Banjarmasin Periode 2021. *Homeostasis*, *6*(2), 433–440. https://doi.org/10.20527/ht.v6i2.9999

Novia, Wahyuni, I., & Wironegoro, R. (2023). Hubungan Derajat Katarak Dan Durasi Diabetes Melitus Tipe 2 Di Instalasi Rawat Jalan Mata RSUD DR. Soetomo Surabaya. *Jurnal Ners*, *7*(1), 251–259. https://doi.org/10.31004/jn.v7i1.13122

Pamungkas, M., Mahwati, Y., Hartiningsih, S. S., Tusrini, W., Barat, N. T., & Timur, T. (2024). Faktor Risiko Kejadian Katarak. *Jurnal Sehat Masada*, *XVIII*, 59–79. https://doi.org/doi.org/10.38037/jsm.v18i1.460

Praja, I. S., & Machmud, R. (2023). Hubungan Faktor Risiko dengan Kejadian Katarak Senilis di RSUP Dr . M . Djamil Padang. *Jurnal Ilmu Kesehatan Indonesia*, *4*(1), 25–32. https://doi.org/doi.org/10.25077/jikesi.v4i1.1022

Puspitasari, A. Y., Akib, M. N. R., & Maharani, R. N. (2024). Prevalensi Kejadian Katarak dengan Diabetes Mellitus di RS Ibnu Sina Makasar Tahun 2020-2022. *Fakumi Medical Journal*, *04*(02). https://doi.org/10.33096/fmj.v4i2.398

Putri, A. S., Pranoto, E., Rusmaningrum, B. N., & Effendi, R. G. (2023). Hubungan Merokok, Diabetes Melitus Terhadap Kejadian Katarak Pada Pasien Berobat di Rumah Mata. *Jurnal Healthsains*. https://doi.org/doi.org/10.46799/jhs.v4i4.893

Saherna, J., Hadrianti, D., & Misdayanti. (2021). Efektivitas Health education Pada pasien Diabetes Melitus terhadap Pencegahan

Risiko Infeksi Pasca Operasi Katarak. *Jurnal Keperawatan Suaka Insan*, *6*(2), 98–104. https://doi.org/10.51143/jksi.v6i2.291

Sari, A. D., Masriadi, & Arman. (2018). Faktor Risiko Kejadian Katarak Pada Pasien Pria Usia 40 sampai 55 Tahun Di Rumah Sakit Pertamina Balikpapan. *Window Of Health*, *1*(2), 61–67. https://doi.org/10.33096/woh.v1i2.645

Sumiyati, Umami, N., & Simarmata, M. (2017). Pengaruh Diabetes Melitus Terhadap Mata. . . *Jurnal Mata Optik*, *2*(2). https://doi.org/10.54363/jmo.v2i2.36

Virgo, G. (2020). Faktor-Faktor Yang Berhubungan dengan Terjadinya Katarak Senilis Pada Pasien Di Poli Mata RSUD Bangkinang. *Jurnal Ners*, *4*(2), 73–82. https://doi.org/10.31004/jn.v4i2.1116