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Relationship of Age, Gender, Duration of Disease and Retinopathy in Type 2 Diabetes Mellitus Patients

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ABSTRACT

The incidence of diabetes mellitus is increasing every year. Indonesia is ranked fifth country with the highest number of people with diabetes mellitus in the world. One of the complications that often occurs is diabetic retinopathy. This study aims to analyze the relationship between age, gender, duration of diabetes mellitus type 2 and diabetic retinopathy. This research is an analytical observational with a cross-sectional approach. All variable data in this study was obtained from medical records. A total of 91 samples were selected using consecutive non random sampling techniques. The chi square test showed a relationship between age (p=0,044; p<0,05), gender (p=0,040; p<0,05), duration of DM type 2 (p=0,046; p<0,05) and diabetic retinopathy. Age, gender, and duration of DM type 2 are factors that cannot be modified and affects the occurrence of retinopathy diabetic

INTRODUCTION

The International Diabetes Federation states that there are approximately 463 million people aged 20-79 years suffering from type 2 diabetes mellitus (DM) with a mortality rate of 4.2 million people. (IDF, 2019) Complications that occur due to DM affect the morbidity and mortality of DM patients. Diabetic retinopathy is a frequent complication of DM. (Yau et al., 2012) One in four patients with type 2 DM will experience diabetic retinopathy. (Shaniaputri et al., 2022) Diabetic retinopathy can cause permanent blindness. (Wykoff et al. ., 2021) It is estimated that 30% of type 2 DM patients will experience vision-threatening diabetic retinopathy (VTDR). (Nantwich, 2015) As many as 1 in 12 patients with VTDR experience bilateral blindness. (Sasongko et al., 2017).

Several factors can influence the occurrence of diabetic retinopathy in DM sufferers, including age, gender, and length of illness. (Dewi Mulyani & Afgani Ridwan, 2019; Hertapanndika, Sutyawan, & Triningrat, 2020; Yusran, 2017) Previous research by Setyoputri et al showed that DM patients aged 51-60 years and were female were more likely to experience complications of retinopathy. (Setyoputri et al., 2017) The difference was found by Hertapanndika et al who stated that the proliferative type of diabetic retinopathy was more prevalent in males while the non-proliferative type was more many in women. (Hertapanndika et al., 2020) In type 2 DM patients who are over 50 years old, the risk of experiencing diabetic retinopathy is 9.6% and increases by 45.2% in type 2 DM patients who have had DM for more than 10 years. (Leley et al., 2021) These results are different from Wibawa's study which found that DM patients who experienced the most complications of retinopathy were in the long-standing DM group of less than 5 years. (Dewi Mulyani & Afgani Ridwan, 2019).

Diabetic retinopathy is a complication that is often found in patients with type 2 DM and can cause blindness which will cause difficulties in activities of daily living. Based on the explanation above, it was also observed that there were still differences in the results of previous studies regarding the relationship between age, gender, duration of suffering from type 2 DM and the incidence of diabetic retinopathy. This study aims to analyze the relationship between age, gender and duration of DM with the incidence of diabetic retinopathy.

METHOD

This research is an analytic observational study with a cross-sectional design. Secondary data was taken from the medical records of type 2 DM patients who were treated from January 2021 to December 2021 at the Internal Medicine Polyclinic at RSUD Dr. R. Goeteng Taroenadibrata, Purbalingga. Samples were selected using consecutive non-random sampling techniques. The number of samples in this study was 91 people. Statistical analysis used the Chi-Square test with a significance level of 0.05. This research has passed an ethical review from the Faculty of Medicine, Trisaktik University number 138/KER-FK/VII/2022.

RESULTS AND DISCUSSION

In this study, it was found that 24.2% of type 2 DM patients had diabetic retinopathy. These results are similar to the findings by Nasrul et al in their research on the personal community in the city of Mataram. The results of this study showed that 28.36% of type 2 DM sufferers had diabetic retinopathy. (Nasrul et al., 2021) Another study by Wibawa et al at Sangla Hospital Denpasar found as many as 35.1% of type 2 DM patients had diabetic retinopathy. (Made et al., 2018) Findings of lower incidence of diabetic retinopathy compared to national (43.1%). (Sasongko et al., 2017)

The results of this study also showed that most of the subjects with type 2 DM were female (73.6%). This is by RISKESDAS 2018 data which shows that women (1.78%) have more type 2 DM sufferers than men (1.21%). This figure has increased compared to the previous 5 years, namely 1.7% for women and 1.4% for men. (Ministry of Health of the Republic of Indonesia, 2018) Estrogen hormone levels affect the occurrence of type 2 DM. (De Paoli et al., 2021) Women who have experienced menopause have found an increased risk of suffering from type 2 DM. (Yan et al., 2019) Decreased estrogen levels in postmenopausal women are associated with the condition inflammation.

Table 1. Subject Characteristics

Characteristics	Frequency	Percentage (%)
Diabetic Retinopathy		
Yes	22	24,2
No	69	75,8
Long Suffering Diabetes Mellitus		
< 5 Years	23	25,3
5-10 Years	41	45,1
> 10 Years	27	29,7
Age		
< 55 Years	48	52,7
≥ 55 Years	43	47,3
Gender		
Man	24	26,4
Woman	67	73,6

This affects insulin sensitivity. (Abildgaard et al., 2020) Another study by Lionardi D et al stated that there was no correlation between estradiol levels and type 2 DM in women of reproductive age. (Lionardi et al., 2020) In this study, it can be observed that the mean age of female subjects is 55.36 ± 10.153, which is the range of menopause age in women. However, data on the frequency of menopausal women have not been analyzed in this study.

In addition, it was found that most of the subjects had type 2 DM for 5-10 years (45.1%) and were aged <55 years (52.7%). Increasing age can reduce physical strength and defenses, causing various diseases and complications. The largest number of complications for diabetics in the world occurs at the age of 45-64 years and especially at the age of over 55 years. (Ilery et al., 2014) Data on the frequency distribution of subject characteristics can be observed in Table 1.

This study found that the group of subjects who had type 2 DM for > 10 years was the largest group with diabetic retinopathy (40.7%) with p = 0.046. This shows that there is a relationship between the duration of suffering from type 2 DM and the incidence of diabetic retinopathy. In addition, it is also seen that the longer a patient suffers from type 2 DM, the greater the incidence of diabetic retinopathy. These results are consistent with those presented by Martins R et al that the prevalence of all diabetes complications mellitus will increase rapidly after > 15 years of diagnosis of diabetes mellitus. > 10 years. (Primaputri et al., 2022) Unlike the results in this study, Mulyani D et al found that diabetic retinopathy was most commonly found in patients who had been diagnosed with type 2 DM within < 5 years. (Dewi Mulyani & Afgani Ridwan , 2019) In this study, many groups with long-standing type 2 DM <5 years also suffered from hypertension. Hypertension is known to be one of the risk factors associated with diabetic retinopathy complications in type 2 DM patients. (Liu et al., 2020; Tilahun et al., 2020)

Age as a factor that influences the incidence of diabetic retinopathy can also be observed from the results of this study (p = 0.044). The age group ≥ 55 years who suffered from diabetic retinopathy (34.9%) was greater than the group < 55 years who suffered from diabetic retinopathy (14.6%). These results are similar to those presented by Mulyani D et al that the greatest age of DM patients with complications of retinopathy diabetes is aged 45-64 years.

Table 2. Relationship Between Age, Sex, Duration of Type 2 DM and Diabetic Retinopathy

Characteristics	Diabetic Retinopathy				Total		*p-value*[a)]
	Yes		No				
	N	%	N	%	n	%	
Age							
<55 Years	7	14.6	41	85.4	48	52.7	**0,044***
≥ 55 Years	15	34.9	28	65.1	43	47.3	
Gender							
Man	10	41.7	14	58.3	24	26.4	**0,040***
Woman	12	17.9	55	82.1	67	73.6	
Long Suffered DM type 2							
<5 Years	5	21.7	18	78.3	23	25.3	**0,046***
5-10 Years	6	14.6	35	85.4	41	45.1	
>10 Years	11	40.7	16	59.3	27	29.7	

Description: *p<0.05

(Dewi Mulyani & Afgani Ridwan, 2019) this study, the relationship between gender and diabetic retinopathy (p=0.040) could also be observed. The male sex group with diabetic retinopathy (41.7%) was greater than the female sex group with diabetic retinopathy (17.9%). The findings in this study are research by Cherchi S et al. The number of men with type 2 DM who have diabetic retinopathy is significantly greater than that of women. (Cherchi et al., 2020) Another study by Setyoputri et al showed that women had more diabetic retinopathy (64%). (Setyoputri et al ., 2017) Different results may be due to differences in the subjects studied. In this study, all subjects were type 2 DM sufferers who had experienced diabetic retinopathy. In this study, in terms of the total number of patients with diabetic retinopathy, there were more female patients (12 subjects) than male patients (10 subjects).

The findings in this study indicate that age, gender, and length of illness are factors that cannot be modified and influence the occurrence of complications of diabetic retinopathy. In the group of patients with type 2 DM who are older, male and have had type 2 DM for > 10 years, special attention is needed, especially to control modifiable diabetic retinopathy risk factors. Modifiable risk factors for diabetic retinopathy that have not been studied in this study are uncontrolled hypertension, high blood glucose and HbA1c levels, and obesity. (Hasan et al., 2023; Liu et al., 2020; Sun et al., 2021)

CONCLUSION

Diabetic retinopathy complications occur in more than a quarter of type 2 DM patients. Age, gender and length of illness are factors associated with the incidence of diabetic retinopathy complications in type 2 DM patients.

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