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# Analysis Of Risk Factors For Diabetic Retinopathy: Literature Review

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**ABSTRACT**
Diabetes mellitus (DM) is a global epidemic and affects populations in both developing and developed countries, with varying levels of health care and resources. different. DM is a chronic disease and generally degenerative in nature which if not treated properly will cause various complications. Diabetic Retinopathy (DR) is the main complication of Diabetes Mellitus (DM) which is the main cause of blindness. Objective: This literature aims to analyze the risk factors for the occurrence of retinopathy. diabetic. Method: This research uses literature method review , a scientific article or journal downloaded from PubMed , Garuda Portal, and Google Scholar with SINTA IV and V standards in the time span 20 20 -202 4. The keywords in this article search are Diabetic Retinopathy and risk factors. Results: In this literature, it was found namely 20 research articles that report risk factors for the occurrence of retinopathy diabetic. Conclusion: There are several risk factors for retinopathy. Diabetic, namely high cholesterol levels, high blood pressure, being pregnant, smoking habits, and blood sugar levels that are not well controlled.



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## INTRODUCTION

Diabetes mellitus (DM) is a global epidemic and affects populations in both developing and developed countries, with varying levels of health care and resources. different (Dalillah, 2024). Diabetes occurs due to impaired insulin secretion, insulin function or both which cause disruption in the metabolism of glucose, protein and fat (Ila, 2023).

This disease is one of the catastrophic diseases because it has a high prevalence and incidence every year throughout the world. In 2015, around 415 million adults in the world or around 8.5% of the world's population suffered from diabetes. The prevalence of diabetic retinopathy in Indonesian adults with Type 2 diabetes mellitus is 43.1% (mild and moderate NPDR, and severe 9.41%, 7.46%, 11.1%, and 12.1%, respectively).) (Primaputri , 2022).

Complications in DM are divided into two broad categories, namely macrovascular and microvascular complications. Macrovascular complications include diseases of the cardiovascular system, cerebrovascular and peripheral blood vessels. Microvascular complications are complications that occur in small blood vessels such as diabetic retinopathy and diabetic nephropathy (Hana, 2023).

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Diabetic Retinopathy (DR) is a major complication of Diabetes Mellitus (DM) which is the main cause of blindness. (Deviyana, 2024). Diabetic retinopathy is the most common cause of blindness found in adults between 20 and 74 years of age, where diabetic patients have a 25 times greater risk of experiencing blindness than non-diabetics (Rohaya, 2023).

Globally, the prevalence of diabetic retinopathy is 34.6%. Then, in other countries such as Africa and Ethiopia after analyzing various hospital-based studies, the prevalence was 31.6% and 19.48%. In Indonesia, diabetic retinopathy is the second most common complication after diabetic nephropathy, which has a prevalence of 43.1% (Purnama, 2023)

Diabetic Retinopathy is divided into two types, namely Non-Proliferative Diabetic Retinopathy and Proliferative Diabetic Retinopathy. NPDR type Diabetic Retinopathy is characterized by weakening of the blood vessels in the retina. In certain cases, there is leakage of fluid to the blood in the retina. The blood vessels appear enlarged with irregular vessel edges. If the condition of blood vessel damage in the retina worsens, NPDR type Diabetic Retinopathy can become PDR type. Blood vessel damage in the PDR type causes abnormal branching of new blood vessels in the retina so that the process of normal fluid circulation in the eye is disrupted. The eyeball will get high pressure (Esmiralda, 2023).

The development of DM into diabetic retinopathy can be prevented by avoiding risk factors that can cause complications. Prevention of diabetic retinopathy consists of primary and secondary prevention. Primary prevention is to reduce the incidence of diabetic retinopathy in DM patients by increasing awareness and knowledge, modifying lifestyle, and routine early screening. Meanwhile, secondary prevention is to reduce the development of diabetic retinopathy in DM patients who have been diagnosed with diabetic retinopathy by controlling blood sugar, blood pressure, and routinely undergoing screening (Purnama, 2023).

Based on description in on, seen that the incidence of diabetic retinopathy is still high. Therefore, it is necessary done studies literature so that can made a conclusion from various researchesThis is what makes researchers interested in conducting this *literature review.* Literature *review* This aiming For analyzing risk factors for diabetic retinopathy.

## METHOD

This study uses a literature review method. Literature is obtained by means of reviewing scientific articles or journals downloaded from PubMed, Garuda Portal and Google Scholar with SINTA IV and V standards. Articles are screenedbased on the provisions, including articles published in 2020 - 202 4 , article Which published can downloaded in a way *full text* And own access open, articlewith design qualitative and quantitative Which researched with the title analysis of risk factors for diabetic retinopathy. Keywords in the article search include risk factors and diabetic retinopathy.

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## RESULTS AND DISCUSSION

| No | Writer | Objective Study | Location | Amount Sample | Design Study | Results |
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| 1. | Yuying Hou, MD , Yitong Cai, MD , Zhumin Jia, BS , Suling Shi, BS (202 0) | This research aims tolook at the risk factors associated with diabetic retinopathy. | In China | - | *Literature review* | Research result shows 11 factors that influence that is age next , type sex male , duration of DM, insulin treatment , glucose blood fasting , glucose 2 - hour postprandial blood , glycoside hemoglobin A1c [HbA1c], total cholesterol [TC], triglycerides [TG], mass body [BMI], pressure blood systolic. |
| 2. | Musokeri Tatenda Lewis, Wani Mena, Maibouge Tanko Mahamane Salissou (2022) | To determine the prevalence of diabetic retinopathy and its relationship with hypertension, age, gender, and fasting blood glucose levels. | Highland Eye Eye Clinic , Zimbabwe | 135 | *Retrospective* | Average age of subjects study This is 60.8±14 years with subject Woman more from half of the total amount subjects (58.5%). Four tens four percent experience excess weight (BMI 25-30), 34.8% experienced obesity , and prevalence retinopathy diabetic in a way overall is 31.1% ( renopathy) non- proliferative diabetic , 20%; renopathies proliferative , 11.1%). The proportion subject with retinopathy increase along with duration of DM, namely 23.3% in those who had DM duration is less of 10 years and 46.6% in those who had DM duration longer from 10 years. Age and hypertension in a way |

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| | | | | | | significant relate with existence retinopathy diabetic (p<0.05) in analysis univariate , but No There is identified relationships between retinopathy and glucose blood fasting (chi-square test, p = 0.0965). |
| 3. | Nisa Khoirun Nafia, Trilaksana Nugroho. (2021) | This study aims to determine the risk factors associated with the occurrence of diabetic retinopathy in patients with type 2 DM. | Health Center Mount Pati | 43 | Observation al analytic | There is a significant relationship between blood sugar control (p=0.014) and the incidence of diabetic retinopathy in patients with type 2 DM. Uncontrolled blood sugar is the most dominant risk factor for diabetic retinopathy and has a 13 times greater chance of suffering from RD among other factors in this study. |
| 4. | Jeong, Ihn Sook , Kang, Chan Mi (202 2 ) | This study aimed to investigate the prevalence and risk factors of diabetic retinopathy (DR) in patients with diabetes mellitus (DM) using the 7th Korean National Health and | Korea | 549 & 849 | *Analysis study* | Results this research The prevalence of DR was 25.87% in Group 1 and 20.14% in Group 2. Risk factors for DR were identified as insulin therapy (Group 1: OR=5.31, Group 2: OR=5.27), duration of DM >10 years (Group 1: OR=2.20, Group 2: OR=3.10), and systolic blood pressure >140 mmHg (Group 1: OR=2.26, Group 2: OR=2.23) for both |

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| | | Nutrition Examination Survey (2017~2018). | | | | groups. |
| 5. | Naufallah Dinda Harumi, Ramzi Amin (2020). | This study aims to investigate the risk factors for diabetic retinopathy (DR). | at Dr Mohammad Hoesin General Hospital Palembang | 50 | *Analytic observational descriptive* | There was a significant relationship between HbA1C levels (p value = 0.050) with PR value = 1.463 and total cholesterol (p value = 0.038) with PR value = 1.667 for diabetic retinopathy. |
| 6. | The 2018 film adaptation of the novel by Aldiana Halim, Syumarti, Mayang Rini, Nina Ratnaningsih, Erwin Iskandar, Iwan Sovani, Rova Virgana, Muhammad Rinaldi Dahlan (2022) | Our study aimed to determine the prevalence and factors associated with DR among people with type 2 diabetes based on DR screening integrated with Prolanis in Greater Bandung, Indonesia. | in Greater Bandung, Indonesia. | 4.251 | *Retrospective* | The overall age-specific prevalence of DR was 30.7% (95% CI: 28.7%-32.8%) and sight-threatening DR 7.6% (95% CI: 6.5%-9.0%). The following factors were associated with a higher prevalence of each DR: age 50+ (OR: 1.37; 95% CI: 1.05-1.77), duration of diabetes five to ten years (OR: 1.38; 95% CI: 1.11-1.71) and more than ten years (OR: 1.40; 95% CI: 1.13-1.73), and postprandial blood glucose 200 mg/dl or higher (OR: 1.27; 95% CI: 1.03-1.52). The following factors were associated with a higher prevalence of sight-threatening DR: diabetes duration of five to ten years (OR: 2.01; 95% CI: 1.39-2.91) and more than ten years |

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| | | | | | | (OR: 1.86; 95% CI: 1.28-2.71), postprandial blood glucose 200 mg/dl or higher (OR: 1.52; 95% CI: 1.05-2.21) and systolic blood pressure 180 mmHg or higher (OR: 2.67; 95% CI: 1.16-6.17). |
| 7. | Vu Van Nga, Nguyen Thi Binh Minh, Dinh Thi My Dung, Nguyen Thi Lan Anh, Nguyen Cong Huu, Bui Thi Van Anh, Nguyen Xuan Hiep, Hoang Thi Thu H, Tran Van Khanh, Vu Thi Thom, Le Ngoc Thanh (2023). | Our study aims to determine the risk factors and clinical features associated with diabetic retinopathy in Vietnamese patients with type 2 diabetes mellitus. | Department of General Internal Medicine - E Hospital and Vietnam National Eye Hospital | 140 | *Case control* | DR patients had significantly higher age, RBC, Hb, eGFR, uric acid, and blood creatinine levels than patients without DR. Duration of diabetes mellitus more than 15 years was associated with an 8.319-fold increased risk of DR. In conclusion, age, RBC, Hb, eGFR, uric acid, creatinine levels and duration of diabetes mellitus more than 15 years are risk factors for DR. |
| 8, | Tiara Shaniaputri , Erwin Iskandar, Angga Fajriansyah (2022). | This research aims to find out epidemiological data in the form of prevalence of diabetic retinopathy in Bandung Raya which is expected to provide | Health Centers in Greater Bandung | 1,835 | *descriptive* | This study showed the prevalence of diabetic retinopathy and VTDR of 19.46% and 7.68% respectively. The prevalence was higher in women. Patients with a duration of DM of 10 years and GDS and GDP levels of 200 mg/dl had the highest prevalence. Based on blood pressure examination, the highest prevalence was in patients with SBP 140 mmHg and |

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| | | a contribution in the prevention and management of retinopathy better and more effective diabetic. | | | | TDD <90 mmHg. |
| 9. | English: Aisyah Primaputri, KSri Irmandha, Marzelina Karim, Prema Hapsari, Zulfiyah Surdam, Rismayanti, Paulus, Ade Rahmy Sujuthi (2022). | This study aims to determine the relationship between the type of *diabetic retinopathy* with the duration of *diabetes mellitus* and HbA1C levels. | RSP. Unhas | 83 | *Quantitative observational analytic* | The results of this study were dominated by patients aged 50-54 years (26.5%). This study also showed that HbA1C levels were dominated by > 9.0% (43%) with a long duration of <5 years (51%). The type of retinopathy that dominated was PDR (68%). |
| 10. | Karisman, Sri Irmandha K, Meriam Malind, Ratih Natasha M, Ardiyanto (2024). | The aim of this study was to determine the prevalence of diabetic retinopathy at JEC-ORBITA Makassar in 2022. | JEC ORBITA Makassar | 882 | *analytic observational* | Patients with male gender were 354 people (40.1%) and female gender were 528 people (59.9%). In terms of age, age ≤ 30 years were 8 people (0.9%), age 31-40 years were 37 people (4.2%), age 41-50 years were 196 people (22.2%), age 51-60 years were 388 people (44.0%), age > 60 years were 253 people (28.7%). In terms of diagnosis, Proliferative Diabetic Retinopathy was 472 people |

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| | | | | | | (53.5%), Non-Proliferative Diabetic Retinopathy was 410 people (46.4%). The prevalence of patients with Proliferative Diabetic Retinopathy was higher, namely 472 (53.5%) and Non-Proliferative Retinopathy was 410 (46.5%). The highest prevalence of diabetic retinopathy patients is in the 41-50 year age group (44.0%). |
| 11. | Veronika Puteri, Naima Lassie, M. Nurhuda (2022). | To determine the characteristics of diabetic retinopathy patients who underwent vitrectomy surgery. | Padang Eye Center, RSKM | 50 | *Descriptive categorical* | Characteristics of diabetic retinopathy patients who underwent vitrectomy surgery were found to be the most age group 46-55 years and 56-65 years each 17 people (34%), with gender predominantly female (58%), and type 2 DM (98%), duration of diabetes <5 years (38%), with a history of hypertension (76%), the highest degree of diabetic retinopathy PDR+PV (50%), with bilateral eye involvement (86%), the most type of vitrectomy procedure in the category of vitrectomy + endolaser + inj. Anti-VEGF (34%), vision before the procedure in the poor category (96%), vision 1 month after surgery was |

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| | | | | | | mostly still in the poor category (84%), and the subjective quality of vision of patients after 1 month of surgery was improving (42%). |
| 12. | Allaa Roto, Randa Farah, Mahmood Al-imam, Mohammed Q. Al-Sabbagh and Nakhleh Abu-Yaghi ( 2022 ) | To measure the prevalence of diabetic retinopathy in patients with type 2 diabetes, determine its characteristics, and identify associated risk factors. | Jordan | 1316 | *Cross sectional study* | Male 774 (58.8%) of the participants. The prevalence of DR was 28.2% (371 participants). DR was significantly more frequent in participants who were under 60 years old, female, had diabetes for >10 years, used insulin, did not use metformin, had a body mass index >30 kg/m2, were smokers, or had a history of hypertension. Advanced stages of DR were more frequent in participants who were in the end stage of nephropathy and albuminuria. |
| 13. | Hamzeh Al Zabadi, Ibrahim Taha and Rami Zagha ( 2020 ) | This study aimed to explore the prevalence and risk factors associated with DR among diabetic patients in West Bank City. | West Bank, Palestine | 3 85 | *Cross Sectional* | Results from study This found that the prevalence of DR in the West Bank as a whole (41.8%), NPDR (50.3%), PDR (9.9%), DME (39.7%). In univariate analysis, the results of the relationship between DR and BMI (p = 0.034), duration of DM (p = 0.002), LDL (p = 0.034), GOT (p = |

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| | | | | | | 0.016), BU (p = 0.044). In multivariate analysis, the results of the relationship between DR and duration of DM 10-19 years (CI: 95%), abnormal LDL (CI: 95%), abnormal GOT (CI: 95%), overweight (CI: 95%). |
| 14. | Jie Xuan , Liqi n Wang , Liqi Fan, Shuxing Ji ( 202 2 ) | This study aims to analyze factors related to diabetic retinopathy. | China | - | *Meta analysis* | Results from study This found that the occurrence of DR was related to the course of diabetes (OR=1.03), SBP (OR=1.01), HbA1c (OR=1.08), total cholesterol (OR=1.20), high-density lipoprotein cholesterol (OR=1.74), fasting blood glucose (OR=1.19), and hypertension (OR=1.25). |
| 15. | Sebastian Dinesen, Lonny Stokholm, Yusuf Subhi, Tungade et al.. ( 2023 ) | Our aim was to evaluate the rate of progression to PDR and identify the demographic and clinical characteristics of patients who subsequently developed PDR compared with | Danish Hospital ( Screening Program) DR Danish patient ) | 201. 945 | *Cohort* | In multivariate analysis, this study showed a relationship between PDR progression and duration of DM within 10 years (CI=95%), type 1 diabetes (CI=95%), Charlson Comorbidity Index Score>0; score 1(CI=95%), score 2 (CI=95%), score ≥3(CI=95%), use of insulin (CI=95%), use of antihypertensive drugs (CI=95%). |

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| | | patients who did not develop PDR. | | | | |
| 16. | Muhammad Uthman, Syed Naeemullah, Farhan Fateh Jang, Amna Malik ( 2021 ) | To study the relationship between retinopathy and HbA1C levels in T2DM patients. | Endocrine Clinic, Shaikh Zayed Hospital, Lahore. | 100 | *Cross-sectional study.* | This study showed 56% of male patients and 44% of female patients with an average age of 40-58 years, an average HbA1C of 7.1 -11%. 37% suffered from NPDR with an average age of 40 - 58 years. 55% suffered from PDR with an average age of 42-58 years. Average HbA1C 7.2-9% (DM patients), 7.1-11% (NPDR), 7.6 - 11% (PDR). |
| 17. | Bashayr A. Bajaber, Mohammed A. Alshareef ( 2021 ) | The aim of this study was to estimate the prevalence and risk factors of diabetic retinopathy. | Specialist Hospital. | 251 | *cross-sectional study* | The results of this study showed the prevalence of RD patients 54.6%, mild NPDR 52.6%, severe mild NPDR 15.3%, PDR 4.4%. Multivariate logistic regression analysis revealed that patients who have had diabetes for 11 to 16 years , patients who do not take daily medication on time, patients who do not have annual fundus examinations and patients with uncontrolled diabetes have a higher risk of experiencing DR. |

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| 18. | Salem A. Alghamdi, MD, Ayla M. Tourkmani, Pharm.D, PhD, Turki J. Alharbi, MD,, Abdulaziz Bin Rsheed, MD, Wedad H. Almadani, MSc, MPH. ( 2021 ) | The aim of this study was to assess the prevalence and risk factors of DR in patients with T2DM at different risks, based on the level of glycemic control. | Primary health care in Riyadh, Saudi Arabia. | 428 | *cross-sectional study* | The prevalence of high-risk DR was 88.1% and 22% in low-risk patients. The prevalence of patients with high macular edema in the high-risk group was 15.8% compared to low-risk patients 4.9% (p<0.001). In bivariate analysis, the average age of patients was 61±11 years and the duration of diabetes was 13±7 years. High HbA1c and LDL levels were associated with the risk of DR (p<0.0001). |
| 19 | Chao-Hsien Lee, Peng-Lin Tseng, Wei-Ting Chang, Yi-Chien Chen, Tsai-Tung Chiu (2022). | This study aims to analyze, model, and compare risk factors for diabetic retinopathy (DR) in type 2 diabetes mellitus (DM) patients with and without metabolic syndrome (MS). | Ophthalmology outpatient clinic at a single institute in southern Taiwan | 802 | *Cross-sectional study* | Comparison of DR risk factors between patients with and without MS showed that glycated hemoglobin (HbA1c) levels were a risk factor for DR. However, female gender, betel chewing, family history of DM, and higher total cholesterol were found to be risk factors for DR among patients with MS. |
| 20. | Enrique O Graue-Hernandez , David Rivera-De-La-Parra, Sergio Hernandez-Jimenez, Carlos A Aguilar-Salinas, David Kershenobich-Stalnikowitz , Aida | To determine the prevalence of diabetic retinopathy (DR) and diabetic macular edema | Comprehensive care center | 1.232 | *Cross-sectional study* | DR was associated with duration of diabetes (p<0.001), hemoglobin A1c (HbA1c) levels of 7.0-8.9 (p<0.001), HbA1c ≥9 (p<0.001), and systolic blood pressure (SBP ) per 5 mmHg |

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| | Jimenez-Corona. (2020). | (DME) and associated risk factors in patients newly diagnosed with type 2 diabetes. | | | | (p<0.001). |

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## Discussion

Diabetic retinopathy (DR) is one of the microvascular complications of diabetes mellitus due to uncontrolled blood sugar and prolonged occurrence. Several risk factors are suspected as triggers of DR, namely duration of the disease, age, poor blood sugar control or hyperglycemia and blood pressure, puberty, pregnancy, blood lipid levels , hyperviscosity, kidney failure, anemia, and smoking. The most important factor is biochemical changes that are related to hyperglycemia (Burhan, 2024).

Retinopathy Diabetic is the 4th leading cause of blindness globally after cataracts, glaucoma, and macular degeneration. People aged 20-64 years in America experience blindness due to diabetic retinopathy. Complications arise after 7 years of suffering from diabetes, with an incidence rate of 50% and increasing to 90% after suffering from diabetes for 17-25 years. Causes of blindness due to Diabetic retinopathy in the UK is most common in patients aged 30-60 years. The prevalence of diabetic retinopathy in Indonesia reaches 10-32% of the entire diabetic population (Puteri, 2022). Based on results in on in get a number of risk factors for diabetic retinopathy.

### High cholesterol levels

Diabetic retinopathy is a microvascular disorder that occurs due to the long-term effects of diabetes mellitus. Diabetic retinopathy is the most common cause of vision loss in adults in the working age group. Increased blood pressure is one of the risk factors that can cause pathophysiological changes. Long-term hypertension can cause the process of arteriole sclerosis and arteriole occlusion can occur. Increased cholesterol can also result in complications in macrovascular such as heart disease and microvascular such as diabetic retinopathy.

Increased lipids or also called dyslipidemia is a disorder of lipid metabolism in the blood. Insulin resistance is involved in the pathogenesis of diabetic dyslipidemia with increased production of small dense LDL particles and impaired glucose tolerance in type 2 diabetes. The higher the cholesterol level, the higher the atherosclerosis process. Diabetic retinopathy develops gradually, showing progressive changes in the retinal microcirculation that cause increased vascular permeability, retinal hypoperfusion, and retinal vascular proliferation (Kurniawan, 2023).

### High blood pressure

Hypertension can be defined as persistent blood pressure where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. Hypertension is a medical condition characterized by increased blood pressure in the arteries of the body, which is above the healthy normal limit. In the context of type 2 diabetes mellitus patients, the relationship between hypertension and diabetic retinopathy complications is very close. Patients who suffer from type 2 diabetes and have uncontrolled or abnormal blood pressure tend to experience blood vessel damage in the retina, which is a characteristic of diabetic retinopathy.

Hypertension can worsen blood vessel damage in the retina of the eye that is already vulnerable due to diabetes, increasing the risk of developing and progressing diabetic retinopathy. This condition can cause bleeding, swelling, and even serious retinal detachment, which can be sight-threatening for people with type 2 diabetes. On the other hand, patients

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with blood pressure controlled within normal limits are less likely to experience complications of diabetic retinopathy. Effective management of hypertension and regular blood pressure monitoring are essential in efforts to prevent and control diabetic retinopathy in patients with type 2 diabetes (Sinaga, 2023).

**Pregnant**

In women with diabetes, in particular gestational diabetes or existing diabetes before pregnancy, blood sugar level fluctuations larger ones can occur during the period pregnancy. Increase in pregnancy hormones such as estrogen and progesterone can cause greater insulin resistance. high, which in turn can worsen blood sugar control. Uncontrolled blood sugar levels during pregnancy can trigger or worsen diabetic retinopathy. In addition, increased blood volume during pregnancy can put additional strain on the cardiovascular system, increasing the risk of high blood pressure which can also contribute to RD. This condition is known as gestational diabetic retinopathy (Dalillah, 2024).

**Smoking habits**

Smoking can be a significant additional risk factor in the development and progression of RD in individuals with type 2 DM. Toxic chemicals found in cigarette smoke, especially nicotine and carbon monoxide, can damage blood vessels throughout the body, including blood vessels in the retina of the eye (Dalillah, 2024). This process can worsen the condition of blood vessels that have been affected by diabetes. Smoking can accelerate angiopathy. Nicotine in cigarettes can increase blood pressure and cause vasoconstriction. This can reduce blood flow to the eyes, increasing pressure on the walls of blood vessels. blood, and worsen retinal ischemia. Smoking can also worsen the process. inflammation and oxidative stress in the body. Both of these processes can trigger changes pathology of the retinal blood vessels, accelerates retinal vascular proliferation and increases the risk of bleeding and edema in eyes (Dalillah, 2024).

**Blood sugar levels are not well controlled**

Glycemic control one of which can be done by glycosylated hemoglobin level examination (HbA1C). HbA1c provides an overview average blood sugar levels for three months last and reflects blood sugar control daily life of DMT2 patients. HbA1C levels that controlled (<6.5%) intensively can prevent and slow down events and development of retinopathy in patients with type 2 diabetes (Setyanto, 2023). HbA1c level regulation is said to be good if the level is <7.0%. This condition can reduce the posterior segment of the eye. Because the increased retinal ischemia in the PDR and NPDR groups is less. There is a significant correlation between HbA1c above 7% and the prevalence of diabetic retinopathy. HbA1c levels above 6.5% can also increase the prevalence of various microvascular complications including diabetic retinopathy. Diabetic retinopathy can appear after 5 years of diabetes, and more than 85% of patients develop diabetic retinopathy after 25 years (Kristin, 2024).

## CONCLUSION

Based on results identification And review a number of in review literature This, solt can be concluded that there are several risk factors for diabetic retinopathy, namely high cholesterol

levels, high blood pressure, pregnancy, smoking habits and poorly controlled blood sugar levels. The author's suggestion for patients with diabetes mellitus is to routinely perform fundoscopy examinations to monitor the development of the disease and to determine whether complications of diabetic retinopathy have occurred. The results of this study can be used as a comparison for further research in terms of determining the risk factors for diabetic retinopathy, and conducting research with a wider population and it is hoped that other variables can be added. The use of better research designs such as cohort studies, or with a larger sample size.

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