Original Article :

Frequency of Retinopathy Among Newly Diagnosed Patients with Diabetes Mellitus

Nayef F. ALSwaina

Department of Ophthalmology, College of Medicine, Qassim University, Kingdom of Saudi Arabia.

Received on Nov 14, 2024, accepted for publication on Jan 27, 2025, dx.doi.org/10.5455/mjhs.2025.04.007

Corresponding Author:

Nayef F. ALSwaina, Department of Ophthalmology, College of Medicine, Qassim University, Kingdom of Saudi Arabia. Email: nalswaina@qu.edu.sa. ORCID iD: https://orcid.org/0000-0001-5976-4679

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Abstract

Background and Aims:

Diabetes mellitus (DM) is a significant public health issue in Saudi Arabia. Diabetic retinopathy (DR) is one of the serious complications related to DM and considered an important cause of blindness. Understanding of the demographic and clinical characteristics associated with DR is important to inform effective management strategies. Therefore, the aim of the current study is to determine the prevalence and associated risk factors of DR among newly diagnosed type 2 diabetic patients in Al-Qassim University Hospital.

Methods:

This retrospective cross-sectional study was conducted at Qassim University Hospital, Saudi Arabia, from July to September 2024. The study included all newly diagnosed type 2 diabetic patients with complete medical records in the diabetes clinics. Demographic data and clinical parameters were collected.

Result:

The study included 77 patients, with a mean age of 51 years (SD = 13.03) and a mean diabetes duration of 15.6 months (SD = 8.22). Diabetic retinopathy was present in 7.8% of patients, while neuropathy and nephropathy had very low prevalence rates of 3.9% and 2.6%, respectively. No statistically significant associations were observed between demographic or clinical factors and the prevalence of retinopathy ($p > 0.05$).

Conclusion:

This study revealed low rates of diabetic complications among the sample, possibly due to the short duration of diabetes in most patients. The lack of significant associations between complications and factors like HbA1c or blood pressure underscores the complexity of diabetic complications and suggests that long-term studies are needed to capture these relationships fully.

Key words:

Diabetes mellitus, Retinopathy, Glycemic control, Saudi Arabia

Introduction:

Diabetes mellitus (DM) is a chronic disease that can result in severe consequences. DM is becoming increasingly common, according to recent studies[1]. The prevalence of DM was approximately 23.7% in Saudi Arabia in 2004. By 2011, this figure rose significantly to 30%, with a prevalence of 34.1% in men and 27.6% in women[2,3]. Diabetic retinopathy (DR) is a serious complication involving microvascular changes that occur in most body systems in diabetics over time[4]. Diabetic retinopathy is the most common factor contributing to new-onset blindness among patients aged 20-74 years. During the first 20 years of the disease, nearly all patients affected with type 1 DM and up to 60% of patients with affected type 2 have developed retinopathy at some point[5]. In Saudi Arabia, several cross-sectional studies have found that the prevalence of diabetic retinopathy (DR) among diabetic patients ranges from 30% to 36% [6–8].

It is not unusual to observe diabetic retinopathy changes at the time of diagnosis of type 2 DM because this condition could be present long before the clinical diagnosis is made [9]. This study will focus on patients who have recently been diagnosed with type 2 diabetes. Internationally, the prevalence of DR among newly diagnosed type diabetic patients ranged between 5-35 % [10]. Another international systematic review showed that 13.1% of newly diagnosed type 2 diabetic patient had retinopathy[11]. Recent cross-sectional studies in Saudi Arabia show varying prevalence of DR among newly diagnosed diabetics across different regions of the country suggesting the importance of regional assessment. A study in Abha region of Saudi Arabia reported that 3.3% of newly diagnosed diabetic patients have some form of DR[12]. Another study conducted in Dammam, Saudi Arabia reported a prevalence of DR among newly diagnosed diabetic patients of 6.26%[13]. However, limited data exists on the current prevalence of diabetic retinopathy among newly diagnosed patients affected with diabetes in Al-Qassim region. This study aims to determine the prevalence and associated risk factors of diabetic retinopathy among newly diagnosed type 2 diabetic patients in Al-Qassim University Hospital. Understanding the current prevalence and risk factors can greatly enhance patient outcomes and quality of life by guiding public health initiatives and policymaking tailored for this demographic region.

Methods:

This is a retrospective study involving medical records review of newly diagnosed type 2 diabetic patients who presented to the outpatient clinics of Qassim University

Medical City between July and September 2024. A purposive sampling technique was utilized, selecting all patients who had complete medical records. The inclusion criteria encompassed records of patients diagnosed with type 2 diabetes within two years prior to enrolment, age more than 18 years old, had ophthalmology visit with fundus eye exam, and with data covering all relevant variables such as age, sex, diabetes type, occupation, level of education, hemoglobin (HbA1c) levels, duration of diabetes, and risk factors. Exclusion criteria included any medical records with missing or incomplete data related to these variables, as incomplete records would limit the validity of our analysis.

Data collection covered both demographic and clinical parameters. Demographic data included age, gender, occupation, and family history of diabetes. Clinical data covered the duration of diabetes, age of onset, blood sugar control (categorized as HbA1c <7% as controlled, 7–9% as uncontrolled, and >9% as poorly controlled), use of anti-diabetic medications, presence of dyslipidemia, obesity classifications based on body mass index (BMI), and blood pressure (BP) status, categorized as either normotensive or hypertensive (classified as hypertensive if BP 140/90 or higher). Data management and analysis were carried out using SPSS software. Frequency and percentage distributions were calculated for all studied variables. Statistical associations were examined through cross-tabulations, using Chi-square tests, independent t-tests, and ANOVA tests, with a significance level set at $p < 0.05$.

In terms of ethical considerations, approval was obtained from the Research Ethics Committee at Qassim University prior to study initiation (approval IRB No. 24-12-04). All data were kept confidential and used solely for research purposes. This ensured compliance with ethical standards and the protection of participant privacy.

Results:

The demographic analysis of patients in this study showed that the mean age was 51 years (SD = 13.03), with the majority of participants aged between 51–60 years (35.1%), followed by those aged 41–50 years (22.1%). Gender distribution indicated that 61% of the participants were male, while 39% were female. Glycemic control, measured by HbA1c levels, had a mean value of 7.3% (SD = 1.8), with 61% of the patients having an HbA1c below 7%, and the remaining 39% having HbA1c levels above 7%, indicating that most of patients had controlled blood sugar level. The average duration of diabetes among participants was approximately 15.6 months (SD

= 8.22). Regarding anti-diabetic treatment, most patients (89.6%) were on oral hypoglycemic agents alone and the rest of patient using insulin therapy either with or without additional drugs. The average body mass index (BMI) of participants was 30.21 kg/m^2 (SD = 6.68), classifying them predominantly as obese (50.6%), with 27.3% classified as overweight, and a minority of participants either had a normal weight (19.5%) or were underweight (2.6%). Mean total cholesterol levels were recorded at 4.94 mmol/L (SD = 3.10). Blood pressure analysis showed that the majority of participants were normotensive (63.6%), while 36.4% were classified as hypertensive and were receiving antihypertensive treatment (Table 1)

Table 1: Demographic factors of the patients.

		Count	Column N %
Age	Mean (SD)	51 (13.03)	
	21-30	5	6.5%
	31-40	13	16.9%
	41-50	17	22.1%
	51-60	27	35.1%
	> 60	15	19.5%
Gender	Male	47	61.0%
	Female	30	39.0%
HbA1c	Mean (SD)	7.30 (1.80)	
	< 7	47	61.0%
	> 7	30	39.0%
Duration of DM (Months)	Mean (SD)	15.64 (8.22)	
Anti-diabetic medication	oral hypoglycemic agent only	69	89.6%
	Insulin with or without drug	8	10.4%
BMI	Mean (SD)	30.21 (6.68)	
	Underweight	2	2.6%
	Normal weight	15	19.5%
	Overweight	21	27.3%
	Obese	39	50.6%
Total cholesterol	Mean (SD)	4.94 (3.10)	
Blood pressure	Normotensive (< 140/90 mmHg)	49	63.6%
	hypertensive (receive antihypertensive treatment)	28	36.4%

Analysis of diabetic complications revealed that neuropathy was present in only 3 patients (3.9%). Nephropathy was observed in two patients (2.6%). Retinopathy was slightly more prevalent (n=6, 7.8%), with 5.2% (n=4) of participants presenting with mild non-proliferative diabetic retinopathy (NPDR), and 2.6% (n=2) exhibiting severe NPDR, while 92.2% had no signs of diabetic retinopathy (Table 2).

Table 2: The prevalence of neuropathy, nephropathy, and retinopathy.

		Count	Column N %
Neuropathy	Absent	74	96.1%
	Present	3	3.9%
Nephropathy	Absent	75	97.4%
	Present	2	2.6%
Retinopathy	Absent	71	92.2%
	Present	6	7.8%

The association between retinopathy and demographic factors was also explored. Although the age group 41–50 years showed a slight increase in the prevalence of mild NPDR (11.8%), age was not significantly associated with retinopathy prevalence (p = 0.539). Similarly, there was no statistically significant association between gender and retinopathy (p = 0.425), though retinopathy prevalence was marginally higher among male participants. HbA1c levels also did not show a significant association with retinopathy (p = 0.846), though there was a slight increase in retinopathy prevalence among those with HbA1c > 7% (Table 3).

Table3: Retinopathy prevalence association between demographic factors.

Count		No DR		DR		P-value
		Row N %	Count	Row N %		
Age	21-30	5	100.0%	0	0.0%	0.539
	31-40	12	92.3%	1	7.7%	
	41-50	15	88.2%	2	11.8%	
	51-60	25	92.6%	2	7.4%	
	> 60	14	93.3%	1	6.7%	
Gender	Male	42	89.4%	5	10.6%	0.425
	Female	29	96.7%	1	3.3%	

HbA1c	< 7	44	93.6%	3	6.4%	0.846
	> 7	27	90.0%	3	10.0%	
Anti-diabetic medication	oral hypoglycemic agent only	63	91.3%	6	8.7%	0.993
	insulin with or without drug	8	100.0%	0	0.0%	
BMI	Underweight	2	100.0%	0	0.0%	0.188
	Normal weight	12	80.0%	3	20.0%	
	Overweight	20	95.2%	1	4.8%	
	Obese	37	94.9%	2	5.1%	
Blood pressure	normotensive (<140/90 mmHg)	45	91.8%	4	8.2%	0.480
	hypertensive (receive antihypertensive treatment)	26	92.9%	2	7.1%	

Discussion:

This study offers valuable insights into the demographic, clinical, and complication profiles of diabetic patients in Saudi Arabian hospital setting. The findings are consistent with existing literature on the prevalence of diabetes, its complications, and the associated risk factors in the Middle East. In our study, diabetic retinopathy was identified in a relatively low proportion (7.8%) among newly diagnosed type 2 DM patients and this rate is consistent with other regional studies in Saudi Arabia that report a lower retinopathy prevalence rate of 3.3% and 6.25% in Abha and Dammam, respectively[12,13]. The current result is also similar to several studies reported in different countries including Kuwait (7.6%), Denmark (5%), Australia (6.2%) and Southern India (7.3%). However, different results were reported in studies from Romania (14.37%), Taiwan (25.5%) and the United Kingdom Prospective Diabetes Study (UKPDS) group in the United Kingdom (35%)[14–16].

This difference in the prevalence between studies could be because of the variation in the time of onset and detection of DM. In addition, the difference in the socioeconomic factors that determines the accessibility and availability of health care facilities that help in early detecting of DM is another cause of variation. In Saudi Arabia, due to high awareness of population about the disease and the availability of free health care services could contribute to the low prevalence of DR.

The association between glycemic control and diabetic complications, particularly retinopathy, has been extensively studied, with evidence consistently supporting a significant link between poor glycemic control and an increased risk of diabetic retinopathy[17–19]. In our study, HbA1c levels did not show a statistically significant association with the presence of retinopathy, despite the slightly higher retinopathy prevalence in patients with HbA1c levels >7%. This result may be attributable to the relatively short average duration of diabetes (15.6 months) observed in the study population, as prolonged hyperglycemia is a key factor contributing to retinopathy progression over time[20,21]. Moreover, prior studies indicate that early intervention and rigorous glycemic control are effective in reducing the risk of retinopathy in newly diagnosed patients [22,23], which may explain the limited retinopathy burden observed here.

The demographic distribution of this study's participants, with a mean age of 51 years and a higher male prevalence (61%), reflects the typical profile of type 2 diabetes patients in Saudi Arabia where the disease onset tends to occur at a relatively younger age compared to Western countries24. The high BMI observed in our population (mean 30.21 kg/m^2) further supports findings that obesity is a prevalent risk factor for diabetes in Saudi Arabia and the broader Gulf region[25,26]. Obesity is well-documented as a major risk factor for the development and progression of type 2 diabetes, due to its association with insulin resistance and beta-cell dysfunction[27–29].

Despite the observed prevalence of hypertension (36.4%), our findings did not show a statistically significant relationship between blood pressure and retinopathy. This finding is consistent with some reports suggesting that hypertension's impact on retinopathy development may depend on other factors such as glycemic control and duration of diabetes[30,31]. While blood pressure control remains essential for managing diabetes complications, the lack of association in this study highlights the multifactorial nature of diabetic complications and the need to examine additional variables that may contribute to retinopathy[32].

Furthermore, our study identified very low rates of nephropathy and neuropathy (2.6% and 3.9%, respectively), which may again be due to the relatively short diabetes duration. Studies have found that nephropathy and neuropathy prevalence rises with prolonged diabetes duration and poor glycemic control[33], reinforcing the importance of early diabetes management.

This study has several limitations that should be acknowledged. Firstly, the retrospective design may introduce biases related to data accuracy and completeness, as the analysis relies on existing medical records that may have inconsistencies or missing information. Secondly, the relatively small sample size may limit the generalizability of the findings to the broader diabetic population in Saudi Arabia. Additionally, the study's focus on a specific hospital may not fully represent the diversity of diabetic patients across different healthcare settings in the region. Furthermore, the short duration of diabetes among participants may not provide a comprehensive view of long-term complications, as the development of such complications typically increases with prolonged diabetes.

Conclusion:

In conclusion, the prevalence DR was found to be relatively low among patients with newly diagnosed type 2 DM. While our findings indicate a low prevalence rate of diabetic retinopathy, it is essential to maintain ongoing monitoring, conduct thorough fundus examinations, and implement proactive management strategies to prevent long-term complications. Given the rising trends in obesity and diabetes in the region, further studies should focus on longitudinal assessments to better understand the progression of complications and to identify effective preventive strategies. Improving the management of modifiable risk factors, such as obesity and high blood pressure, could significantly enhance patient outcomes in this demographic.

Conflicts of interest:

The author has no conflict of interest to declare.

Source of funding:

The author declares that this study has received no financial support.

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