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Original Article

Pattern of Diabetic Retinopathy and Its Effects on Health-Related Quality of Life in In-Patients at Endocrinology Unit, Hayatabad Medical Complex Peshawar

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Disclaimers

Author Contributions	Sara Saleem has major contributions to this study, she conducted the data collection, data analysis, methodology, literature review, extraction of results. Muhammad Imshad Khan contributed in the analysis of the study; Bilal Ahmad assisted in the discussion part of the study; Muhammad Numan assisted in the literature review; Arif Ullah assisted with data collection; Noreen Fayaz contributed to the methodology; Uzma curated the data..
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Abstract

Background: Diabetes mellitus (DM) is a metabolic disorder with widespread effects on the body, particularly impacting the nerves, kidneys, heart, and eyes. Diabetic retinopathy (DR), a severe complication of DM, results from high blood sugar levels damaging the small blood vessels in the retina. This microangiopathy is one of the most common causes of acquired visual loss in working-age adults, significantly affecting health-related quality of life (HRQoL).

Objective: The study aimed to determine the patterns of diabetic retinopathy and assess its effects on health-related quality of life (HRQoL) in in-patients at the endocrinology unit of Hayatabad Medical Complex, Peshawar.

Methods: This cross-sectional study was conducted over six months at the endocrinology unit of Hayatabad Medical Complex. A total of 318 diabetic patients were selected through non-probability convenience sampling. Data were collected using a validated questionnaire, focusing on patients diagnosed with DM who were willing and able to participate. The Quality of Life Scale (QOLS), assessing five domains of quality of life, was used to evaluate HRQoL. Descriptive statistics, frequencies, and percentages were calculated using SPSS Version 25. The Chi-square test was used to assess associations between variables, with a p-value of <0.05 considered statistically significant.

Results: Out of 318 participants, 141 (44.3%) were male, and 177 (55.7%) were female. The age group with the highest frequency was 51-60 years (34.3%). Among the participants, 56 (17.6%) had mild DR, 81 (25.5%) had moderate DR, and 120 (37.7%) had severe DR, while 61 (19.2%) had no clinically significant DR. A significant association was found between DR and HRQoL ($p=0.04$). There was a weak positive correlation between vision-related quality of life (VRQoL) and HRQoL ($r=0.124$, $p=0.027$). Significant associations were also observed between DR and factors such as gender, socioeconomic status, visual acuity, laser treatment, vitrectomy, and cataract presence ($p<0.05$).

Conclusion: Diabetic retinopathy is highly prevalent among diabetic patients and significantly impacts their health-related quality of life. Preventive measures, including health education and regular ocular examinations, are crucial to limit the complications of diabetes and improve HRQoL.

1 Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (1). This condition affects various organs and systems in the body, leading to serious complications, particularly in the nerves, kidneys, heart, and eyes. One of the most significant ocular complications of diabetes is diabetic retinopathy (DR), a form of microangiopathy caused by prolonged hyperglycemia. Diabetic retinopathy is a leading cause of acquired vision loss in adults of working age and poses a substantial threat to the health-related quality of life (HRQoL) of affected individuals (2). The global prevalence of diabetic retinopathy is estimated to be around 93 million, with 28 million cases severe enough to cause vision impairment (3). Furthermore, the World Health Organization (WHO) reports that 37 million cases of blindness worldwide can be attributed to diabetic retinopathy, with a significant prevalence of 23% in the Asian subcontinent alone (4).

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Diabetic retinopathy progresses through various stages, starting with non-proliferative diabetic retinopathy (NPDR), which can be further classified into mild, moderate, and severe stages, and advancing to proliferative diabetic retinopathy (PDR). NPDR is characterized by vascular permeability, capillary occlusion, and the presence of microaneurysms (4-8). As NPDR progresses, the risk of developing macular edema, a condition marked by retinal thickening due to fluid leakage from capillaries, increases. Macular edema can occur at any stage of retinopathy and is a major cause of vision loss in NPDR. In PDR, new blood vessels form on the retina and optic disc, primarily due to retinal ischemia caused by capillary loss. These new vessels are fragile and prone to bleeding, leading to vitreous hemorrhages and subsequent vision loss. Fibrous tissue often accompanies these new vessels, further complicating the condition (9).

The increasing burden of non-communicable diseases, including diabetes, is a significant public health concern, especially in developing countries like Pakistan. In Pakistan, the prevalence of diabetes mellitus is reported to be as high as 28.78%, making it the fifth most populous country with a high rate of diabetes (10-14). The progression of diabetic retinopathy from NPDR to PDR significantly affects an individual's vision and overall quality of life, leading to substantial ocular, nephrological, neurological, and cardiovascular complications. This study aims to identify the patterns of ocular changes associated with different grades of diabetic retinopathy and assess their impact on the health-related quality of life in patients at the endocrinology unit of Hayatabad Medical Complex, Peshawar. By understanding these patterns and their effects, the study seeks to inform better management and rehabilitation strategies for patients suffering from diabetic retinopathy (15).

The QOLS (Quality of Life Scale), a 16-item instrument assessing five conceptual domains of quality of life, was employed in this study to measure the impact of diabetic retinopathy on patients' lives. These domains include material and physical well-being, relationships with others, social, community and civic activities, personal development and fulfillment, and recreation. The scores range from 16 to 112 points, with lower scores indicating poorer quality of life (7).

This cross-sectional study, conducted over six months, utilized a non-probability convenience sampling method to select 318 participants from the endocrinology unit of Hayatabad Medical Complex. Inclusion criteria required participants to be diagnosed with DM and willing to participate in the study, while those unable to interact or unwilling to participate were excluded (12-19).

Statistical analysis using SPSS Version 22 revealed significant associations between diabetic retinopathy and various factors such as gender, socioeconomic status, visual acuity, laser treatment for ocular problems, vitrectomy, and cataract presence. Specifically, diabetic retinopathy was found to have a significant impact on HRQoL ($p=0.04$), with a weak positive correlation between vision-related quality of life (VRQoL) and HRQoL ($r=0.124$, $p=0.027$). The findings suggest that diabetic retinopathy is prevalent among diabetic patients and significantly affects their quality of life. Preventive measures, including regular ocular examinations and health education, are essential to mitigate the complications of diabetes and improve HRQoL in these patients (20-23).

Diabetic retinopathy poses a significant threat to the quality of life of diabetic patients, highlighting the need for comprehensive management strategies. Regular screening and timely intervention can help prevent the progression of retinopathy and its associated complications, ultimately improving the overall health and well-being of affected individuals. The study underscores the importance of addressing the ocular complications of diabetes as part of a holistic approach to diabetes care.

2 Material and Methods

The study was a descriptive cross-sectional analysis conducted over a six-month period at the endocrinology unit of Hayatabad Medical Complex in Peshawar, Pakistan. The primary objective was to determine the patterns of diabetic retinopathy and assess its impact on the health-related quality of life (HRQoL) in diabetic patients. The sample size of

318 participants was calculated using the World Health Organization (WHO) sample size formula for health studies (9). Participants were selected through non-probability convenience sampling, focusing on individuals diagnosed with diabetes mellitus (DM) who had undergone ocular health check-ups and possessed medical records. Patients who were unwilling to participate or physically unable to interact were excluded from the study.

Approval for the study was obtained from the Advanced Studies and Research Board (ASRB) of Khyber Medical University (KMU), and ethical clearance was secured from the Ethical Review Committee of KMU. Additionally, permission for data collection was granted by the authorities of the endocrinology ward at Hayatabad Medical Complex. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

Data collection involved the use of a pretested, validated questionnaire, which included questions on the duration of diabetes mellitus, vision in both eyes, grades of diabetic retinopathy, and the effects of diabetic retinopathy on HRQoL. The Quality of Life Scale (QOLS), a 16-item instrument assessing five conceptual domains of quality of life (material and physical well-being, relationships with other people, social, community and civic activities, personal development and fulfillment, and recreation), was employed to evaluate HRQoL (8, 17). The QOLS scores ranged from 16 to 112 points, with lower scores indicating poorer quality of life.

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 25. Descriptive statistics were used to summarize the data, with frequencies and percentages calculated for categorical variables such as gender, occupation, marital status, systemic illness, ocular illness, and residence. Mean and standard deviation were computed for continuous variables including income, education, vision status, body mass index (BMI), and quality of life scores. The Chi-square test was employed to assess the association between dependent and independent variables, with a p-value of less than 0.05 considered statistically significant (17-21).

The study aimed to identify patterns of ocular changes associated with different grades of diabetic retinopathy and assess their impact on HRQoL. By understanding these patterns and their effects, the research sought to inform better management and rehabilitation strategies for patients suffering from diabetic retinopathy. The comprehensive data collection and analysis processes ensured that the findings would contribute valuable insights into the relationship between diabetic retinopathy and quality of life among diabetic patients (22).

3 Results

The study included 318 participants, comprising 141 males (44.3%) and 177 females (55.7%). The demographic and clinical characteristics of the participants are summarized in Table 1. The highest frequency was observed in the 51-60 years age group (34.3%), followed by the 41-50 years age group (23.3%).

Table 1: Demographic and Clinical Characteristics of Participants

Variable	Frequency (n=318)	Percent (%)
Gender		
Male	141	44.3
Female	177	55.7
Age (Years)		
20-30	9	2.8
31-40	14	4.4
41-50	74	23.3
51-60	109	34.3
61-70	67	21.1
71-80	26	8.2

Variable	Frequency (n=318)	Percent (%)
81-90	17	5.3
91-100	2	0.6
Education Level		
No Education	131	41.2
Matric	111	34.9
Intermediate	40	12.6
Bachelor	17	5.3
Master	19	6.0
Employment Status		
Own Business	51	16.0
Employed	43	13.5
Retired	61	19.2
Housewife	153	48.1
Student	10	3.1
Marital Status		
Married	245	77.0
Unmarried	36	11.3
Separated	10	3.1
Divorced	6	1.9
Widow/Widower	21	6.6
Residence		
Rural	129	40.6
Urban	189	59.4
Family Structure		
Nuclear	134	42.1
Joint	184	57.9
BMI Classification		
Underweight	4	1.3
Normal Weight	61	19.2
Pre-Obese	101	31.8
Class I Obesity	89	28.0
Class II Obesity	56	17.6
Class III Obesity	7	2.2
Diabetes Status		
Known DM	270	84.9
Newly Diagnosed	48	15.1

The distribution of diabetic retinopathy (DR) severity and its association with gender, socioeconomic status, and clinical variables are detailed in Table 2.

Table 2: Distribution and Associations of Diabetic Retinopathy

Variable	Normal	Mild	Moderate	Severe	p-value
Total (n=318)	61	56	81	120	

Gender					0.042
Male	29	19	45	48	
Female	32	37	36	72	
Socioeconomic Status					0.004
Own Business	12	11	15	13	
Employed	8	6	11	18	
Retired	11	6	23	21	
Housewife	24	33	29	67	
Student	6	0	3	1	
Laser Treatment					<0.001
Yes	10	9	21	49	
No	51	47	60	71	
Vitrectomy					<0.001
Yes	1	8	4	27	
No	60	48	77	93	
Cataract					0.004
Yes	14	19	23	57	
No	47	37	58	63	
Health-related Quality of Life					0.040
Low	6	6	11	7	
Moderate	18	25	30	63	
Severe	37	25	40	50	

The association between diabetic retinopathy and health-related quality of life (HRQoL) was significant, with a p-value of 0.040, indicating that DR has a considerable impact on HRQoL.

The correlation between vision-related quality of life (VRQoL) and HRQoL was weak but statistically significant, with a Pearson correlation coefficient of r=0.124 (p=0.027). The mean HRQoL score was 2.38 (SD=0.653), and the mean VRQoL score was 2.04 (SD=0.248), as summarized in Table 3.

Table 3: Correlation between VRQoL and HRQoL

Quality of Life	Mean	Standard Deviation	Pearson Correlation	p-value
HRQoL	2.38	0.653		
VRQoL	2.04	0.248	0.124	0.027

In summary, the study demonstrated that diabetic retinopathy is prevalent among diabetic patients and significantly affects their quality of life. Preventive measures, including health education and regular ocular examinations, are essential to mitigate the complications of diabetes and improve the overall quality of life for these patients.

4 Discussion

The study revealed significant insights into the prevalence and impact of diabetic retinopathy (DR) on the health-related quality of life (HRQoL) among patients at the endocrinology unit of Hayatabad Medical Complex, Peshawar. The findings underscored the high prevalence of DR in diabetic patients, with a notable proportion experiencing moderate to severe forms of the condition. This aligns with global reports indicating a substantial burden of DR, particularly in developing regions (23).

The gender disparity observed in the study, with a higher prevalence of severe DR in females, highlights the need for targeted interventions. This finding is consistent with earlier research suggesting that women may be at a higher risk of developing severe DR due to factors such as hormonal differences and healthcare access disparities (22-24). The significant association between socioeconomic status and DR severity further underscores the influence of social determinants on health outcomes. Participants with lower socioeconomic status exhibited a higher prevalence of severe DR, which could be attributed to limited access to healthcare resources and poorer diabetes management (25-32).

The study's results showed a weak but significant positive correlation between vision-related quality of life (VRQoL) and HRQoL. This relationship indicates that while vision impairment significantly affects quality of life, other factors also play crucial roles. Similar findings have been reported in previous studies, where VRQoL was identified as a critical determinant of overall quality of life in diabetic patients (33). The significant association between DR and HRQoL emphasizes the multifaceted impact of DR, affecting not only visual function but also physical, emotional, and social well-being (33).

The significant associations between DR and clinical interventions, such as laser treatment and vitrectomy, reflect the advanced stages of DR in the study population. The effectiveness of these treatments in managing DR and preventing further visual impairment has been documented, yet the need for regular monitoring and early intervention remains critical (17, 35-38). The study also identified cataract as a common comorbidity among DR patients, which aligns with the known complications of diabetes, including an increased risk of cataract development (Klein et al., 1985).

Despite its strengths, the study had limitations. The cross-sectional design limited the ability to infer causality between DR and HRQoL. Additionally, the use of non-probability convenience sampling may have introduced selection bias, affecting the generalizability of the findings. Future research should consider longitudinal designs and random sampling methods to validate and extend these findings (36).

The study highlighted the urgent need for comprehensive diabetes management programs that include regular ocular examinations and health education to prevent and mitigate the complications of DR. These programs should prioritize early detection and intervention, particularly in high-risk groups such as females and individuals with lower socioeconomic status. Integrating eye care services with primary healthcare could improve access and adherence to regular screenings, thereby reducing the burden of DR and its impact on quality of life.

5 Conclusion

In conclusion, the study provided valuable insights into the patterns and impact of DR on HRQoL among diabetic patients. The findings emphasize the critical need for preventive measures and targeted interventions to address the multifactorial challenges posed by DR. By improving early detection and management, healthcare providers can enhance the quality of life for diabetic patients, ultimately reducing the overall burden of this debilitating condition.

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