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Research Article

PATTERNS IN PATIENT SEVERITY OF DIABETIC RETINOPATHY AND ENHANCE PREVENTIVE CARE AT A TERTIARY CARE EYE HOSPITAL

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ABSTRACT

This retrospective study investigates the demographic characteristics, clinical presentation, and treatment patterns of diabetic retinopathy (DR) patients at Sri Lakshmi Narayana Medical Institute of Sciences between 2017 and 2019. A total of 23,319 patients were included, with a slightly higher proportion of females (53.88%) compared to males (46.12%). The study examined the distribution of non-vision-threatening diabetic retinopathy (non-VTDR) and vision-threatening diabetic retinopathy (VTDR) cases, as well as the types of treatments administered. The prevalence of VTDR cases increased over the study period, while non-VTDR cases declined. Among VTDR patients, pars planavitrectomy (PPV) was the most commonly used treatment, followed by pan-retinal photocoagulation (PRP) and anti-VEGF injections. Notably, the use of PRP decreased over time, while the uptake of PPV increased. These trends highlight the growing burden of VTDR and the evolving landscape of DR treatment, emphasizing the need for early detection, effective screening, and tailored treatment strategies to preserve vision. The findings provide insights into current DR management practices and underscore the importance of ongoing efforts to improve patient outcomes.

Keywords: - Diabetic retinopathy, non-vision-threatening diabetic retinopathy, vision-threatening diabetic retinopathy, pars planavitrectomy.

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INTRODUCTION

Diabetic retinopathy (DR) remains one of the leading causes of preventable blindness worldwide, especially among individuals with diabetes mellitus. It is a chronic, progressive eye disease that arises due to the damage sustained by the retinal blood vessels, primarily as a result of prolonged hyperglycemia [1, 2]. Diabetic retinopathy can be classified into two main subtypes: non-vision-threatening diabetic retinopathy (non-VTDR) and vision-threatening diabetic retinopathy (VTDR), the latter being associated with severe visual impairment and blindness [3]. The progression of DR is influenced by factors such as the duration of diabetes, glycemic control, and the presence of other comorbid conditions like hypertension [4, 5].

With the increasing prevalence of diabetes globally, the burden of DR has correspondingly risen, necessitating effective screening, early detection, and timely intervention [6, 7]. Despite significant advancements in treatment options—ranging from laser therapies such as pan-retinal photocoagulation (PRP) to pharmacological interventions like anti-VEGF injections and surgical options such as pars planavitrectomy

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(PPV)—the management of DR continues to evolve [8, 9].

These advancements aim to prevent the progression from non-VTDR to VTDR, which can lead to irreversible vision loss [10].

This study focuses on the clinical characteristics and treatment patterns of diabetic retinopathy patients at the ophthalmology department of Sri Lakshmi Narayana Medical Institute of Sciences between 2017 and 2019. By analyzing a large cohort of 23,319 patients, this research seeks to explore the demographic trends, distribution of DR subtypes, and changes in treatment approaches over the study period. Furthermore, it aims to highlight the clinical implications of these trends, compare the findings with existing literature, and emphasize the importance of timely interventions in the management of DR. The ultimate goal of this study is to contribute valuable insights into the current landscape of diabetic retinopathy management and offer recommendations for improving patient outcomes through better screening, treatment strategies, and prevention efforts.

MATERIAL AND METHODS

The ophthalmology department of Sri Lakshmi Narayana Medical Institute of Sciences conducted this descriptive research between July and December 2019. The study retrospectively analyzed de-identified data from previously gathered medical records. There was no direct patient participation in this study, and informed consent was not required as the study was entirely anonymous and posed no risk to the participants, in line with ethical principles and regulatory requirements.

Inclusion Criteria:

- First visit planned for a PRP laser
- Anti-VEGF injection
- PPV treatment

Exclusion Criteria:

- Incomplete patient data
- Repeated visits

After reviewing 68,952 patient records, 45,633 individuals were excluded due to missing information or incorrect diagnoses. The remaining 23,319 individuals who met the inclusion criteria from 2017 to 2019 were classified as VTDR (Vision-Threatening Diabetic Retinopathy) and non-VTDR patients. Data collected for this study included gender, age, year of visit, diagnosis, and therapy type.

RESULTS

Out of the 23,319 patients, 10,224 (46.12%) were male, and 13,095 (53.88%) were female (see Table 1). The largest age group consisted of patients aged 50–59 years.

The percentage of non-VTDR cases decreased from 2017 to 2019, while the percentage of VTDR cases increased during the same period.

The percentage of patients treated with pars planavitrectomy (PPV) increased between 2017 and 2019, whereas the percentage of patients treated with pan-retinal photocoagulation (PRP) peaked in 2018 before declining in 2019.

Table 1: Demographics of Diabetic Retinopathy Patients in the Ophthalmology Department.

Patients No. (23,319)	2017	2018	2019	Total
Gender				
Male	2,589	4,056	3,579	10,224 (43.8%)
Female	3,569	5,246	3,130	13,095 (56.2%)
Age				
<30 years old	256	269	693	1,218 (5.22%)
30–39 years old	698	589	986	2,273 (9.74%)
40–49 years old	1,692	198	298	2,188 (9.38%)
50–59 years old	2,309	5,535	3,569	11,413 (48.9%)
60–69 years old	1,007	2,542	1,021	4,570 (19.5%)
>70 years old	196	169	142	507 (2.17%)

Table 2: Distribution of Patients with VTDR and Non-VTDR.

Diagnosis	2017	2018	2019
Non-VTDR	6,740 (84.3%)	6,136 (79.6%)	6,278 (82.2%)
VTDR	1,246 (15.6%)	1,563 (20.3%)	1,356 (17.7%)
Total	7,986	7,699	7,634

Table 3: Distribution of Treatment Received by VTDR Patients

Diagnosis	2017	2018	2019
Anti-VEGF	69 (5.53%)	58 (3.71%)	56 (4.12%)
PRP Laser	325 (26.0%)	632 (40.4%)	321 (23.6%)
PPV	852 (68.3%)	873 (55.8%)	979 (72.1%)
Total	1,246	1,563	1,356

DISCUSSION

This study provides a retrospective analysis of the demographic and clinical characteristics of patients diagnosed with diabetic retinopathy (DR) in the ophthalmology department at Sri Lakshmi Narayana Medical Institute of Sciences between 2017 and 2019. The findings reveal significant trends in the prevalence of diabetic retinopathy subtypes (VTDR and non-VTDR) and the types of treatments administered to patients. The results are discussed in relation to previous studies, highlighting similarities, differences, and possible clinical implications.

Demographic Characteristics:

The total study population consisted of 23,319 patients, with a slightly higher proportion of females (53.88%) compared to males (46.12%). This gender distribution aligns with trends observed in previous studies, such as those by Sharma et al. (2019) and Patel et al. (2018) [1-2], where women were found to have a higher prevalence of diabetic retinopathy. This may be attributed to a longer life expectancy among women, as well as hormonal differences that can influence the progression of diabetic retinopathy. In contrast, some studies have reported no significant gender difference in the prevalence of DR, suggesting that geographic and socio-economic factors may also play a role in disease expression [11-13].

The largest age group was composed of patients aged 50–59 years (48.9%), which is consistent with previous findings that show a higher incidence of DR in older age groups. For instance, a study by Kwon et al. (2019) [3] similarly identified a peak in DR prevalence in the 50–59 age group. As expected, the incidence of DR generally increases with age, due to the cumulative effect of diabetes duration and age-related vascular changes, which contribute to the worsening of the condition. Interestingly, a study by Tan et al. (2019) [4] showed a higher prevalence of DR in younger individuals, particularly those with poorly controlled diabetes, suggesting that early intervention may be needed in younger diabetic patients to reduce the risk of DR [14-17].

Trends in Diabetic Retinopathy Subtypes:

The study also examined the distribution of non-VTDR and VTDR cases over the three-year period. Non-VTDR cases accounted for the majority of patients in 2019 (84.3%), but this percentage gradually decreased over the study period. Conversely, the percentage of VTDR cases increased from 15.6% in 2018 to 17.7% in 2019 [18-19]. This shift suggests a growing burden of vision-threatening complications, which is concerning because VTDR is associated with a higher risk of severe visual impairment and blindness. Similar trends have been reported in other studies, such as by Wang et al. (2019) [5], which observed a rising prevalence of VTDR in diabetic patients over time. This trend may be attributed to worsening diabetes control, increased life expectancy of diabetic patients, and the aging population [20-21].

This study's findings underscore the importance of early intervention in preventing the progression from non-VTDR to VTDR, which is a significant cause of vision loss in diabetic patients. Other studies have highlighted the role of tight glycemic control and regular screening in preventing the onset of VTDR, supporting the need for integrated healthcare approaches to reduce the risk of severe visual impairment in diabetic patients.

Treatment Patterns:

Regarding treatment, patients with VTDR were most commonly treated with pars planavitrectomy (PPV), which showed an increase in the percentage of patients receiving this intervention from 68.3% in 2017 to 72.1% in 2020. This finding aligns with results from a study by Lee et al. (2019) [6], which found that PPV is commonly used in advanced stages of diabetic retinopathy, particularly in cases involving vitreous hemorrhage or retinal detachment. The increase in PPV treatments in this study may reflect either a rise in the severity of VTDR cases or improvements in surgical techniques and access to care that have made vitrectomy a more common and accessible treatment option [22-23].

In contrast, treatment with pan-retinal photocoagulation (PRP) showed a decline after peaking in 2018 (40.4%), with a decrease to 23.6% in 2019. This shift could be attributed to several factors, including the growing use of anti-VEGF injections as a first-line treatment for proliferative diabetic retinopathy. A study by Gower et al. (2019) [7] also reported a decrease in the use of PRP in favor of anti-VEGF therapy, which has been shown to be effective in reducing retinal edema and improving vision outcomes in diabetic retinopathy

patients [24-25]. This study's decline in PRP treatments suggests a potential shift in treatment preferences or regional differences in therapeutic approaches.

Anti-VEGF therapy, which showed a slight decrease from 5.53% in 2018 to 4.12% in 2019, is increasingly used for diabetic macular edema and proliferative diabetic retinopathy. However, the relatively low uptake of anti-VEGF injections in this study could be due to factors such as cost, limited access to medications, or treatment adherence challenges. Other studies, such as those by Tufail et al. (2019) [8], have found varying rates of anti-VEGF use across different regions, with economic barriers often limiting widespread access to these therapies.

Clinical Implications:

The increasing prevalence of VTDR, coupled with the growing use of PPV, highlights the need for enhanced screening and early detection of diabetic retinopathy. As VTDR cases are more likely to lead to irreversible vision loss, timely interventions such as PRP, anti-VEGF injections, and PPV are crucial for preserving vision. The decline in PRP and anti-VEGF treatment percentages may warrant further investigation into whether these treatments are being replaced by other modalities or if there is underutilization of proven therapies in the local setting. The evolving trends in treatment, especially the decline of PRP and the shift towards PPV, require close monitoring to ensure that patients are receiving optimal care based on their individual clinical needs.

Moreover, the changing trends in treatment choices emphasize the evolving landscape of diabetic retinopathy management. Multimodal therapy, which includes a combination of laser treatments, surgical interventions, and pharmacologic therapies, continues to be essential in the management of DR. Previous studies have shown the effectiveness of combination therapies in improving long-term outcomes for diabetic retinopathy patients, underscoring the importance of tailored treatment plans based on patient-specific factors.

Limitations and Future Directions:

This study is limited by its retrospective nature and reliance on de-identified medical records. While it provides valuable insights into treatment patterns and patient demographics, further prospective studies are needed to better understand the factors influencing treatment choices and long-term outcomes in diabetic retinopathy patients. Additionally, studies examining the impact of diabetic control and comorbid conditions on the progression of DR would provide deeper insights into disease management. Other studies, such as the one by Zhang et al. (2019) [9], have suggested that poor glycemic control and the presence of comorbidities, such as hypertension, significantly increase the risk of DR progression. Future research should explore the role of multidisciplinary care in improving patient outcomes.

Conclusion

In conclusion, this study highlights the increasing burden of VTDR, the shift in treatment practices over time, and the need for ongoing efforts to improve screening, treatment, and prevention strategies for diabetic retinopathy. These findings are consistent with previous studies, which have documented similar trends in the rising prevalence of VTDR and changes in treatment preferences. Moving forward, a comprehensive, patient-centered approach is essential to optimizing the management of diabetic retinopathy and reducing the risk of vision loss.

Foot Note

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