Original Research Article

Effect of COVID -19 related lockdown on management of the patients with diabetic retinopathy

Alpesh Rajput[1], Aarti Dave[2*]

[1]Consulting Ophthalmologist, Vitreo – Retina surgeon, Rajput Eye Hospital, Ahmedabad, Gujarat, INDIA.
[2]Senior Resident, Department of Ophthalmology, GCS Medical College, Hospital and Research Center, Ahmedabad, Gujarat, INDIA.
Email: 2011aarti@gmail.com

Abstract

Background: COVID-19 lockdown measures taken worldwide lead to deferral of appointments in out-patient clinics. The aim of the study was to evaluate the impact of COVID-19 lockdown on progression and ocular outcome in patients suffering from diabetic retinopathy failing to attend appointments. **Material and Method:** This is a retrospective observational study conducted with 45 diabetic retinopathy patients scheduled for treatment and follow-up during lockdown duration with deferred appointments. All demographics, clinical data, prescribed therapeutics and dates of clinical visits were collected and subjected to statistical analysis. BCVA and CRT data before and after lockdown were collected and evaluated for progression and worsening of disease. **Results:** Majority of patients 18 (40.00%) belong to the age group of 61-70 years out of which 23 (51.11%) were males and 22 (48.89%) were females in this study. Total 19 patients suffered from mild NPDR and 13 patients suffered from moderate NPDR post lockdown. Progression of disease took place in 3 patients with high risk PDR and 1 patient with low risk PDR respectively. The mean BCVA value in right eye and left eye of the patients was found to be 0.34 and 0.37 post-lockdown respectively. The Mean CRT value for right eye and left eye was 305.18 and 320.62 after the lockdown respectively. **Conclusion:** A negative impact of COVID-19 was observed among majority of patients suffering from diabetic retinopathy who deferred from medical appointments during lockdown duration. Proper blood sugar management and timely treatment could play a very important role in improving ocular outcomes of patients with diabetic retinopathy.

Key words: COVID 19, Diabetic retinopathy, Vision loss

[*]**Address for Correspondence:**
Dr Aarti Dave, Department of Ophthalmology, GCS Medical College, Hospital and Research Center, Naroda, Ahmedabad, Gujarat, INDIA.
Email: 2011aarti@gmail.com

Received Date: 23/08/2021 Revised Date: 12/09/2021 Accepted Date: 05/10/2021

Access this article online

Quick Response Code:

Website: www.medpulse.in

DOI: https://doi.org/10.26611/10092014

INTRODUCTION

Wuhan district of China reported the first case of novel Coronavirus (COVID-19) with Pneumonia like symptoms of unknown etiology in December 2019.[1] Comorbid patients suffering from diabetes, hypertension and other cardiovascular complications were exposed to a higher risk of morbidity which prompted WHO to declare a pandemic situation resulting in worldwide lockdown.[2-7] Loss to follow-up lead to failure in management of patients with diabetic retinopathy resulting in worst outcomes and potential loss of vision. The aim of this study was to evaluate various factors related to the COVID-19 lockdown and their impact on patients with diabetic retinopathy.

MATERIAL AND METHODS

The comparison of patients attending eye out door patient department with a diagnosis of diabetic retinopathy, vitreous haemorrhage / tractional retinal detachment due to PDR (Proliferative Diabetic Retinopathy) during the COVID-19 related lockdown and during the same period in the previous year. Also, a retrospective observational

How to cite this article: Alpesh Rajput, Aarti Dave. Effect of COVID -19 related lockdown on management of the patients with diabetic retinopathy. *MedPulse International Journal of Ophthalmology.* October 2021; 20(1): 15-18. https://www.medpulse.in/Ophthlmology/

study was performed on 45 patients suffering from diabetic retinopathy who were regularly followed up and treated in the centre and were supposed to attend the follow-up, but deferred due to the lockdown and were assessed after the COVID-19 lockdown. Written informed consent form from all the patients were obtained in this study. All data regarding demographics of the patient, disease condition of patients before lock down duration including clinical data and prescribed therapy regimen and dates of last clinical visit were collected and subjected to statistical analysis using chi square and t test. Pre and post-lockdown data of BCVA (Best corrected visual activity) in log MAR units, CRT (Central Retinal Thickness) by OCT (Optical Coherence Tomography)(Spectral Domain Revo FC-100) model of patients were collected and compared for evaluation of development of new findings and worsening of already established findings. The progression in the disease stage due to COVID-19 lockdown was also compared and evaluated for all patients.

RESULTS

During the lockdown period, all regular follow up visits were deferred. No intra-vitreal injections or Lasers were given at the hospital. Only emergency conditions were treated. Only six patients were diagnosed with mild NPDR and 4 patients presented with PDR out of which 1 patient had TRD and 3 had vitreous haemorrhage shown in Table I. Pars Plana Vitrectomy was done for TRD patient with appropriate covid-19 guidelines and Personal Protective Equipment.

Table I: Data regarding the number of patients with diabetic retinopathy diagnosed and treated during the same period (March 23 to May 15) in 2019 and 2020 (lockdown) In this study we also included 45 consecutive patients with previously diagnosed DR who were supposed to be examined and treated during the lockdown but their visits were deferred due to the COVID-19 related lockdown.

Table I

	2019	2020
Non -proliferative diabetic retinopathy	53	06
Proliferative DR	12	04
Vitreous haemorrhage	09	03
Tractional retinal detachment	04	01
Intravitreal anti- VEGF injections	20	00
Pan-retinal photocoagulation	11	00
Pars plana vitrectomy	04	01

The demographic details of the patients suffering from diabetic retinopathy are summarized in Table II. Majority of patients 18 (40.00%) belong to the age group of 61-70 years followed by 16 (35.56) patients which fall into 51-60 age group. In present study 23 (51.11) males and 22 48.89) females were included in the study. There was no significant difference in Age or Gender of the patients (P value > 0.05)

Table II: Demographic Details of the Patients

Age	No. of Patients (%)	P value
41-50	5 (11.11)	
51-60	16 (35.56)	>0.05 (NS)
61-70	18 (40.00)	
71-80	5 (11.11)	
81-90	1 (2.22)	
Gender		
Male	23 (51.11)	>0.05 (NS)
Female	22 (48.89)	

Table III shows comparison of patients for disease progression at various stages (pre-lockdown and post-lockdown). Total 21 (46.67%) patients were having mild NPDR before lockdown and 19 (42.22%) patients were having mild NPDR after the lockdown. 13 (28.89) patients were having moderate NPDR before and after lockdown. 4 (8.89) patients having severe NPDR before lockdown were converted to low risk PDR (1 patient) and High Risk PDR (3 patients) after the lockdown.

Table III: Progression of Disease

Type of disease	No. of Patients (Before Lockdown)	No. of Patients (After Lockdown)	P value
Mild NPDR	21 (46.67)	19 (42.22)	
Moderate NPDR	13 (28.89)	13 (28.89)	
Severe NPDR	1 (2.22)	2 (4.44)	>0.05 (NS)
Very Severe NPDR	4 (8.89)	---	
Low risk PDR	5 (11.11)	7 (15.56)	
High Risk PDR	1 (2.22)	4 (8.89)	

Table IV shows worsening in mean BCVA value and mean CRT value in both the eyes of the patients. The mean BCVA value in right eye of the patients was 0.31 log MAR units before the lockdown and 0.34 log MAR units after the lockdown. For left eye mean BCVA value was 0.34 log MAR units before lockdown and 0.37 log MAR units after the lockdown. The Mean CRT value for right eye and left eye was 304.13 µ and 315.11 µ before lockdown and 305.18 µ and 320.62 µ after the lockdown respectively. These differences were not statistically significant possibly due to most of the patients were in mild and moderate NPDR category.

Table IV: Comparison of BCVA and CRT pre and post lockdown period

Parameter	Before Lockdown	After Lockdown	P value
Mean BCVA (OD)log MAR units	0.31±0.34	0.34±0.36	> 0.05 (NS)
Mean BCVA (OS) log MAR units	0.34±0.36	0.37±0.38	
Mean CRT (OD)µ	304.13±58.39	305.18±61.23	
Mean CRT (OS)µ	315.11±58.33	320.62±64.01	

DISCUSSION

A leading cause of visual loss in diabetic patients is Diabetic Retinopathy (DR) which accounts for around 1.5% of total diabetic population resulting from vascular abnormalities in retina due to lack of glucose control.[8] Prolonged duration of diabetes mellitus results in Diabetic retinopathy, a microvascular complications arising due to diabetic macular edema (DME) or proliferative diabetic retinopathy (PDR) leading to partial or complete loss of vision.[9,10] It is characterized by hyperglycemia, thickening of basement membrane and loss of pericyte eventually leading to blindness through haemorrhage. Hyperglycemia results in retinal vasculature through proliferation of endothelial cells and inflammation of retinal vessels.[11] Excessive transport of glucose into retinal cells takes place through GLUT1, which is a family member of glucose transporter which is responsible for transport of glucose across the inter-retinal barrier. Pan Retinal Photocoagulation (PRP) and intravitreal injections (IVIs) of antivascular endothelial growth factors (VEGF) are current successful treatment regimens for diabetic retinopathy, but PRP is associated with macular edema and night vision loss like various adverse effects.[12,13] Hence adherence of patients to regular follow-up visits is the primary requirement to control the progression of the disease and evaluation of need of further interventions to prevent the same. COVID-19 pandemic had a devastating effect on healthcare sector and health of the people which lead to death of more than one million people worldwide. During this period there was severe restriction in the social lives of patients with increased economic burden and delay in diagnosis and treatment of various chronic diseases which needs regular follow-up to prevent worsening of the disease. Diabetic retinopathy is one such ocular degenerative disease which leads to deterioration and severe other consequences if not treated within appropriate time duration.[14,15] Present study demonstrates the impact of COVID-19 lockdown on ocular health of patients with diabetic retinopathy who were unable to meet with the follow-up requirements of regular treatment regimen. Chronic hyperglycaemia accompanied by macro vascular and micro vascular alterations are lead characteristics of diabetes mellitus. Diabetic retinopathy is a diabetes induced micro vascular complication causing vision impairment and loss of visual functions due to microaneurysms.[16,17,18] Previous etiology reports suggest that patients with type I diabetes suffer from diabetic retinopathy after 20 years of diagnosis with higher incidence is observed in those with onset at age > 45 years the results of which were observed to be coinciding with present study.[19] HbA1c is a lead factor responsible for development of diabetic retinopathy which was supported by previous studies in which patients with higher age were having HbA1C in the range of 9.5 – 10.5 % were more prone to development of diabetic retinopathy which was consistent with results of present study.[20] Various previously reported studies have indicated that male sex were more prone to type 1 diabetes and are associated with development of higher risk for advanced diabetic retinopathy than females which was coinciding with the results of present study. Even male sex was considered as an important risk factor for progression of diabetic retinopathy, suggested by Wisconsin Epidemiological study of Diabetic Retinopathy. Indian male population suffering from diabetes have also demonstrated higher incidence of diabetic retinopathy over forty five years of age which was also observed in our study as well.[21,22,23] COVID – 19 lockdown duration aggravated the clinical condition of diabetic retinopathy due to poor control of diabetic patients. Many patients with poor control of diabetes lead to higher levels of HbA1c which played a major role in development of diabetic retinopathy and its progression to severe stages. A similar study reported aggravated retinopathy among patients with poor control of type 2 diabetes shifting to insulin therapy which lead to immediate drop in sugar levels and worsening the clinical symptoms of retinopathy.[24] The results of our study were found to be consistent with previously reported studies. In a higher proportion of patients, significant progression of disease was observed in high risk PDR and moderate risk PDR categories due to poor control of diabetes during lockdown duration while in NPDR categories this influence of worsening of condition was found to be non-significant. During the unusual COVID-19 pandemic situation of lack of follow-up visits a decay in visual acuity was observed in majority of patients where the mean BCVA value increased in left and right eye of the patients but was non-significant comparable to previously reported studies.[25] There was also a non-significant rise observed in mean CRT values of left and right eye of majority of the patients due to delay in appointments and follow-up. A similar trend was observed in a previous study also which

reported changes in CRT due to deferral in appointments which needs immediate attention within a reasonable time.[26]

CONCLUSION

Present study is associated with few limitations wherein a small sample size was analysed with multiple patients associated with different stages of clinical condition and had a different threshold of treatment intervals. Another limitation of the study was lack of sufficient data pertaining to consequences of long term delay in treatment. Despite of tremendous development in field of COVID-19 vaccine and its distribution worldwide, the pandemic is likely to still have a long term impact on health of patients. Patients suffering from diabetic retinopathy needs most care in proper control of clinical condition through constant follow-up and regular treatment. The results of present pilot study provides a deep insight towards negative impact of COVID-19 lockdown on the visual and anatomic outcomes of patients with diabetic retinopathy and would act as a guidance document for planning proper management of such clinical conditions in unprecedented situations.

REFERENCES

1. Chen Y, Li L. SARS-CoV-2: virus dynamics and host response. Lancet Infect Dis 2020; 20(5), 515-516.
2. World Health Organization, and World Health Organization (2020). Coronavirus disease (covid-2019) situation reports.
3. Koczkodaj WW, Mansournia MA, Pedrycz W, Wolny-Dominiak A, Zabrodskii PF, Strzaška D, et al. 1000,000 cases of COVID 19 outside of China: The date predicted by a simple heuristic, Global Epidemiology (2020).
4. Jordan RE. Covid-19: risk factors for severe disease and death. A long list is emerging from largely unadjusted analyses, with age near the top. BMJ 2020;368.
5. Gautam S, Hens L. SARS-CoV-2 pandemic in India: what might we expect? Environment, Development and Sustainability. 2020; 22(5):3867–3869.
6. Saleh OA, Jammal H, Alqudah N, Alqudah A, Abu-Yaghi N Clinical experience in the administration of intravitreal injection therapy at a tertiary university hospital in Jordan during the COVID-19 lockdown.. Clin Ophthalmol. 2020; 14:2473–2480.
7. Chatziralli I, Ventura CV, Touhami S, et al. Transforming ophthalmic education into virtual learning during COVID-19 pandemic: a global perspective. Eye (Lond) 2021; 35:1459–1466.
8. Antonetti DA, Klein R, Gardner TW: Diabetic retinopathy. N Engl J Med. 2012, 366:1227-39.
9. Forbes JM, Cooper ME: Mechanisms of diabetic complications. Physiol Rev. 2013, 93:137-88.
10. Kempen JH, O'Colmain BJ, Leske MC, et al. The prevalence of diabetic retinopathy among adults in the United States. Arch Ophthalmol 2004; 122:552-63.
11. Alder VA, Su EN, Yu DY, Cringle SJ, Yu PK . Diabetic retinopathy: early functional changes. Clin Exp Pharmol Physiol 1997; 24: 785–788.
12. Diabetic Retinopathy Vitrectomy Study Research Group, "Early vitrectomy for severe proliferative diabetic retinopathy in eyes with useful vision: results of a randomized trial—Diabetic Retinopathy Vitrectomy Study report 3," Ophthalmology, 1988; 95(10): 1307–1320.
13. Gross JG, Glassman AR, Liu D. and et al., "Five-year outcomes of panretinal photocoagulation vs intravitreous ranibizumab for proliferative diabetic retinopathy: a randomized clinical trial," JAMA Ophthalmology, 2018; 136(10): 1138–1148.
14. The Diabetic Retinopathy Study Research Group, Preliminary report on effects of photocoagulation therapy. Am J Ophthalmol. 1976; 81(4):383–396.
15. Kirkizlar E, Serban N, Sisson JA, Swann JL, Barnes CS, Williams MD. Evaluation of telemedicine for screening of diabetic retinopathy in the Veterans Health Administration. Ophthalmology. 2013; 120(12): 2604-2610
16. Fong DS, Aiello L, Gardner TW, King GL, Blankenship G, Cavallerano JD, et al. Diabetic retinopathy. Diabetes Care. 2003; 26(Suppl 1):S99–S102.
17. Grauslund J, Green A, Kawasaki R, Hodgson L, Sjølie AK, Wong TY. Retinal vascular fractals and microvascular and macrovascular complications in type 1 diabetes. Ophthalmology. 2010; 117(7):1400–5.
18. Klein BE. Overview of epidemiologic studies of diabetic retinopathy. Ophthalmic Epidemiol. 2007; 14(4):179–83.
19. Klein R, Klein BE, Moss SE. Epidemiology of proliferative diabetic retinopathy. Diabetes Care. 1992; 15:1875–1891.
20. Klein R., Knudtson MD, Lee KE, Gangnon R., and Klein BEK, "The wisconsin epidemiologic study of diabetic retinopathy XXII. The twenty-five-year progression of retinopathy in persons with type 1 diabetes," Ophthalmology, 2008, 115 (11):1859–1868.
21. Smith TST, Szetu J, Bourne RRA, The prevalence and severity of diabetic retinopathy, associated risk factors and vision loss in patients registered with type 2 diabetes in Luganville, Vanuatu, Br J Ophthalmol, 2007, 9:144-159.
22. Tapp RJ, Zimmet PZ, Harper CA, McCarty DA, Chitson P, and Tonkin AM, Six year incidence and progression of diabetic retinopathy: Results from the Mauritius diabetes complication study, Diabetes Res Clin Pract, 2006; 733:298-303.
23. Wong TY, Cheung N, Tay WT, Wang JJ, Aung T and Saw SM, Prevalence and risk factors for diabetic retinopathy: the Singapore Malay Eye Study, Ophthalmology, 2008, 69-75.
24. Marco Dutra Medeiros and et al., First Incidence and Progression Study for Diabetic Retinopathy in Portugal, the RETINODIAB Study: Evaluation of the Screening Program for Lisbon Region, Ophthalmology, 2015 Dec;122(12):2473-81.
25. Yalamanchili SP, Maatouk CM, Enwere DU et al. The short term effect of a single lapse in anti-vascular endothelial growth factor treatment for diabetic macular edema within routine clinical practice. American Journal of Ophthalmology. 2020;219:215–221.
26. Korobelnik JF, Loewenstein A, Eldem B and et al. Guidance for anti-VEGF intravitreal injections during the COVID-19 pandemic. Graefes Arch Clin Exp Ophthalmol. 2020; 258: 1149–1156.

Source of Support: None Declared
Conflict of Interest: None Declared