



PROGRESSION OF DIABETIC RETINOPATHY IN PATIENTS AFTER COVID-19

Azamat F. Yusupov¹, Shirin A. Djamalova², Narzikul Kh. Makhmudov³

¹ DSc, Professor, Director of Republican Specialized Scientific and Practical Medical Center of Eye Microsurgery, Tashkent, Uzbekistan.

<https://orcid.org/0000-0003-1040-2866>

² DSc, Associated professor, Republican Specialized Scientific and Practical Medical Center of Eye Microsurgery, Tashkent, Uzbekistan.

<https://orcid.org/0000-0002-8765-8176>

³ PhD researcher, Republican Specialized Scientific and Practical Eye Microsurgery Medical Center, Tashkent, Uzbekistan.

<https://orcid.org/0000-0003-1098-1810>

Article DOI: <https://doi.org/10.36713/epra13956>

DOI No: 10.36713/epra13956

SUMMARY

Research Objective: assessment of the degree of progression of diabetic retinopathy (DR) in patients who have had a coronavirus infection.

Methods. A retrospective and prospective analysis of the severity of DR was performed in 84 patients with type 2 diabetes mellitus who underwent COVID-19. Based on a comparative analysis of the dynamics of the disease during the pandemic (2020-2021) and the "pre-pandemic period" (2018-2019).

Results. In persons who underwent COVID-19, the progression of the stages of non-proliferative retinopathy prevailed. In most cases, there was a transition from the mild stage of non-proliferative retinopathy to moderate and moderate to severe.

Conclusion. Postponed COVID-19 contributes to a significant progression in the form of an increase in the level of the non-proliferative stage of DR

KEY WORDS: COVID-19; diabetic retinopathy; progression.

INTRODUCTION

Throughout the pandemic, scientific publications have increasingly focused on publishing and expanding research [1,2,3,4] dedicated to ophthalmological manifestations of coronavirus infection. According to the literature, numerous cases of various visual organ impairments have been identified in COVID-19, as confirmed by various studies [5,6,7]. Complications related to the vascular coat and retina, resulting from developing coagulopathy and vasculitis, are of great interest as they significantly alter the course of the disease towards aggravation [8,9].

Currently, diabetic retinopathy (DR) represents one of the most common retinal diseases that can lead to vision loss in working-age individuals. Patients with diabetes mellitus (DM) are particularly vulnerable to coronavirus infection since there are multiple publications indicating a more severe course of the disease in such patients and its association with obesity as one of the most significant comorbidity factors [10,11,12,13].

Some studies [14,15,16] have shown that coronavirus infection can influence the course and prognosis of DM and its

complications through various mechanisms. It is particularly important to note the impact of glycemic decompensation in patients, which can be induced by the direct effect of the virus, as previously described as COVID-19-associated hyperglycemia in patients without a history of DM. Prolonged therapy with glucocorticosteroids, sometimes administered as methylprednisolone pulse therapy, is also a significant factor affecting the glycemic level [17,18].

Given the above, special attention should be paid to studying the impact of coronavirus infection on diabetic retinopathy (DR), including its peculiarities in terms of progression, various stages, and complications.

RESEARCH OBJECTIVE

To assess the degree of diabetic retinopathy (DR) progression in patients who have experienced a coronavirus infection based on a comparative analysis of the disease dynamics during the pandemic period (2020-2021) and the pre-pandemic period (2018-2019).



MATERIAL AND METHODOLOGY

Patients. The study included 84 patients with diabetes mellitus (DM) who had confirmed laboratory evidence of past COVID-19 and underwent examination and treatment at the Termez Branch of the National Scientific and Practical Medical Center of Medical Genetics. The mean age of the patients was 56.6±6.3 years. The gender distribution was as follows: 35 males (41.7%) and 49 females (58.3%).

The Inclusion Criteria for Patients in the study were as follows

Confirmed diagnosis of diabetic retinopathy based on ophthalmological examination data;
 Availability of ophthalmological examination data conducted at the institution where the study was performed in 2019;
 Confirmed diagnosis of past COVID-19 based on immunological (ELISA, PCR) or instrumental (chest CT scan) diagnostic methods;
 Availability of laboratory test results (complete blood count, biochemical blood analysis, coagulogram) and information on the received treatment for COVID-19.

The Exclusion Criteria for patients in the study were as follows

Inability to comply with the requirements of the study; presence of systemic diseases that could affect the study results;
 Presence of glaucoma or other pathologies of the fundus (macular edema, epiretinal fibrosis, wet or dry age-related macular degeneration, etc.)
 Use of medications that could potentially affect the course of diabetic retinopathy.

METHODOLOGY

A retrospective analysis of ophthalmological examination results of patients with type 2 diabetes mellitus (DM) in 2018-

2019 was conducted at the Termez Branch of the Republican Scientific and Practical Medical Center of Medical Genetics. The examination involved comparing the ophthalmological findings of patients during their visits to the center at two time points, with a temporal interval of 10-12 months between them. Subsequently, the study took on a prospective nature.

The third data collection point involved examining patients by an ophthalmologist during their stay at a COVID-19 treatment facility in the period of 2020-2021. The examination was conducted during the acute phase of COVID-19, 14 days after confirming the diagnosis. It included ophthalmoscopy using a portable fundus camera and an assessment of the stage of diabetic retinopathy (DR) according to the ICO classification (2017).

For the fourth data collection point, patients were revisited 10-12 months after recovering from COVID-19, and their complete ophthalmological examination results were analyzed at the specialized ophthalmological institution (Termez Branch of the Republican Scientific and Practical Medical Center of Medical Genetics). The evaluation included assessing the stage of DR based on the ICO classification (2017).

RESULTS

Over the 10-12 month period in 2018-2019, according to the data from the retrospective analysis, progression of diabetic retinopathy (DR) was observed in a total of 17 eyes (10.1%). When analyzing the stages of DR where progression was more frequently detected, the ratio was approximately equal, with the pathological process progressing more in the mild non-proliferative and moderate non-proliferative stages of DR (Table 1).

Table 1
Dynamics of DR progression.

Stage of DR	1 st data collection point		2 nd data collection point		3 rd data collection point (acute stage of COVID-19 in 2020-2021 yy)		4 th data collection point (full examination after 10-12 month)	
	n	%	n	%	n	%	n	%
No DR	16	9,5	12	7,1	10	6,0	5	3,0
Mild NPDR	28	16,7	27	16,1	23	13,7	16	9,5
Moderate NPDR	42	25,0	41	24,4	45	26,8	41	24,4
Severe NPDR	38	22,6	42	25,0	44	26,2	56	33,3
PDR	44	26,2	46	27,4	46	27,4	50	29,8
Total	168	100	168	100	168	100	168	100

Comparing the data from the 2nd and 3rd data collection points, the time interval between eye examinations for patients ranged from 3 to 6 months. This comparison of chronological points was conducted to determine the progression of DR during the acute phase of COVID-19. The table results demonstrate that during this chronological period, despite the development of

COVID-19, progression was only observed in 10 eyes (5.9%), among which there were only 2 cases of progression to the severe non-proliferative stage and no cases of progression to the proliferative stage.



In-depth ophthalmological examination data revealed progression of the DR stage in only 44 eyes of 36 patients (42.8%) out of 84, when comparing the DR structure based on the results of the 3rd and 4th examination points. The analysis showed that in individuals who had recovered from COVID-19, progression of the non-proliferative retinopathy stages prevailed. In most cases, a transition was observed from the mild stage of non-proliferative retinopathy to the moderate stage, and from the moderate stage to the severe stage. According to classification criteria, progression of ophthalmoscopic DR symptoms, such as microaneurysms, microhemorrhages, intraretinal microvascular abnormalities, and venular caliber changes, was observed. Development of neovascularization, fibrosis, preretinal or vitreous hemorrhage, indicating progression to the proliferative stage, was comparatively less frequent. In 4 eyes (3.7%) of patients, cases of transition from severe non-proliferative to proliferative stage of DR were identified.

In all cases during the retrospective analysis, a comparison of the mean best-corrected visual acuity (BCVA) was also conducted. The comparative analysis at two study points, 1 and 2, demonstrated no significant differences in BCVA between the mean values: 1st study point - 0.83 ± 0.06 , 2nd study point - 0.82 ± 0.07 , $p = 0.628$. According to the data from the 4th follow-up point, which was approximately 10-12 months after recovering from COVID-19, a significant decrease in the mean value was observed in patients, despite the fact that the differences compared to the values at the 1st and 2nd follow-up points were not statistically significant.

CONCLUSION

In conclusion, it was found that previous COVID-19 infection contributes to significant progression in terms of increasing the level of non-proliferative DR, as evidenced by an increase in microhemorrhages and intraretinal microvascular abnormalities based on the DR classification.

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