Al-Azhar International Medical Journal

Volume 4 | Issue 8 Article 34

2023
Section: Ophthalmology

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How to Cite This Article

Hegazy, Hassan Mohammad; Hodeeb, Ahmad Elsayed; and Aboseada, Mohammad Abdelghany Mohammad (2023) "Assessment of Retinal and Choroidal Circulation in Post COVID-19 Patients," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 8, Article 34.
DOI: https://doi.org/10.58675/2682-339X.1935

ORIGINAL ARTICLE

Assessment of Retinal and Choroidal Circulation in Postcoronavirus Disease 2019 Patients

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Abstract

Background: **Numerous ocular signs have been documented as a result of coronavirus disease 2019 (COVID-19) infections, in addition to severe systemic disease. These manifestations included choroidal and retinal changes. This study aimed to investigate the retinal and choroidal circulation rate in post-COVID-19 patients.**

Aim: **To assess retinal and choroidal circulation in post-COVID-19 patients.**

Patient and methods: **In an observational cross-sectional study, 40 eyes of 20 post-COVID-19 patients attending ophthalmology outpatient clinics of Al-Azhar University hospitals were recruited in the period from mid-June 2022 for 6 months. The following data were collected: Detailed medical history, Complete ophthalmological examination including Uncorrected visual acuity (UCVA), best corrected visual acuity (BCVA), Examining the anterior segment with a slit lamp, measuring the intraocular pressure (IOP), and checking the fundus. A Topcon OCT Triton was utilized to perform Optical Soundness Tomography Angiography (OCTA), too, and Fundus Fluorescein Angiography (FFA) was performed utilizing a Topcon TRC 50DX-Group retinal camera.**

Results: **In the current study, the mean age was 27.5 years. Most patients were males. The mean body mass index was 26.61 ± 4.13. As regards ophthalmic examination, most members were normal and only a few cases showed some abnormalities. As regards Fundus Fluorescein Angiography and OCTA, most of the study members were within the normal range only a few cases showed some abnormalities. Finally, and unlike other studies, our study has proven that COVID-19 may pass without causing retinal microvascular abnormalities.**

Conclusion: **Retinal and choroidal circulation in our study was not markedly affected during the COVID-19 pandemic.**

Keywords: Choroidal circulation, Coronavirus disease 2019, Retinal circulation

1. Introduction

The coronavirus disease 2019 (COVID-19), which was brought on by coronavirus 2 producing severe acute respiratory syndrome, spread to Wuhan, a city in China's Hubei Province (SARS-CoV-2).[1] The respiratory system is involved, which is the main clinical symptom.[2]

Various ophthalmic side effects, including microangiopathy, extraocular muscle paralyzes, and idiopathic intracranial hypertension with papilledema, have been accounted for notwithstanding the extreme foundational infection. Conjunctivitis, extreme keratitis, and intense point conclusion glaucoma all affect the front portion. The retina is impacted by cotton fleece patches, hemorrhages, and retinal vascular impediments.[3]

The natural eye offers direct optical admittance to the retina and its vascular framework for painless optical tasks. The presentation of optical cognizance tomography angiography (OCTA) has changed how medical services suppliers and analysts approach retinal vascular evaluation as of late OCTA.[4] Fundus Fluorescein Angiography (FFA) is a crucially significant indicative strategy for the evaluation of patients with retinal problems. An obtrusive test requires intravenous color imaging for something like 10−15 min.[5] The current study's objective was to

Accepted 6 February 2023.
Available online 8 December 2023

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https://doi.org/10.58675/2682-339X.1935

assess COVID-19 patients' choroidal and retinal circulation.

2. Patients and methods

The Al-Azhar Faculty of Medicine's Ethics Committee gave the study the thumbs up. Prior to enrolment, study volunteers provided written informed consent. In an observational cross-sectional study, 40 eyes of 20 post-COVID-19 patients attending ophthalmology outpatient clinics of Al-Azhar University hospitals were recruited in the period from mid-June 2022 for 6 months.

2.1. Inclusion criteria

We included individuals aged 20–60 and recovered from COVID-19 within 6–18 months from recovery. Diagnosis of COVID-19 was confirmed by PCR at the time of infection.

2.2. Exclusion criteria

Chronic kidney disease, chronic liver disease, high blood pressure, coronary heart disease, or auto-immune collagen illnesses such as systemic lupus erythematosus, rheumatoid arthritis, or ankylosing spondylitis were all rejected. Furthermore, patients with systemic medications associated with retinopathy (e.g., chloroquine) were also excluded from the study. The following data were collected: Detailed medical history, Complete ophthalmological examination including: Uncorrected visual acuity (UCVA) and best corrected visual acuity (BCVA), Anterior segment slit-lamp examination, Intra ocular pressure (IOP) measurement, and Fundus examination: retina and optic disc evaluation using slit lamp biomicroscopy by an auxiliary lens (+78 lens and +90 lens). In addition, Color photography fundus examination and FFA was performed using (Topcon TRC 50DX -canon retinal camera) and OCTA was performed using (Topcon OCT Triton), 6 × 6 mm scan was taken centered on the fovea.

2.3. Statistical analysis

The statistical significance was calculated using the SPSS (Statistical Package for the Social Science) programme version 25.0 (IBM Inc., Chicago, USA) and Microsoft Office Excel 2016 software. For parametric data, continuous variables were displayed as mean SD (standard deviation), and for nonparametric data, as median (min-max). Quantitative data were described using percentages and figures.

3. Results

In the current study, the age ranged from 19 to 54 years with mean of 27.5 years. Most patients were males. The mean body mass index (BMI) of the included patients was 26.61 ± 4.13 (Table 1).

As regard clinical ophthalmic examination, most of the study members were within the normal range only few cases showed some abnormalities. (Tables 2 and 3).

As regard FFA and OCTA, most of the study members were within the normal range only few cases showed some abnormalities (Table 4).

Finally, and unlike other studies, our study has proven that COVID-19 may pass without causing retinal microvascular abnormalities.

4. Discussion

Since December 2019, COVID-19, which is brought on by the highly contagious Coronavirus 2 virus that causes severe acute respiratory sickness, has been recognised as a worldwide pandemic (SARS-COV-2) Cascella and colleagues.[6] Although there have been a number of cases reported as COVID-19 ocular complications, early research suggested that COVID-19 ocular manifestations were generally uncommon Guan and colleagues.[7] In this study, individuals who had undergone COVID-19 were evaluated for retinal and choroidal circulation. The Al-Azhar Faculty of Medicine's Ethics Committee gave the study the thumbs up. Before enrolling in the study, individuals provided written informed consent. 40 eyes of 20 post-COVID-19 patients who attended ophthalmology outpatient clinics at Al-Azhar University hospitals were recruited for a 6-month observational cross-sectional study starting in mid-June 2022. Our results show that the superficial capillary plexus (SCP) and deep capillary plexus vascular density (VD) in early post-COVID-19 patients and the general population are similar (DCP) Savastano and colleagues.[8]

The principal companion study, which gave the greatest scale trial information to resolve this issue in the early postirresistible period of Coronavirus sickness, detailed a cotton fleece spot commonness of 12.9% in the post-Coronavirus populace. Relapse

Table 1. Demographic and clinical data among the studied group.

Demographic and clinical data	Study group (n = 20)
Age/years (Mean ± SD)	27.5 ± 6.79
Median (Min-Max)	26 (19–54)
Sex	n (%)
Male	19 (95%)
Female	1 (5%)
BMI (Mean ± SD)	26.61 ± 4.13
Median (Min-Max)	26.8 (20.2–35)

Table 2. Ophthalmologic examination.

Ophthalmologic examination	Study group (n = 20)
UCVA (Mean ± SD)	
RT-Eye	0.46 ± 0.43
LT-Eye	0.46 ± 0.46
BCVA (Mean ± SD)	
RT-Eye	0.04 ± 0.09
LT-Eye	0.12 ± 0.33
IOP (Mean ± SD)	
RT-Eye	14.75 ± 2.55
LT-Eye	14.45 ± 2.19

examination uncovered that the commonness was practically identical to the control populace Savastano and colleagues.[8]

A recent cross-sectional study by Abrishami and colleagues[9] on 31 patients 2 weeks after they had recovered from COVID-19 shown that both SCP and DCP had lower foveal and parafoveal VD than an equivalent healthy cohort. Given the greater prevalence of immunological disorders, obesity, diabetes, and cardiovascular diseases among people with moderately symptomatic forms of COVID-19 infection, this result needs to be interpreted with caution Vavvas and colleagues.[10]

Anatomical and functional vascular irregularities in the retina may really be related to systemic conditions like the one mentioned over, as the scientific literature has unstintingly demonstrated. The capability to stratify the population for concurrent medical issues is not possible due to the small sample size and lack of retrospective data, which greatly limits the operation of the reported conclusion.

8 because of the finding that 22 of retinal microangiopathy created at a mean of 43 days after the beginning of Coronavirus first side effect, Landecho colleagues[11] conjectured that Coronavirus microangiopathy could act as an in vivo biomarker of fundamental vascular disorder. Savastano and colleagues 8's. study, which found that postCoronavirus cases had progressed mean BMIs and a propensity to have direct relationships with SCP perfusion in 6 mm promotions, loans backing to this recommendation. Savastano and colleagues analysis of a

Table 3. The examination of the including nerves.

Characters	Study group (n = 20)	
Pupil, n (%)	Normal	Abnormal
RT-Eye	20 (100%)	–
LT-Eye	18 (90%)	2 (10%)
Color vision, n (%)	Normal	Abnormal
RT-Eye	19 (95%)	1 (5%)
LT-Eye	18 (90%)	2 (10%)
Fundus, n (%)	Normal	Abnormal
RT-Eye	20 (100%)	–
LT-Eye	19 (95%)	1 (5%)

Table 4. The investigations.

Characters	Study group (n = 20)	
OCT angio n (%)	Normal	Macular ischemia
RT-Eye	20 (100%)	–
LT-Eye	20 (100%)	–
FFA n (%)	Normal	Abnormal
RT-Eye	20 (100%)	–
LT-Eye	19 (95%)	1[a] (5%)

[a] Prepapillary Hge, turuious blood vessels, and leakage.

gathering of cases with a moderate type of the grumbling (low frequence of life-hanging difficulties and ICU confirmations) and impacted by a genuinely low weight of fueling fundamental circumstances in contrast with writing information for hospitalized Coronavirus cases is one more urgent element to consider Mazzaccaro and colleagues.[12]

As a matter of fact, 9 of Coronavirus cases had retinal hemorrhages during the violent phase of the infection, 7 had cotton coat patches, 28 had enlarged modes, and 13 had convoluted vessels Invernizzi and colleagues.[13] Likewise, posterior to controlling for factors, mean tone breadth showed a positive connection with Coronavirus in both extreme and nonserious cases varied with unexposed members, a negative relationship with the period from side effect launch, and a positive relationship with complaint soberness Invernizzi and colleagues.[13]

Likewise, four cases with gentle cotton coat patches and micro hemorrhages along the retinal hall yet no side goods or signs of intraocular vexation were reported by Marinho and colleagues.[14] A 40-time-old Coronavirus case who gave enlarged and convoluted retinal corridors, plate edema, and retinal hemorrhages was recorded in one further case of retinal papillophlebitis Insausti-Garcia and colleagues.[15]

In discrepancy with the age matched controls, mean macular SCP VD and DCP VD were impressively lower in the Coronavirus bunch. The Coronavirus bunch likewise had a bigger FAZ region, but this did not negotiate factual significance. Private examination tracked down egregious sluice mischances in 4 cases, in malignancy of the space of barefaced microvascular irregularities. The rehabilitated mates and the nonhospitalized associates showed no considerable kinds in SCP, DCP VD, and FAZ region, as per this examination.[9] Marinho and colleagues 15 portrayed cotton-coat patches and micro hemorrhages in 4 cases in a new case series, which are demonstrative of an internal retinal ischemia process. Exercising OCTA examination, Savastano and colleagues[8] set up that mended Coronavirus cases had lower helical peripapillary slender supersystem perfusion consistence than age

matched controls. Casagrande and colleagues[16] set up SARS- CoV-2 viral ribonucleic sharp in the retina of people who had passed on with Coronavirus in a posthumous assessment. The meaning of surveying retinal vascular association with this disease would appear to be featured by reports of microvascular injury and apoplexy in cases with extreme Coronavirus impurity Magro and colleagues.[2] The SCP VD and DCP VD were basically lower in this concentrate by Abrishami and colleagues[9] varied with age matched controls. In these examination examinations, the FAZ region and circuit were comparably mathematically expanded, albeit the distinctions were not authentically critical. This could be because of the review's incompetence to identify bitty kinds. Before the enhancement of clinically clear retinopathy, In the early discovery of retinal vascular complaint in primary conditions like diabetes, OCTA testing can be a pivotal tool. This framework might be appropriate to descry microvascular abnormalities comparative microaneurysms, venous beading, advancement of the FAZ, and fine nonperfusion in diabetic eyes with fundamentally no reasonable retinopathy side merchandise. Because of the solid relationship between the quantitative floodgate shortfall appraisals and the clinical phase of retinopathy and the microvascular highlights of OCTA, OCTA can serve as a biomarker of retinal illness in persons with abecedarian ails like diabetes Takase and colleagues.[17]

We know about the review's different crunches. Most importantly, there were fairly many members in our review. The volume of members we anticipated to subscribe up for this study was altogether lowered by barring those with other abecedarian issues that could prostrate visual inflow, still the severe rejection norms likewise basically lowered the volume of puzzling factors. Likewise, there might be huge limits to similar exploration because of the significant expenditure of the examinations, application of intrusive ways (FFA), and attainability of a regulating information base of the OCTA values (at the hour of the review). At long last, to help these issues, redundant examination with lesser illustration figures is needed.

4.1. Conclusion

Retinal and choroidal circulation in our study was not markedly affected during the COVID-19 pandemic (despite presence of post covid retinal microvascular abnormalities proven by other studies). As the number of literature and studies is limited), further research is required to evaluate the prevalence of retinal microvascular abnormalities among post-COVID population. In addition, larger sample may be required.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declared that there were no conflicts of interest.

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