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Original Article

PRESCRIBING PATTERN OF OCULAR MEDICINES IN OPHTHALMIC MANIFESTATIONS OF COVID-19

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) declared as pandemic in March 2020, by WHO still is a cause of concern worldwide. In the year 2024 also, many cases of COVID-19 are being reported worldwide. The systemic manifestations of COVID-19 vary depending upon its severity but at the same time treating the ophthalmic manifestations of COVID-19 also remained challenging. Thus while knowing the prescribing pattern of ocular medicines in ophthalmic manifestations of COVID-19 will surely improve and upskill the clinical scenario and will enhance the rational use of medicines.
Objective: To assess the prescribing pattern of ocular medicines in patients with ophthalmic manifestations of COVID-19.
Materials and methods: This observational cross-sectional study was carried out in 112 patients having the primary diagnosis of COVID-19 infection confirmed by laboratory findings. The patients who were having COVID-19 and concurrent ocular manifestations on admission were included in the study. The study was conducted in the Ophthalmology Department in collaboration with Pharmacology department of Government Medical College, Jammu, J&K after taking approval from institutional ethics committee. Written informed consent from the patients was taken prior to commencement of the study. The data from all the patients who were enrolled in the study was recorded in the form of sociodemographic characteristics such as age, sex etc. The type of ocular manifestations and the prescribing treatment for the respective ocular condition related to COVID 19 was also recorded. The severity of COVID 19 disease was also done into mild, moderate and severe. The patients who were not willing to participate in the study were excluded from the study. The data was analyzed using the simple descriptive statistics.
Results: Of the 112 patients screened, 98 gave consent to participate in the study while as 14 patients were not willing to participate in the study (response rate was 87.5%). Of the 98 participants, 67 were males whereas 31 were females. The Patients of COVID-19 infection presented with various ophthalmic manifestations. The most common complaint was conjunctivitis in (33.6%) patients. Among the various ophthalmic medications Ribavarin was the most common medicine prescribed in 88.7% of patients.
Conclusion: It can be concluded from the present study that many COVID-19 patients had ocular manifestations and in them the conjunctivitis was the most common ocular symptom and many patients had co-morbiditis also due to which they acquired COVID-19 and various other ophthalmic manifestations of Covid-19 due to the compromised immune status in them.

Keywords: *Ocular medicines, COVID-19, Ophthalmic manifestations.*

INTRODUCTION

Severe acute respiratory syndrome coronavirus-2 (SARS-Cov-2) was initially detected in December 2019 in Wuhan, China[1] and within no time Coronavirus disease 2019 (COVID-19) spread across the globe at a rapid pace and was declared a pandemic on March 11, 2020 by WHO.[2] The most common symptoms of COVID-19 are fever, dry cough and shortness of breath[3] due to involvement of respiratory system which gets more frequently infected with SARS-Cov-2 but apart from Respiratory system, COVID-19 also causes secondary damage to other organs that varies based on co-existing diseases in the patient.[4] Studies have shown that SARS-Cov-2 binds to angiotensin converting enzyme 2 (ACE-2) receptors. As these receptors are also present in the eye, this may be a possible transmission route and an organ of infection.[5] SARS-Cov-2 is thought to be transmitted from person to person mainly through respiratory droplets or close contact.[6] The ocular surface is exposed to the outside environment which may become a potential gateway for pathogens such as viruses to invade the human body.

Moreover, ACE-2 which is a cellular receptor for SARS-Cov-2[7] has also been detected in the human retina,[8] vascularised retinal pigment epithelium, choroid[9] and cornea and conjunctival epithelia.[10] For these reasons, it is important to evaluate the clinical spectrum of ocular diseases caused by SARS-Cov-2 infection. COVID-19 may pose challenges in clinical diagnosis because there is no pathognomonic symptom to detect the disease.

Several clinical symptoms have been frequently reported among COVID-19 patients including but not limited to cough, fever, fatigue, sorethroat, nasal obstruction, shortness of breath, headache, sputum production and hemoptysis.[11] Moreover, while some patients show a wider range of gastrointestinal symptoms such as diarrhea, abdominal pain, low apetite and vomitting[12], others have shown renal and ocular symptoms.[13] Most clinical research about SARS-COV-2 have focused on respiratory manifestations; however a growing body of evidence has raised concerns about the ocular complications caused by SARS-COV-2.[14] The reported ocular manifestations of the infection vary greatly and include dry eye, foreign body sensation, itching, blurring of vision, conjunctivitis, chemosis and photophobia.[15] Some studies have even reported conjunctivitis as an early sign for COVID-19 diagnosis.[16]

Knowing the prevalence and type of ocular manifestations of COVID-19 can help physicians diagnose the infection better and sooner in the course of the disease. Therefore, we aimed to summarize the relevant published literature on the ocular manifestations of COVID-19 patients.

MATERIALS AND METHODS

This observational cross-sectional study was carried out in 112 patients having the primary diagnosis of COVID-19 infection by laboratory findings and concurrent ocular manifestations on admission were included in the study. The study was conducted in the Ophthalmology Department in collaboration with Pharmacology department of Government Medical College, Jammu, J&K after taking approval from Institutional Ethics Committee vide No. IEC/GMC/2021/574.Written informed consent from the patients was taken prior to commencement of the study. The data from all the patients who were enrolled in the study was recorded in the form of sociodemographic characteristics such as age, sex etc. The type of ocular manifestations and the prescribing treatment for the respective ocular condition related to COVID 19 was also recorded. The severity of COVID 19 disease was also done into mild, moderate and severe. The mild stage was characterized by the absence of pneumonia and hypoxia. Moderate stage was characterized by the presence of pneumonia in the absence of criteria of the severe stage. The severe form of the disease was characterized by the presence of any of the following: Oxygen satuaration less than 90%, involvement of more than 50% of lung field, a respiratory rate more than 30 cycles/min or any of the manifestations of respiratory distress. All the patients were explained about the nature and purpose of the study. The patients who were not willing to participate in the study were excluded from the study. Statistical analysis of the data was done by descriptive statistics.

RESULTS

Of the 112 patients screened, 98 gave consent to participate in the study while as 14 patients were not willing to participate in the study (response rate was 87.5%). Of the 98 participants, 67 were males whereas 31 were females. The sociodemographic details of the patients are outlined in Table 1 and Figure 1.

The Patients of COVID-19 infection presented with various ophthalmic manifestations. The major ocular complaints with which the patients presented are outlined in Table 2 and Figure 2. The most common complaint was conjunctivitis in (33.6%) patients followed by itching and burning sensation in (16.3%) patients and Pain in eyes in (12.2%) patients.

The various ocular medicines prescribed for the various ocular complaints are outlined in Table 3 and Figure 3. The various ocular medicines prescribed were in the form of drops and ointments. The most common drug prescribed was Ribavirin eye drops in (88.7%) followed by Topical antibiotic eye drops in (70.4%) and lubricating ophthalmic drugs in (82.6%). The other ocular medicines prescribed were Benzalkonium chloride (BAK) in (64.3%), artificial tears in

(62.2%) and steroidal eye drops in (54.1%). Table 4 shows the various co-morbidities in patients presented with ophthalmic manifestations of COVID-19.

Table 1 : Sociodemographic details of the patients

Characteristics	n (%)	
Gender	Male	67 (68.4)
	Female	31 (31.6)
Age (years)	18-30	12 (12.2)
	31-40	27 (27.5)
	41-50	36 (36.7)
	51-60	16 (16.3)
	>60	7 (7.1)

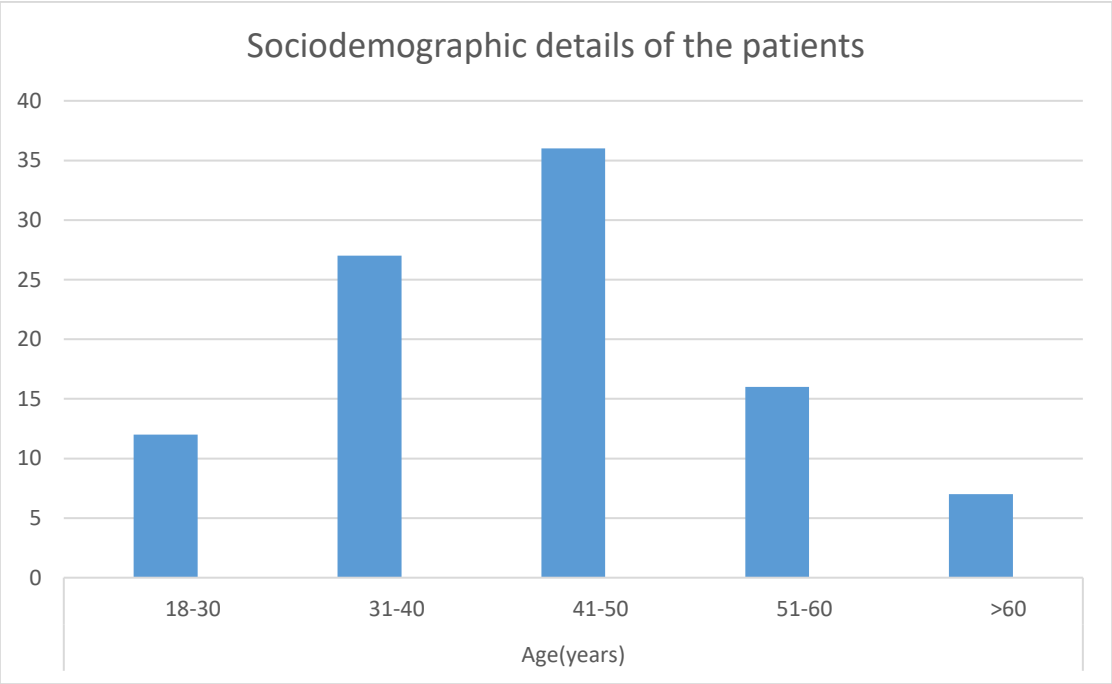

Figure 1: Sociodemographic details of the Patients

Table 2: Chief Ocular complaints

Chief Ocular Complaints	
Ocular Complaints	Percentage of respondents n(%)
Conjunctivities	33 (33.6)
Eye pain	12 (12.2)
Photophobia	9 (9.2)
Itching/Burning sensation/Foreign body sensation	16 (16.3)
Watering/Discharge	4 (4.1)
Redness/Hyperaemia	11 (11.2)
Conjunctival congestion/chemosis	3 (3.1)
Lid edema/Periorbital edema/Ptosis	2 (2.1)
Refractive errors/Blurring of vision	8 (8.2)

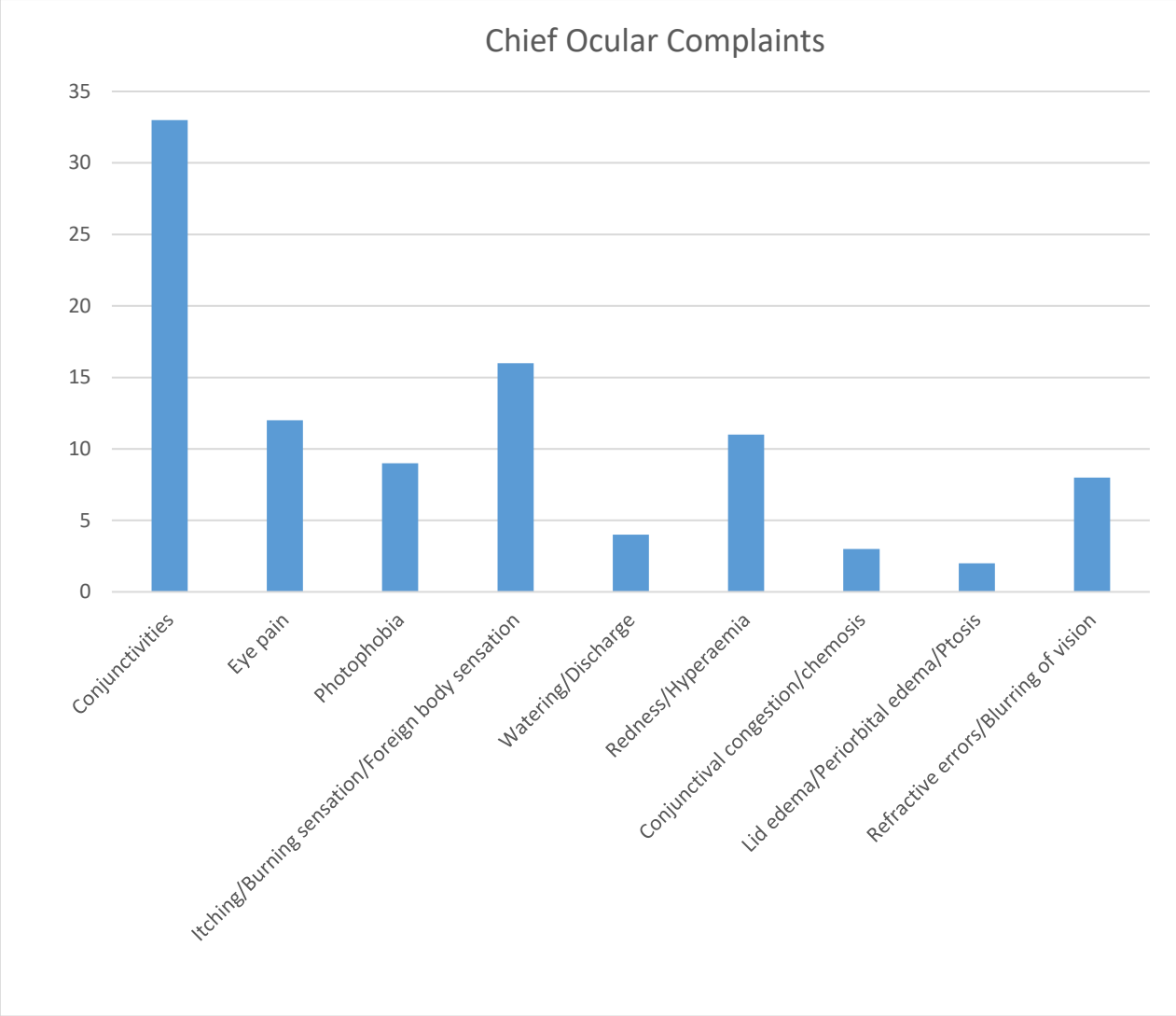

Figure 2: Chief Ocular Complaints

Table 3: Prescribing pattern of ocular medicines	
	RESPONSE n (%)
Ribavirin (eye drops)	**87 (88.7)**
Lubricating ophthalmic ointment/drops	**81 (82.6)**
Topical antibiotics	**69 (70.4)**
Benzalkonium chloride (BAK)	**63 (64.3)**
Artificial tears	**61 (62.2)**
Topical steroids	**53 (54.1)**
Hypertonic saline	**37 (37.8)**
Cold compresses	**19 (19.4)**

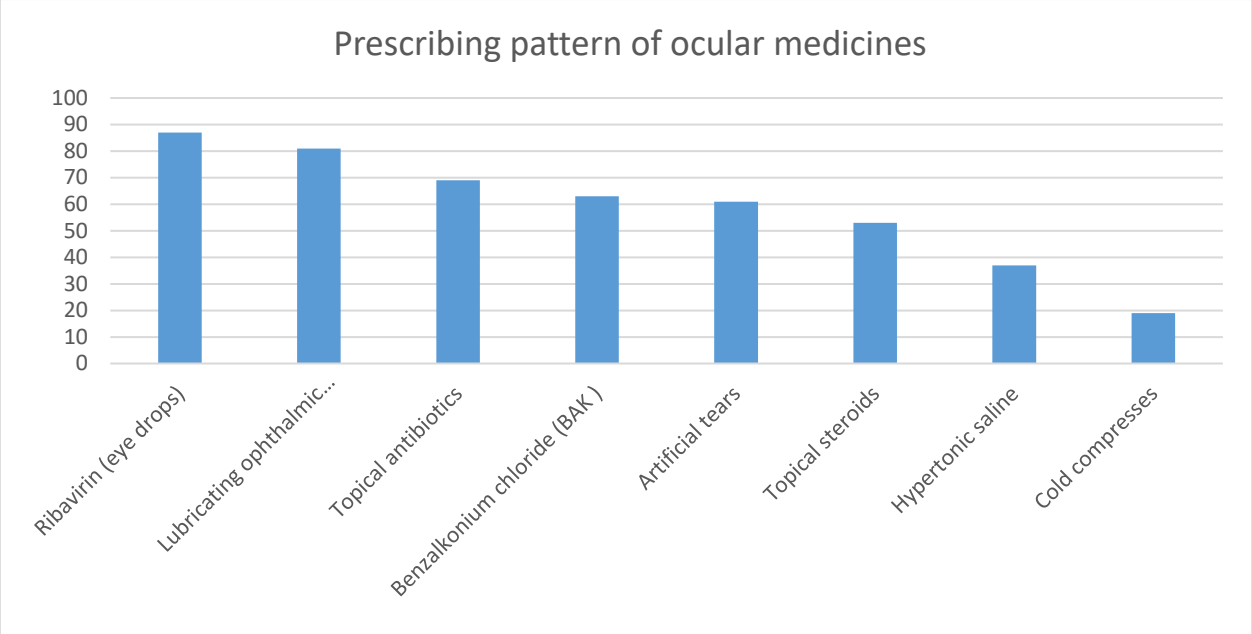

Figure 3: Prescribing pattern of ocular medicines

Table 4: Percentage of patients presented with co-morbidities

Co-morbidities

Co-morbidities	n(%)
Diabetes	17 (17.3)
Hypertension	24 (24.5)
Both Diabetes and Hypertension	9 (9.2)
Others	15 (15.3)
No co-morbidities	33 (33.7)
Total	98

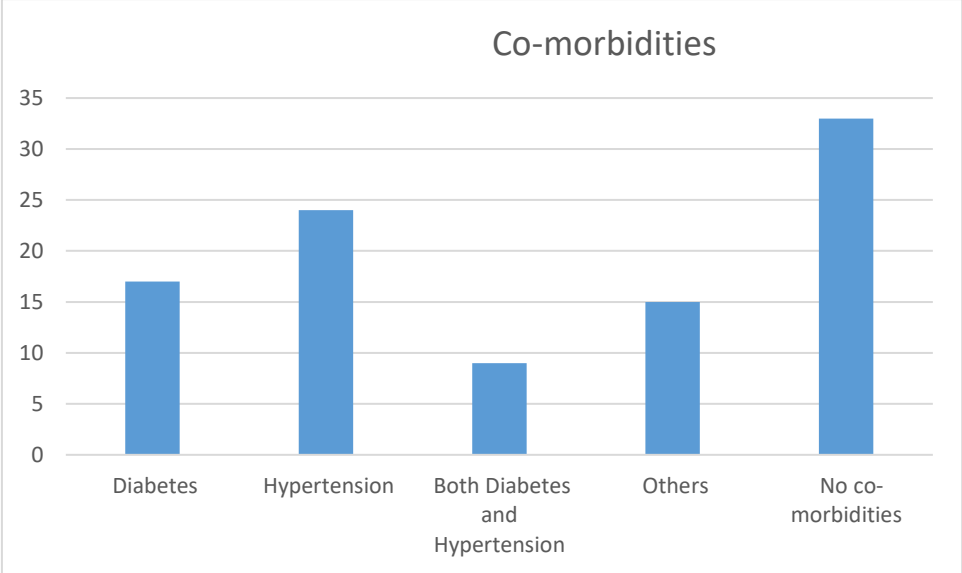

Figure 4: Types of co-morbidities encountered

DISCUSSION

In the present study, males were affected more as compared to females. This is similar to study done by Garcia-Posada M etal.[17] The reason for male preponderance could be that women compared to men are less susceptible to viral infections based on a different innate immunity, steroid hormones and factors related to sex chromosomes. This is similar to a study done by P Conti etal.[18] Most of the patients in our study were of middle aged group as is seen in the study done by P Muralidhar[19]. Many patients of COVID-19 developed eye diseases as it has been seen that numerous respiratory viruses

such as adenovirus, influenza virus, respiratory syncytial virus, coronavirus and rhinovirus exhibit an affinity for ocular tissues which could be responsible for ocular infections.

In a study, done by Costa IF et al[20], dry eye diseases were also reported in patients who had suffered from mild to moderate COVID-19 only. In a study done by Membrilla JA etal[21], it has been observed that eyeache alongwith headache occurred in patients who had mild COVID-19 in the acute stage. The probable reason could be the accumulation of SARS-COV-2 Ribonucleic acid (RNA) virus in trigeminal nerve (nerve endings in the conjunctiva and cornea), which may trigger immune reactivity of Angiotensin Converting Enzyme 2 (ACE 2) in cerebral blood ovessels and cerebral endothelium leading to activation of a cascade of inflammatory reactions and the release of glutamate resulting in persistent headache.

In the present study, refractive errors were developed in 8 (8.2 %) of patients. This is similar to the study done by Alrashidi.[22] It may be because of the development of abnormalities in the tonic mechanism of accommodation. However, much research has to be done in this area to have a better understanding of the mechanism. In the present study Ribavirin eye drops were prescribed more frequently in 87(88.7%) patients followed by lubricating ophthalmic ointment and drops in 81(82.6%) and topical antibiotics in 69(70.4%) of patients. Ribavirin drops were highly prescribed in our study which is similar to the study done by Chen L etal[23] where it was observed that although in some patients the viral illness is self-limited, the Ribavirin eye drops helps in the gradual symptomatic improvement in conjunctivitis of mild COVID illness. Topical antibiotics were prescribed in 69(70.4%) of patients in our study. This is similar to the study done by Joseph S[24] where antibiotics were prescribed in 2nd number. The basis of use of topical antibiotics is due to superimposed bacterial infections. Topical steroids were also used in 54% of patients in the present study which is consistent with the study done by Mobeen H etal.[25] Steroids although flare up the underneath infections have been used in majority of COVID-19 patients to suppress the cytokine storm syndrome. Most of the co-morbiditis found in our study were Diabetes, Hypertension and others which is consistent with the studies done by Watanabe JH etal.[26] It is apparent that many patients who were suffering from co-morbidities like Diabetes had low immune status and thus easily acquired COVID-19 infection.

CONCLUSION

It can be concluded from the present study that many COVID-19 patients had ocular manifestations and in them the conjunctivitis was the most common ocular symptom and many patients had comorbiditis also due to which they acquired COVID-19 and various other ophthalmic manifestations of Covid-19 due to the compromised immune status in them.

Limitations

The sample size was small in our study and thus requires studies with larger sample size.

Declaration:
Conflicts of interests: The authors declare no conflicts of interest.
Author contribution: All authors have contributed in the manuscript.
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