

Changing trend in the pattern of ocular diseases in patients attending ophthalmology department of a teaching institute in North India during COVID-19 pandemic

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ABSTRACT

Purpose: The objective of this study is to report the changing trend in ocular diseases during COVID-19 pandemic. **Methods:** A retrospective review of patients attending the ophthalmology department of a teaching institute was conducted. We studied the 3 months of the COVID period from April 2020 to June 2020. For comparison, we took the corresponding period of April 2019 to June 2019. Data were collected from the medical record section of the Hospital. **Results:** Overall, 876 patients presented during the 2020 period compared to 7,242 patients in the 2019 period. Percentage of female patients decreased from 53.1% to 49.1% in the 2020 period ($P=0.0251$). There is significant decrease in pediatric group in the 2020 period ($P<0.0001$). In the 2019 period, refractive errors was the most common (57.6%) followed by cataract (12.29%), allergic conjunctivitis (3.82%), diabetic retinopathy (3.37%). While in the 2020 period refractive errors, constitute 22.37%, followed by allergic conjunctivitis (8.56%), scleritis/episcleritis (7.19%), dry eyes (7.08%), infective conjunctivitis 6.85%, anterior uveitis (6.74%). In the 2020 period, there was significant decrease ($P<0.00001$) in the percentage of refractive errors, cataract and diabetic retinopathy, and significant increase in painful symptomatic conditions. The features of ocular trauma in the two study periods were also quite different. **Conclusion:** There is significant decrease in patients of curable/avoidable blindness. We should be ready for the increase burden of curable/avoidable blindness and should plan various strategies to overcome the potential backlog of blindness.

Keywords: Changing trend, COVID-19, ocular diseases

Introduction

On December 31, 2019, a cluster of pneumonia cases of unknown origin were reported in Wuhan hospitals.^[1] Two weeks later, new coronavirus was identified through genomic sequencing.^[2] WHO declared COVID-19 as an epidemic on

January 30, 2020.^[3] In India, a complete lockdown was declared starting from 24 March 2020 till 14 April 2020 for 21 days which was extended till 31 May 2020. To prevent the transmission of SARS-COV2 virus, strict guidelines like lockdown, social distancing, use of hand sanitizers, and face masks were enforced. Because of these, new challenges were faced both by patients and ophthalmologists.^[4] The guidelines which were practiced by ophthalmologists include triaging of patients to deal with serious ocular emergencies, management of patient load in operation theatres and outpatient department, use of personal protective measures, and proper infection control.^[5]

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Our hospital continued to offer ophthalmic services on outpatient basis with the aim to provide effective and safe eye care services to the community. Just enough staff was posted on a rotation basis to make sure that these patients were taken care of. It has been observed that even after the lockdown is over, there is significant reduction in total attendance of patients and the pattern of clinical profile has also changed. The uncertainty of coronavirus infection has created lot of anxiety in the community. The anxiety has made people fearful of coming to a hospital for their medical treatment. A pronounced challenge is that of assuaging the panic in the society. With this background in mind, we decided to compare the patient profile in this COVID period for 3 months (April, May, June 2020) with that of last year (April, May, June 2019). We compared the 3 months COVID period (April, May, June 2020) with the same months of last pre-COVID year (April, May, June 2019) considering the seasonal variation which affects the prevalence of various ocular diseases. So our aim in this study is to report the changing trend in ocular diseases presenting to the ophthalmology department of a teaching institute in North India during COVID-19 period.

Materials and Methods

A retrospective review of patients attending the ophthalmology department of a teaching institute in North India was conducted. Extreme care was taken at the hospital to ensure that the universal protocols developed toward preventing the spread of COVID-19 were being strictly implemented and monitored. We studied the 3 months of the period during which functions of our department were affected—from April 2020 to June 2020 (the 2020 period). For comparison we took the corresponding previous year period—April 2019 to June 2019 (the 2019 period). Details of the new patients presented to the ophthalmology department between April 2019 and June 2019 and between April 2020 and June 2020 were collected from the medical record section of the hospital. A comparison was done between the two corresponding periods of 2 years to elucidate the changing trend in this pandemic.

The Ethical clearance was taken from the Institutional Ethics Committee. None of the identifiable parameters of the patient detail were used for analysis of the data. For analysis, the Excel sheet with the data was used. Continuous variables were presented as mean \pm SD and median and categorical variables were presented in number and percentage (%). To calculate *P* value, Z TEST of proportion was used. A *P* value of < 0.05 was considered statistically significant.

Result

Overall, 876 patients presented during the 2020 period compared to 7,242 patients in the 2019 period. The mean number of patients seen per week was 73 (876/12). This was significantly lower than the mean number of 603.5 (7242/12) patients seen per week in the 2019 period. [Figure 1] Prior to the outbreak of COVID-19, our department would handle an average of 2,414 cases per

month, this was now decreased by $>75\%$ in the 2020 period. In the 3 months, the number of patients was 83 in April, 351 in May, and 442 patients in June 2020 which showed $>75\%$ decrease in number of patients as compared to 2,861 patients in April, 2,393 in May, and 1,988 patients in June 2019 [Figure 2].

There were 446 (50.9%) males and 430 (49.1%) females in the 2020 period as compared to 3,401 (46.9%) males and 3,841 females (53.1%) in 2019 period [Figure 3]. The male: female ratio was 1.04:1 as compared to 0.88:1 during the 2019 period. Percentage of female patients decreased from 53.1% to 49.1% in the 2020 period ($P = 0.0251$ at 95% CI).

The mean age of the patients was 35.5 ± 18.72 years while the median age was 36 years in the 2020 period as compared to 33.3 ± 19.42 years with median age of 30 years in the 2019 period.

The mean age was significantly different between the two periods ($P = 0.0007$ at 95% CI).

The most common age group at presentation was between 41 and 50 years with 155 (17.7%) patients in the 2020 period while the most common age group at presentation was between 21 and 30 years with 1,404 (19.4%) patients in the 2019 period [Figures 4 and 5].

There were 147 (16.8%) patients who were children (≤ 16 years) and 729 (83.2%) were adults in the 2020 period while in the 2019 period, 1,704 (23.5%) patients were children (≤ 16 years) and 5,538 (76.5%) were adults. The adult: pediatric ratio was 4.9:1 in the 2020 period as compared to 3.25:1 in the 2019 period. There is significant decrease in pediatric group presentation in the 2020 period ($P < 0.0001$ at 95% CI).

Pattern of ocular diseases in the 2020 period and the 2019 period is quite different [Tables 1 and 2]. In the 2019 period, refractive errors was the most common ocular disease accounting for 57.6% followed by cataract 12.29%, allergic conjunctivitis 3.82%, diabetic retinopathy 3.37%, infective conjunctivitis, 2.76%, trauma 2.54%, etc., [Figure 6]. While in 2020, the top six diseases were refractive errors 22.37%, allergic conjunctivitis 8.56%, anterior uveitis 8.2%, scleritis/episcleritis 7.19%, dry eyes 7.08%, infective conjunctivitis 6.85% [Figure 7].

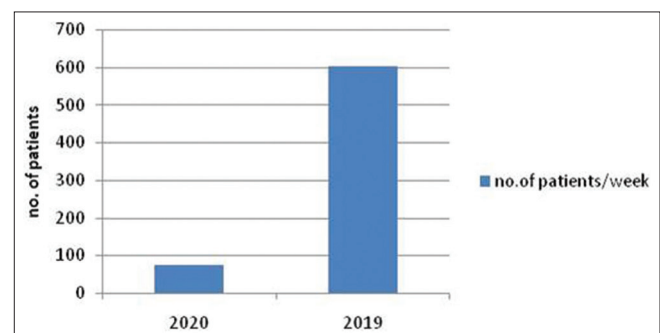


Figure 1: Number of patients in both the periods

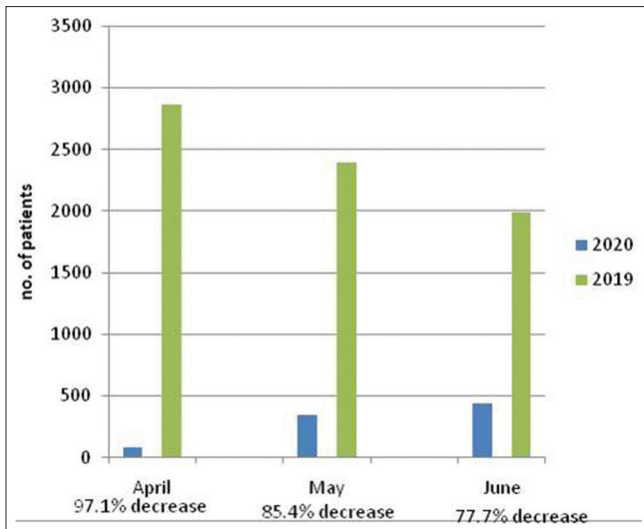


Figure 2: Decrease in percentage of attendance in the 2020 period

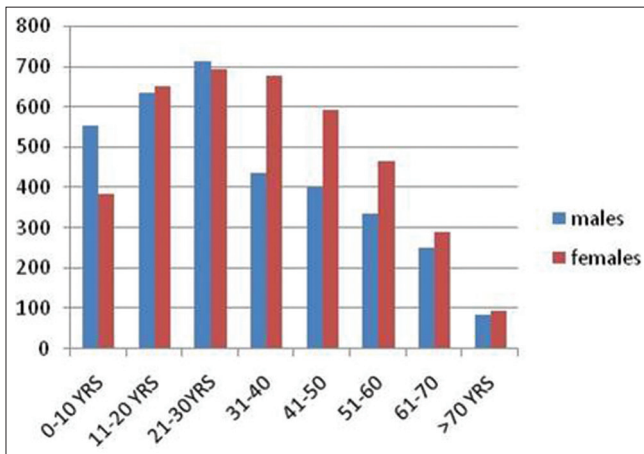


Figure 4: Sex distribution in different age groups in the 2019 period

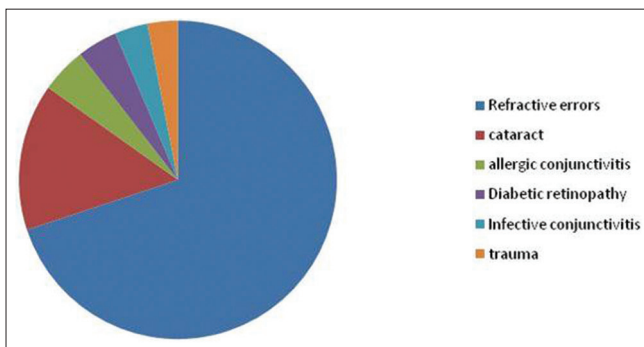


Figure 6: showing top 6 diseases in 2019

Statistically significant decrease was noted in the percentage of certain diseases like refractive errors, cataract, diabetic retinopathy, pterygium in the 2020 period [Table 3]. In parallel there was significant increase in symptomatic patients having pain, redness of eyes with the diagnoses of allergic conjunctivitis 8.56, anterior uveitis 8.2, scleritis/episcleritis 7.19, dry eyes 7.08, infective conjunctivitis 6.85, trauma, dry eyes [Table 4].

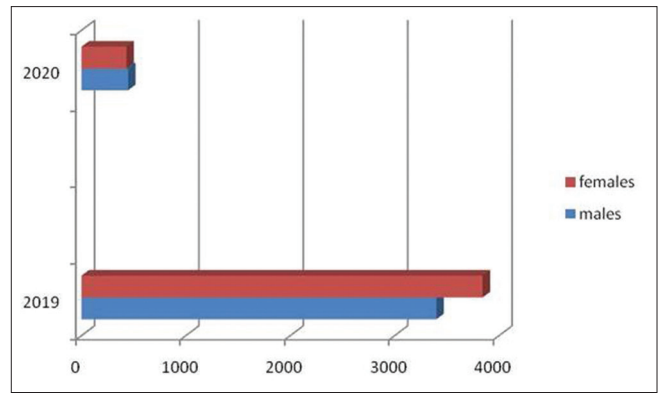


Figure 3: Gender distribution in 2 periods

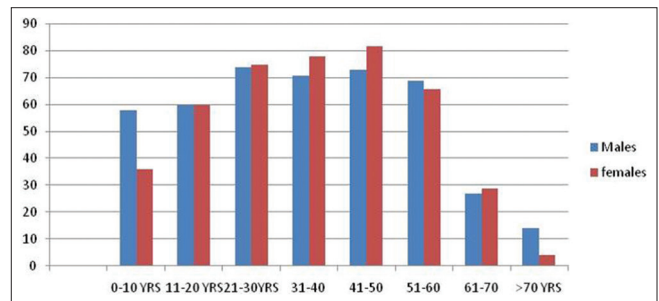


Figure 5: Sex distribution in different age groups in the 2020 period

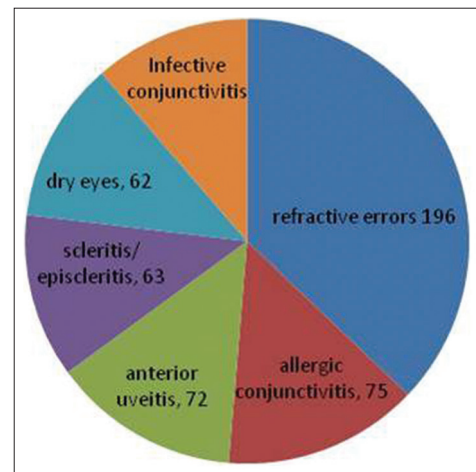


Figure 7: Top 6 diseases in 2020

DISEASE	2019		2020	
	No. of patients	Percentage %	No. of patients	Percentage %
Refractive errors	4172	57%	196	22.40%
Anterior segment disease	2535	35%	598	68%
Posterior segment diseases	535	8%	82	9.30%
TOTAL	7242	100%	876	100%

The characteristics of ocular trauma in the two study periods were also quite different [Table 5]. During the 2020 period, the proportion of children less than 16 years with ocular

Table 2: Percentage of different eye diseases in both the periods

Diseases	2019		2020	
	No. of patients	Percentage	No. of patients	Percentage
Refractive Errors	4172	57.61	196	22.37
Anterior segment diseases				
Infective conjunctivitis	200	2.76	60	6.85
Allergic conjunctivitis	277	3.82	75	8.56
Blephritis	30	0.41	5	0.57
Stye/chalazion	130	1.8	50	5.71
Dry eyes	82	1.13	62	7.08
Dacryocystitis	51	0.7	11	1.26
Pterygium	110	1.52	0	0
Sub conjunctival hemorrhage	50	0.69	15	1.71
Trauma in. corneal foreign bodies	184	2.54	58	6.63
Corneal diseases	139	1.92	30	3.42
Lid diseases	19	0.26	2	0.23
Scleritis/episcleritis	76	1.05	63	7.19
Anterior uveitis	115	1.59	72	8.2
Cataract	890	12.29	58	6.62
Squint	15	0.21	4	0.46
Proptosis	5	0.07	0	0
Orbitalcellulitis/preseptalcellulitis	8	0.11	3	0.34
Endophthalmitis/ptysis bulbi	3	0.04	0	0
Glaucoma	136	1.88	23	2.63
Nerve palsies	15	0.21	7	0.8
Posterior segment diseases				
Diabetic retinopathy	244	3.37	15	1.71
Retinal detachment	8	0.11	2	0.23
Macular diseases	68	0.94	11	1.26
Optic neuropathies	62	0.86	9	1.03
Retinal Vascular Diseases	79	1.09	19	2.17
Congenital/hereditary diseases	21	0.29	0	0
Intermediate/Posterior Uveitis	31	0.43	21	2.4
Vitreous diseases	22	0.3	5	0.57
Total	7242	100	876	100

Table 3: List of diseases having significant decrease in 2020 period

Disease	2019		2020		P
	No. of patients	Percentage	No. of patients	Percentage	
Refractive errors	4172	57.61	196	22.37	<.00001
Cataract	890	12.29	58	6.62	<.00001
Diabetic retinopathy	244	3.37	15	1.71	0.0083
Pterygium	110	1.52	0	0	0.00024
Congenital/hereditaryds	21	0.29	0	0	0.1096
Lid diseases	19	0.26	2	0.23	0.8493
Proptosis	5	0.07	0	0	0.4354
Endophthalmitis	3	0.04	0	0	0.5485

trauma reduced from (15.7% to 9.3%), while the proportion of adults increased (from 53.7% to 75.0%). On the basis of the mechanisms of trauma, the percentage of trauma because of falls and sports had the maximum decrease (respectively, from 8.1% to 3.5% and from 6.5% to 3.5%), while injuries because of domestic violence had the highest increase (from 5.4% to 10.4%). In our 2019 study group in the posterior segment group, diabetic retinopathy (3.37%) leads followed by retinal vascular diseases (1.09%) and macular diseases (0.94%). While in the

2020 period, posterior uveitis (2.4%) leads followed by retinal vascular diseases (2.17%).

In the posterior segment diseases in 2020 period, significant increase in percentage is seen in certain diseases like retinal vascular diseases (1.09% to 2.17% $P=0.00578$) and posterior/intermediate uveitis (0.43% to 2.4% $P < 0.00001$). While significant decrease is seen in diabetic retinopathy (3.37% to 1.71%, $P = 0.0083$).

Table 4: List of diseases having significant increase in 2020 period

Disease	2019		2020		P
	No. of patients	Percentage	No. of patients	Percentage	
Allergic conjunctivitis	277	3.82	75	8.56	<.00001
Infective Conjunctivitis	200	2.76	60	6.85	<.00001
Trauma	184	2.54	58	6.63	<.00001
Corneal diseases	139	1.92	30	3.42	0.00318
Glaucoma	136	1.88	23	2.63	0.13104
Stye	130	1.8	50	5.71	<.00001
Anterior uveitis	115	1.59	72	8.2	<.00001
Dry eyes	82	1.13	62	7.08	<.00001
Retinal Vascular Diseases	79	1.09	19	2.17	0.00578
Scleritis/episcleritis	76	1.05	63	7.19	<.00001
Macular ds	68	0.94	11	1.26	0.36812
Opticneuropathies	62	0.86	9	1.03	0.61006
Dacryocystitis	51	0.7	11	1.26	0.07672
Sub conjunctival h"age	50	0.69	15	1.71	0.00132
Intermediate/Post. Uveitis	31	0.43	21	2.4	<.00001
Blephritis	30	0.41	5	0.57	0.50286
Vitreous diseases	22	0.3	5	0.57	0.1936
Squint	15	0.21	4	0.46	0.14986
Nerve Palsies	15	0.21	7	0.8	0.00148
Orbital/preseptal cellulitis	8	0.11	3	0.34	0.0784
Retinal detachment	8	0.11	2	0.23	0.34722

Table 5: Ocular Trauma

Characteristic	2019		2020	
	No. of pateints	Percentage	No. of pateints	Percentage
Total pts of trauma	184	2.54	58	6.63
Mechanism of injury				
Animal care	8	4.4	4	6.8
Injuries with plants	22	12	9	15.5
Falls	15	8.1	2	3.5
Domestic violence	10	5.4	6	10.4
Industrial works	24	13.1	9	15.5
Chemical	12	6.5	6	10.4
Sports	12	6.5	2	3.5
Unknown	81	44	20	34.4

Discussion

This is the first study reporting the changing trends of the ocular diseases in a teaching institute of North India during the 3 months COVID period. The findings of this study suggest that the increased enforcement of the social distancing measures on a national scale to prevent community transmission and the anxiety has made people fearful of coming to a hospital for their medical treatment which resulted in a decreased footfall of patients to the hospital. The decreasing number of patients in the 2020 period would also have possibly been to the financial crunch because of the loss of many private jobs or an understanding among the community to go to the hospital only when the emergency arises.

In the 2019 period, there was female preponderance which was similar to other studies.^[6,7]

This female preponderance may be because of the location of our hospital making it easily accessible to females who do not have to depend on their spouses or other family members to bring them to the hospital as well as good awareness among community about importance of eye diseases.

In another study, almost equal attendance rates for both males and females to the ophthalmology outpatient clinic were seen,^[8] while male preponderance was seen in another study.^[9] Percentage of female patients decreased from 53.1% to 49.1% in the 2020 period (*P* value 0.0251 at 95% CI). This decrease may be either the females neglecting themselves because of the kids staying at home now because of school closure, increase workload of females as helping kids on their online teaching, financial crunch because of loss of private jobs or anxious of acquiring the COVID-19 infection. There is significant decrease in pediatric group presentation in the 2020 period (*P* < 0.0001 at 95% CI)

which can be because of the fear of COVID infection among the parents not bringing their children and giving less importance to eye disorders like painless refractive errors which was the major ocular disease in children. The cases of ocular trauma in children were also decreased in the 2020 period, could be related to school closure and decreased outdoor playing in this COVID pandemic.

In the 2019 period, refractive errors was the most common ocular disease accounting for 57.6% followed by cataract 12.29%, allergic conjunctivitis 3.82%, diabetic retinopathy 3.37%. While in the 2020 period, refractive errors constitute only 22.37% with increase in the percentage of allergic conjunctivitis 8.56%, anterior uveitis 8.2%, scleritis/episcleritis 7.19%, dry eyes 7.08%, Infective conjunctivitis 6.85%, etc., Our 2019 pattern is similar to some studies in which refractive error was the major cause followed by cataract, conjunctivitis.^[7,9]

Refractive errors constitute major ocular health problems in the developing world. It impairs quality of life and has educational, social, and economic consequences. In this study, in the 2019 period, refractive errors was the most common cause of presentation to the Eye Department while there is significant decrease in the percentage of refractive error patients in the 2020 period. The other ocular diseases which show statistically significant decrease in the 2020 period are the cataract, diabetic retinopathy, pterygium mainly. This significant decrease might be attributed to the painless progressive nature of the diseases and an understanding of the patients to go to the hospital only in the event of emergency care. The percentage of cataract cases might also be decreased because all routine or non-emergency surgeries have been cancelled in view of the COVID-19 outbreak and this news have been spread in the nearby areas leading to the decrease in cataract patients.

It has been noted that the percentage of painless ocular diseases like cataract and diabetic retinopathy decreases but there is increase in the severity of the disease. The cataract patients presenting in the 2020 period were mostly mature, bilateral in presentation and presenting with more vision loss. Similarly there is increase in the severity of diabetic retinopathy patients, the type of patients seen are mostly of proliferative type and having macular edema leading to marked loss of vision. Our concern is that these ocular diseases were presenting with more severe and advanced stage suggesting that the patients were reluctant to seek medical attention because of risk of exposure to COVID-19.

Some ocular conditions like refractive errors and cataract are treatable or curable while vitamin A deficiencies, etc., are largely preventable.^[10] Many have eye disorders that result in visual loss. National Programme for Control of Blindness and Visual Impairment (NPCB &VI) documented that 62.6% blindness is because of cataract, 19.70% is because of refractive error followed by 0.90% corneal blindness, 5.80% glaucoma, 1.20%, surgical complication, 0.90% posterior capsular opacification, 4.70%, posterior segment disorder, and 4.19%. because of others. Its main objective was to reduce the backlog of avoidable and treatable blindness by identification and treatment at primary, secondary,

and tertiary levels. In our study also in 2019 period, the main causes were mainly refractive error and cataract but in 2020 period, there is significant decrease in these cases which is increasing the backlog of treatable/curable blindness in the community, thereby leading to the failure of objectives made by National Programme for Control of Blindness and Visual Impairment (NPCB&VI). This COVID pandemic has created anxiety and fear both among patients and the healthcare workers. It is important to build the confidence in the society to live with the virus. The healthcare workers should provide accurate information, bust myths and motivate the society in removing their anxiety and fears. Proper availability of coronavirus testing along with acquiring quality safety measures is the major step in resuming elective surgeries. The COVID-19 virus is not very well understood till now. It is not known that how it will behave in the future. And till now there is no vaccine to prevent it and also there is no effective treatment. However, at this time, a cautious and controlled approach will be the correct way to boost up our attendance in eye department.

Significant increase was noted in the percentage of symptomatic patients having pain, redness of eyes with the diagnoses of allergic conjunctivitis, anterior uveitis, scleritis/episcleritis, Infective conjunctivitis, corneal diseases, stye, dry eyes, etc. These painful and symptomatic conditions continued to present to the department. This shows that the patients are only coming to the eye department when they are symptomatic and cannot tolerate their symptoms. There is significant increase in the percentage of cases of ocular trauma in the 2020 period. The characteristics of ocular trauma in the two study periods were quite different. During the 2020 period, the proportion of children in less than 16 years with ocular trauma was decreased while the proportion in adults increased. This might be because of complete closure of schools and limitation of outdoor playing. The percentage of ocular trauma due to falls and sports had the highest decrease while injuries because of domestic violence had the highest increase. All these changes in trauma profile have been seen because of the closure of schools and offices and decreased outdoor activities. Increase in domestic violence might be because the couples are staying together either working from home or loss of jobs. It has been noted that most of the children are coming to the eye department with headache, eye strain, and foreign body sensation; they were mostly diagnosed with dry eyes. The percentage of dry eyes in the 2020 period is significantly increased because children are spending long hours in front of computer and mobile screens during the online classes.

In the developed world like USA, age related macular degeneration and posterior capsular opacification leads, followed by diabetic retinopathy and glaucoma.^[11] But in our 2019 study, in the posterior segment group diabetic retinopathy leads followed by retinal vascular diseases and macular diseases. Diabetic retinopathy was the commonest cause for attendance in retina clinic (35.58%) with CSME in 43.06% DR cases, followed by ARMD and hypertensive retinopathy changes. in another study.^[12]

In summary overall, 876 patients presented during the 2020 period compared to 7242 patients in the 2019 period. Percentage

of female patients decreased from 53.1% to 49.1% in the 2020 period ($P = 0.0251$) There is significant decrease in pediatric group in the 2020 period ($P < 0.0001$). The diseases which formed the main chunk of treatable and preventable blindness earlier like refractive errors, cataract, diabetic retinopathy, and vitamin A related eye diseases are not getting attention during this COVID time leading to an increase in the backlog of treatable and preventable blindness which was the main objective of National Programme for Control of Blindness and Visual Impairment (NPCB &VI).

In this study, we have seen the pattern has completely changed in the 2020 period because of COVID pandemic. The patients are attending the eye department when they are symptomatic and cannot tolerate the symptoms. They are not bothered of painless and chronic conditions which are increasing the backlog of curable/preventable blindness and will have impact on socioeconomic status of the society.

The primary healthcare workers should understand the problem that many patients with ocular diseases can be treated at primary care centers like infective conjunctivitis, allergic conjunctivitis, vitamin A Deficiency related eye problems, etc., so that these patients might not need to attend higher centers which can decrease their unnecessary exposure to COVID-19 infection and also prevent overcrowding in Ophthalmology department so that other patients having serious issues can be handled easily. The patients are very anxious in attending eye hospitals, and the primary healthcare providers are the first step in the ladder of healthcare system they can play a very important role in allaying the anxiety and fear of the patients. The primary health care physicians should encourage patients to go the ophthalmology higher centers if they have ocular problems which cannot be managed by them by taking proper measures like wearing proper masks and using hand sanitization. In this way these primary care physicians can provide invaluable service in decreasing the backlog of preventable or curable blindness which is the main objective of National Programme for Control of Blindness and Visual Impairment (NPCB & VI).

Conclusion

We, the authors, present our experience of COVID period of ocular disorders presenting to the eye department of a teaching institute in North India. An understanding of clinical profile of the patients helps to plan our resources better in order to adapt to a new way of eye care delivery system in the near future, safeguarding the health of our patients and also our healthcare providers. Various programs should be implemented to help in reducing the load of visual disability and blindness in the community which is increased after the COVID outbreak as patients are not attending the hospitals out of pandemic fear.

We need to change our style of working from the pre-COVID period, what we have been practicing for the past several decades. After the COVID outbreak, – maintaining social distance among

patients and healthcare providers, healthcare personnel donning PPE during patient care, scheduling of patients will be the new pattern in the future. Ophthalmologists should consider the hidden burden of ocular diseases when planning the strategies for their recovery. The normalcy road with regards to surgeries, peripheral camps, and inpatient services will be bumpy. We should be ready for the increase burden and should plan various strategies to overcome the potential back-log of blindness because blindness not only affects quality of life but also has educational, social and economic consequences.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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