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Dr. Devika Parameshwar
Assistant Professor, Department
of Ophthalmology, AJ Institute
of Medical Science and Research
Center, Mangalore Dakshin
Kannada, Karnataka, India

Dr. Akarshitha B
Postgraduate 3rd Year,
Department of Ophthalmology,
AJ Institute of Medical Science
and Research Center, Mangalore
Dakshin Kannada, Karnataka,
India

Dr. Rajani Kadri
Associate Professor, Department
of Ophthalmology, AJ Institute
of Medical Science and Research
Center, Mangalore Dakshin
Kannada, Karnataka, India

Dr. Sudhir Hegde
Professor, Department of
Ophthalmology, AJ Institute of
Medical Science and Research
Center, Mangalore Dakshin
Kannada, Karnataka, India

Dr. Ajay Kudva
Associate Professor, Department
of Ophthalmology, AJ Institute
of Medical Science and Research
Center, Mangalore Dakshin
Kannada, Karnataka, India

Dr. Akansha Shetty
Resident, Department of
Ophthalmology, AJ Institute of
Medical Science and Research
Center, Mangalore Dakshin
Kannada, Karnataka, India

Dr. Jayaram Shetty
Professor Department of
Ophthalmology, AJ Institute of
Medical Science and Research
Center, Mangalore Dakshin
Kannada, Karnataka, India

Corresponding Author:
Dr. Devika Parameshwar
Assistant Professor, Department
of Ophthalmology, AJ Institute
of Medical Science and Research
Center, Mangalore Dakshin
Kannada, Karnataka, India

Impact of Covid 19 pandemic on pattern of paediatric inpatient referral for ophthalmic consultation in a teaching institute hospital

Devika Parameshwar, Akarshitha B, Rajani Kadri, Sudhir Hegde, Ajay Kudva, Akansha Shetty and Jayaram Shetty

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Abstract

Importance: Paediatric inpatient referral for Ophthalmology consultations are often requested to evaluate a variety of conditions at a teaching institute hospital. The on-going corona virus disease (COVID-19) pandemic has affected every aspect of health care in general, including inpatient referrals that could result in long term adverse effect due to the delay in screening, management and providing of required care.

Objective: To know the change in paediatric inpatient referral pattern for ophthalmic consultation from pre COVID to COVID period and the effect of the same on visual morbidity.

Design, Setting, and Participants: This retrospective record review study included paediatric inpatient references for ophthalmology consultation in a teaching institute hospital from Dec 2019 to May 2020. Patient profile, date of admission, diagnosis, reason for referral and ophthalmic evaluation details were collected from medical record charts. Data obtained was tabulated and analysed.

Result: Total of 67 inpatient referrals were requested. Group 1 (45 patients, 67.17%) were during pre COVID period and group 2 (22 patients, 33.83%) included patients in the pandemic period. Mean age was 4.85 ± 4.47 and 4.45 ± 4.35 years in group 1 and group 2 respectively. Refractive error ($P=0.019$) and ophthalmic screening was the cause for referral in majority in group 1. Referral for optic disc oedema screening was the cause in majority in group 2 ($P=0.000$)

Conclusion: COVID period adversely affected the inpatient refractive error screening, a cause of amblyopia in older patients. Inpatient referral for papilledema screening increased despite the pandemic as the condition is considered an emergency.

Keywords: COVID-19 pandemic, ophthalmic consultation, paediatric inpatient referral

Introduction

In late 2019 the world was presented with a very new pandemic of pneumonia caused by a novel virus originating from Wuhan in China. It was called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2); also known as 2019 novel Coronavirus (2019-nCoV) [1]. Preparatory epidemiological information pointed out that symptomatic manifestation of COVID-19 in children is rare and as per the reports from Chinese Centres for Disease Control and Prevention as of March 2020, only 2% cases of less than 19 years have been found affected by SARS-CoV-2 [2]. However COVID-19 has left behind its mark on the same group in a number of other ways. This pandemic affected the whole world including the paediatric population in delaying the delivery of necessary care. Inpatient consultation services are a critical component of providing clinical care for patients and an important part of residency education. Ophthalmic issues that arise among in-hospital patients present unique circumstances for the evaluating ophthalmologist [3, 4].

Major causes of visual morbidity in childhood include corneal scarring secondary to vitamin A deficiency, congenital cataract, Retinopathy of Prematurity (ROP), and congenital glaucoma [5]. In paediatric population it is important to detect the ocular conditions as early as possible and to treat in order to avoid lifelong visual impairment. Examination of the eyes should be performed beginning in the new-born period and at all well-child visits. Examination of the new-born for ocular structural abnormalities, such as cataract, corneal opacity, and ptosis, which are known to result in visual problems are of utmost important. Vision assessment beginning at birth has been endorsed by the American Academy of Paediatrics, the American Association for Paediatric Ophthalmology and Strabismus, and the

American Academy of Ophthalmology.^[6] Since the primary care to be given to the patients has been hampered due to the pandemic, in the long run this is likely to take a toll on the visual acuity adding to the burden of visual morbidity in the paediatric age group. This study is an attempt to document the change in the pattern of paediatric inpatient referral for ophthalmic consultation from pre COVID to COVID period and observe the impact of the 2019 pandemic on the ocular morbidity in paediatric population.

Materials and Methods

This retrospective paediatric inpatient chart review includes 67 patient records with referral for Ophthalmology consultation at our teaching institute hospital over a period of 6 months from December 2019 to May 2020. There were 45 patients referred in 3 months (December 2019 – February 2020) of pre-COVID-19 period (group 1) and 22 patients during 3 months (March-May 2020) of COVID-19 pandemic (group 2). The study was conducted in accordance with the declaration of Helsinki and approved by the Ethics Committee of the Institution.

Patient profile, date of admission, diagnosis, the reason for referral, ophthalmic evaluation details were collected from the medical record charts. All documented data regarding comprehensive ophthalmic examination including best corrected visual acuity/cycloplegic refraction, anterior segment evaluation by slit lamp bio microscope/torch light examination, fundus examination by indirect/direct ophthalmoscopy and additional ophthalmic examinations like intraocular pressure and gonioscopy recording performed when indicated was noted. The data obtained was tabulated and analysed. Any intervention performed by ophthalmologists and any changes in the patient's management attributed to the referral were also noted. Medical records of patients of age less than 16 years, all paediatric inpatient referrals for ophthalmology consultation at our teaching institute hospital were included in the study. Outpatient paediatric referrals, self-referral, referrals from general practitioners, primary health centres and patients above the age of 16 years were excluded.

Statistical analysis

Data collected was analysed statistically using the Statistical Package for Social Sciences for Windows (SPSS) Version 23.0 (SPSS Inc., Chicago, IL, USA). In addition to the standard descriptive statistical calculations (mean and standard deviation), Chi square test was used for comparison between two groups. $P \leq 0.05$ was considered statistically significant.

Results

134 eyes of 67 inpatients had been examined following referral from paediatric department for ophthalmology consultation in our teaching institute hospital. Of the total paediatric inpatients ($n=109$ and 70), 41.28% and 31.42% patients were examined as inpatient referral respectively in group 1 and group 2. Among 67 inpatients referred, 45 (67.17%) were during the pre COVID period, while it dropped to 22 (32.83%) during COVID period. Mean age of the referred patients was 4.85 ± 4.47 years in group 1 (range 2 months to 14 years) and 4.55 ± 4.35 years in group 2 (range 3 months to 14 years). While there were 22 (48.88%) and 12 (54.54%) male children, there were 23 (51.11%) and 10 (45.45%) female children in group 1 and 2 respectively. Demographic profile of the patients is shown in Table 1.

Refractive error was the cause for referral in 10 (22.22%) patients in group 1 and none in group 2 ($P = 0.019$), pre COVID period having more number of referrals for refraction. Optic disc oedema assessment was the cause for referral in 6 (13.33%) and 15 (68.18%) patients in group 1 and 2 respectively ($P = 0.000$), during COVID majority of reference was for emergency to rule out papilloedema. Referral for cataract evaluation included 3 (6.66%) and 4 (18.18%) patients in group 1 and 2 respectively, of which a single patient who was diagnosed to have cataract in group 1 (2.22%), was treated for the same. While 7 (15.54%) patients were referred for general ophthalmic evaluation during pre COVID-19 period, it was comparable during COVID-19 period with 3 (15.12%) patients. 2 (4.44%) patients in group 1 and a single patient (4.55%) in group 2 were referred for strabismus evaluation. One patient each from both group 1 and 2 was referred to look for ocular changes due to oral steroid intake for nephrotic syndrome management. 4 (8.89%) patients who had complaints of redness and itching, 7 patients (15.56%) for fundus evaluation in inborn metabolic errors, 2 (4.44%) patients each to look for Bruch field spots and for proptosis, 1 (2.22%) patient each to screen for anterior uveitis, optic atrophy, cytomegalovirus retinitis and for vision stimulation were referred during pre-COVID-19 period. Reason for inpatient referral from paediatrics department is shown in Table 2 and the significance values for referrals in Table 3.

Discussion

A variety of ophthalmic pathology may be present among paediatric inpatients that are hospitalised primarily for management of paediatric conditions. Paediatric inpatient referrals for ophthalmology consultation form an integral part of assessment especially in developing children to rule out causes hindering the development of eye. Ophthalmic complaints are not so common among the paediatric patients and hence it is important to screen for any abnormal findings. The results of this study revealed a significant drop in the number of paediatric inpatient referrals for ophthalmology consultation from pre COVID to COVID period. This is attributed to the overall reduction in the number of paediatric inpatients as a result of inability of the patients to access health care facilities due to the pandemic restrictions imposed by the government during the time period. In addition a change in the inpatient referral pattern from pre COVID to COVID period was observed which could result in visual morbidity in the affected patients.

During COVID-19 period there was no reference for screening of refractive error. Treatment of significant refractive errors is widely accepted to reduce lifelong vision loss from amblyopia. Children aged 3-5 years may be screened for unexplained vision loss, refractive errors and amblyogenic factors. The timely diagnosis of significant refractive errors in children remains a significant challenge, especially for ages 3-5 years, but treatment provides significant improvement of visual acuity and quality of life^[7]. The drop in the referrals for refractive error screening would result in amblyopia due to uncorrected refractive error adding to the visual morbidity in the long run.

In the present study one out of the three inpatients referred during pre COVID-19 period for screening had congenital cataract and was treated for the same. It is important to screen new born for congenital cataract as it is a treatable cause of visual impairment. Congenital cataract refers to opacity of the lens detected at birth or at an early stage of

childhood, and is an important cause of treatable childhood blindness worldwide [8, 9]. An estimated 200,000 children are bilaterally blind from cataracts, and many more suffer from partial cataracts that progress and cause increasing visual difficulty as the child grows [10]. Our study showed more patients (n=4, 18.18%) being referred for cataract screening during COVID as compared to pre COVID period (n=3, 6.66%). However during the pre COVID-19 period one of the three screened patients underwent surgical treatment for cataract with good visual outcome. During COVID, lack of follow up of the operated patients could add to the visual morbidity due to delay in management in the event of postoperative complications like endophthalmitis that need emergency treatment.

Inpatient referral for screening of strabismus during COVID had remained unchanged in comparison pre COVID period. Exotropia is common type of strabismus in this population followed by esotropia, paralytic strabismus and intermittent exotropia being the least common. Data supports that strabismus screening in developing countries is useful in early detection, appropriate management and prevention of strabismus. [11] Early detection of strabismus and proper treatment serves to reduce the visual morbidity that results from strabismic amblyopia.

Papilledema constituted major part of the inpatient referral cases 68.18% during COVID-19 period as compared to pre COVID-19 period owing to their association with emergency condition and life-threatening causes. Papilledema or optic disc swelling due to elevated intracranial pressure (ICP), can represent a harbinger of life-threatening aetiologies such as intracranial mass lesions or meningitis [12, 13].

Renal disease and methods of managing it additionally led

to papilledema in the paediatric patient, with renal insufficiency, chronic dialysis, and steroid treatments, all potentially contributing to elevated ICP. Hence during the steroid therapy, it is important to watch for steroid responsiveness in patients [14]. Our study shows there was no change in referring inpatients with nephrotic syndrome for cataract and intraocular pressure screening.

In the present study inpatient referral for Anterior segment examination to look for Kayser Fleischer ring was seen only during pre COVID period as it is added finding to the pre-existing disease and hence was not considered as an emergency. KF rings not specific to Wilson disease alone, are also seen in other chronic cholestatic disorders such as primary biliary cholangitis and children with neonatal cholestasis [15]. It was observed in this study that pre COVID-19 period referral of inpatients for normal ophthalmic evaluation and headache screening with incidental finding of patient having refractive errors was totally missed during the COVID period. This is an important, as undiagnosed asymptomatic refractive errors that get diagnosed by screening the inpatients have gone undetected thus affecting the vision in young paediatric population causing amblyopia in the long run.

Table 1: Demographic profile of inpatients referred

Variables	Pre COVID (n=45)		COVID Times (n=22)		
	Number	Percentage	Number	Percentage	
Gender	Male	22	48.88%	12	54.54%
	Female	23	51.11%	10	45.45%
Age	<5years	26	57.8%	13	59.1%
	5-10years	11	24.4%	7	31.8%
	>10years	8	17.8%	2	9.1%

Table 2: Shows causes for paediatric inpatient referral

Inpatient Referral reason	Pre COVID Period Count	Percentage	COVID Period Count	Percentage	P value
Adverse effect of steroids	0	0.00%	1	4.5%	0.154
Anterior uveitis	1	2.22%	0	0.00%	0.484
Blurring of vision	2	4.44%	0	0.00%	0.319
Brusch Field Spots	2	4.44%	0	0.00%	0.319
Cataract	0	0.00%	1	4.5%	0.154
Cataract (Sunflower) and Keyser Fleischer Ring	0	0.00%	1	4.5%	0.154
Cataract, Strabismus, Nystagmus	0	0.00%	1	4.5%	0.154
Cataract Evaluation	1	2.22%	0	0.00%	0.484
Congenital Cataract	1	2.22%	0	0.00%	0.484
Cytomegalovirus Retinitis	1	2.22%	0	0.00%	0.484
Discharge In Both Eyes	1	2.22%	0	0.00%	0.484
Features Of TORCH Infection	1	2.22%	0	0.00%	0.484
Fundus Evaluation	6	13.32%	1	4.5%	0.274
Headache and Eyestrain	5	11.10%	0	0.00%	0.109
Hypertensive Retinopathy And Papilledema	1	2.22%	0	0.00%	0.484
Ocular Movements	1	2.22%	0	0.00%	0.484
Ophthalmic Evaluation	4	8.88%	1	4.5%	0.527
Optic Atrophy	1	2.22%	0	0.00%	0.484
Papilledema	6	13.32%	15	68.18%	0.000
Proptosis	2	4.44%	0	0.00%	0.319
Redness In Both Eyes	1	2.22%	0	0.00%	0.484
Redness In Left Eye	1	2.22%	0	0.00%	0.484
Refractive Error	2	4.44%	0	0.00%	0.319
Squint Evaluation	2	4.44%	0	0.00%	0.319
Steroid Toxicity And Cataract	1	2.22%	1	4.5%	0.602
Vision Evaluation	1	2.22%	0	0.00%	0.484
Vision Stimulation	1	2.22%	0	0.00%	0.484

Table 3: Significance values of referral for ophthalmic consultation

Variables	Pre COVID Period		COVID Period		P Value
	Number	Percentage	Number	Percentage	
Papilledema	6	13.33%	15	68.18%	0.000
Refraction	10	22.22%	0	0.00%	0.019
Ophthalmic Evaluation	10	22.22%	2	9.09%	0.193

Conclusion

This study found that overall paediatric inpatient referral for ophthalmology consultation reduced during COVID as compared to pre COVID times. It was observed that COVID times adversely affected the paediatric inpatient referral for refractive error screening, a cause of amblyopia in older patients. However an increase was observed in the inpatient referral to rule out papilledema, a condition considered as an emergency.

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