Trends in Pediatric Ophthalmic Emergency Department Visits during the COVID-19 Pandemic

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ABSTRACT **Background:** Data on how the coronavirus disease 2019 (COVID-19) affected consultations in ophthalmic departments are sparse.

Objectives: To examine the epidemiology of ophthalmic consultations in a large pediatric emergency medicine department (PED) during the first nationwide COVID-19 lockdown in Israel.

Methods: The database of a tertiary pediatric medical center was retrospectively reviewed for patients aged < 18 years who attended the PED from 17 March to 30 April 2020 (first COVID-19 lockdown) and the corresponding period in 2019. Background, clinical, and disease-related data were collected from the medical charts and compared between groups.

Results: The study included 757 PED visits. There were no significant differences in demographics between the groups. The 2020 period was characterized by a decrease in PED visits (by 52%), increase in arrivals during late afternoon and evening (P = 0.013), decrease in visits of older children (age 5–10 year), and proportional increase in younger children (age 1–5 years) (P = 0.011). The most common diagnoses overall and during each period was trauma followed by conjunctivitis and eyelid inflammation. The mechanisms of trauma differed (P = 0.002), with an increase in sharp trauma and decrease in blunt trauma in 2020 (P < 0.001 for both). In 2020, 95% of traumatic events occurred in the home compared to 54% in 2019 (P < 0.001).

Conclusions: Parents need to learn appropriate preventive and treatment measures to prevent serious and long-term ophthalmic injury while minimizing their exposure to the COVID-19. PEDs and ophthalmic pediatric clinics should consider increasing use of telemedicine and the availability of more senior physicians as consultants during such times.

IMAJ 2022; 24: 289–292

KEY WORDS: coronavirus disease 2019 (COVID-19), ophthalmic emergency department, ophthalmic trauma, pediatrics, pandemic

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In 2020, the coronavirus disease 2019 (COVID-19) became a global pandemic and health emergency. COVID-19 was declared a pandemic by the World Health Organization (WHO) in March 2020. Since that time, more than 800,000 confirmed cases have been documented in Israel [1]. At the outbreak of the virus in Israel, like in many other countries [2], a strict quarantine was enforced. In Israel, the quarantine lasted for 6 weeks. Civilian movements were restricted except for essential services, commercial businesses were closed, entire industries were curbed or shut down, and ambulatory medical services in clinics and hospitals were reduced.

Ophthalmic consultations for pediatric emergency medicine departments (PEDs) at tertiary pediatric hospitals are very busy throughout the year, treating dozens of daily visitors of all ages [3]. Almost half the cases handled are considered non-urgent [3-6]. Data on the ways in which COVID-19 has affected the overall and daily functioning of ophthalmic consultations and the toll it has taken on patients and medical personnel are sparse.

The aim of the present study was to examine the epidemiology of ophthalmology consultation cases in a large PED in central Israel during the first lockdown following outbreak of the pandemic in March–April 2020. Findings were compared to the corresponding period in 2019. The information gained was intended to help families and medical staff to cope with similar events in the future.

PATIENTS AND METHODS

We retrospectively reviewed the comprehensive healthcare database of the ophthalmology department at Schneider Children's Medical Center for all patients aged 18 years or younger who visited the PED from 17 March to 30 April 2020 and from 17 March to 30 April 2019. All children who presented with any ophthalmic complaint or were referred by their primary care physician for consultation with an ophthalmologist were included. The following data were collected from the medical charts: age, sex, eye complaint, reason for referral, previous history of ophthalmic disorders, and diagnosis. The findings were compared between the two periods.

The study was approved by the institutional review board at Rabin Medical Center and adhered to the tenets of the Declaration of Helsinki.

STATISTICAL METHODS

Categorical variables were summarized by frequency count and percentage. No continuous variables were included in the analysis. Pearson's chi-square test was used to evaluate the associ-

Table 1. Clinical characteristics of the PED ophthalmic consultations from March to April 2019 and from March to April 2020 (COVID-19 quarantine)

Variable	2019 (N=510, 67%)	2020 (N=247, 33%)	*P* value
Patient age, n (%)			0.011
0–1 year	36 (7.1)	20 (8.1)	
1–5 years	159 (31.2)	102 (41.3)	
5–10 years	149 (29.2)	45 (18.2)	
10–15 years	104 (20.4)	50 (20.2)	
15–18 years	62 (12.2)	30 (12.1)	
Male sex, n (%)	295 (57.8)	141 (57.1)	0.843
Hour of arrival			0.013
0:00–7:00	54 (10.6)	29 (11.7)	
7:00–16:00	211 (41.4)	80 (32.4)	
16:00–21:00	137 (26.9)	93 (37.7)	
21:00–24:00	108 (21.2)	45 (18.2)	
Trauma, n (%)	152 (29.8)	72 (29.1)	0.853
Senior consultation, n (%)	42 (8.2)	34 (13.8)	0.018
Senior examination, n (%)	28 (5.5)	17 (6.9)	0.447
Normal eye exam, n (%)	222 (43.5)	114 (46.2)	0.496
Urgent diagnosis, n (%)	214 (42.0)	106 (42.9)	0.803

Table 2. Ophthalmic diagnoses made in the PED in March-April 2019 and March-April 2020 (COVID-19 quarantine)

Diagnosis n (%)	2019 (n=288)	2020 (n=133)
Trauma	152 (52.8)	72 (54.1)
Conjunctivitis	52 (18.1)	13 (9.8)*
Eyelid inflammation/infection	40 (13.9)	18 (13.5)
Neurological disorder	15 (5.2)	10 (7.5)
Papilloedema	7 (2.4)	7 (5.3)
Other	6 (2.1)	4 (3)
Corneal disorder	4 (1.4)	2 (1.5)
Uveitis	3 (1.0)	2 (1.5)
Lacrimal system disorder	4 (1.4)	0 (0)
Orbital inflammation	2 (0.7)	1 (0.8)
Ocular surface inflammation	1 (0.3)	2 (1.5)
Retinal disorder	2 (0.7)	0 (0)
Lens disorder	0 (0)	1 (0.8)
Glaucoma	0 (0)	1 (0.8)

Visits in which the examination was normal were excluded

*Significant difference between periods ($P = 0.023$)

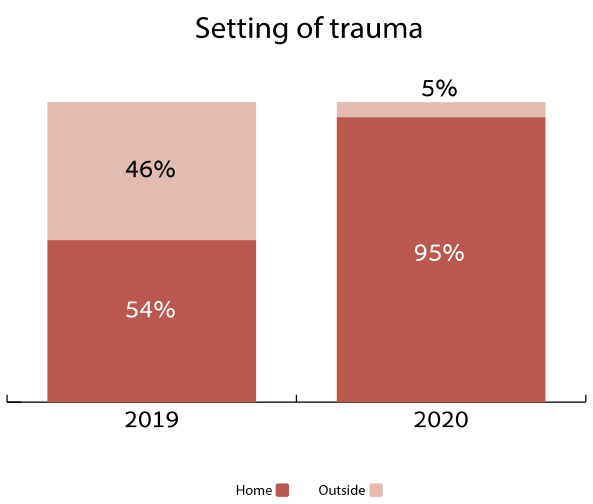
Table 3. Trauma cases in the pediatric emergency medicine department from March to April 2019 and from March to April 2020 (COVID-19 quarantine)

Variable	2019 (n=125)	2020 (n=79)	*P* value
Mechanism of trauma			0.002
Blunt	101 (80.8)	47 (59.5)	< 0.001*
Sharp	6 (4.8)	14 (17.7)	< 0.001*
Chemical	13 (10.4)	16 (20.3)	0.05*
Thermic	5 (4.0)	2 (2.5)	0.57*
Setting			
At home	68 (54.4)	75 (94.9)	< 0.001
Outside	57 (45.6)	4 (5.1)	< 0.001

*Tested by residual analysis

P value < 0.00625considered statistically significant (Bonferroni correction)

Figure 1. Percentage of trauma cases occurring either at home or outside during the two study periods



ation between two variables. *P* value of < 0.05 was considered statistically significant. Post hoc analysis was performed for trauma cases. Bonferroni correction was applied to the *P* value to correct for type 1 errors. Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 21 (SPSS, IBM Corp, Armonk, NY, USA).

RESULTS

During the two study periods a combined total of 757 ophthalmology consultations were requested by our PED. The clinical characteristics of the patients are shown in Table 1. There were no significant differences between the patients who presented during 2020 and 2019 in sex distribution: 295 males (57.8%)

and 141 males (57.1%), respectively; or age range: < 1 month to 18 years in both groups; median 7.4 and 5.2 years, respectively [Table 1].

Compared to data from 2019, the total number of ophthalmology consults from the PED was lower by 52% in 2020, and there was a significant increase in arrivals during the late afternoon and evening ($P = 0.013$). Children aged 5–10 years presented less often than in 2019 with a proportional increase in children aged 1–5 years ($P = 0.011$). In addition, more children underwent initial examination by an ophthalmology resident followed by consultation with a senior ophthalmologist during the 2020 period ($P = 0.018$).

Eye findings were normal in 46.2% of children examined in 2020. A large proportion of visits in 2020 (42.9%) were due to an acute event ($P = 0.803$), similar to reasons for visits in 2019.

The number and frequency of diagnoses made during the two study periods are shown in Table 2. Visits in which no pathology was found were excluded. The most common diagnosis overall and during each period was ophthalmic trauma, with a significantly higher incidence in boys than girls (65.2%, $P = 0.006$). Other common diagnoses in both periods were conjunctivitis followed by eyelid inflammation, although the rate of conjunctivitis was significantly lower in 2020 than in 2019 ($P = 0.023$) [Table 2].

A total of 229 patients (30.3%) were referred to the PED to rule out papilloedema. The diagnosis of papilloedema was ultimately confirmed in 14 patients, who accounted for 4% and 7.5% of the patients referred for this finding in 2019 and 2020, respectively (n=7 each). The difference in the rate of diagnosis of papilloedema between 2019 and 2020 (2.4% and 5.3%) was not statistically significant ($P = 0.261$).

Post hoc analysis of the 204 cases of trauma revealed differences in the underlying mechanisms between the study periods ($P = 0.002$) [Table 3]. There was a significant increase in sharp trauma and a significant decrease in blunt trauma from 2019 to 2020 ($P < 0.001$, for both). In addition, in 2020 95% of traumatic events occurred at home compared to 54% in 2019 ($P < 0.001$). Figure 1 highlights the difference in distribution of the location in which the trauma occurred.

DISCUSSION

We analyzed the files of all patients who were examined by ophthalmologist during a PED visit in one of the largest tertiary pediatric medical centers in Israel during the 6-week quarantine period of the first wave of COVID-19 (mid-March to end-April 2020) and matched the results to the corresponding period in the previous year. Several important epidemiologic findings were noted that can presumably be tied to the unusual conditions imposed by the lockdown.

In our study we found a 48% decrease in the number of ophthalmic consultations in 2020 relative to 2019, which is most likely explained by fear of exposure to COVID-19 outside of the home. A significant reduction in the rate of patient attendance to the hospital during COVID 19 pandemic was also reported by another study that examined the effect of the pandemic on the ophthalmology in Israel among 21 hospitals [7]. It showed a significant decline in the number of doctor-patient encounters in most ophthalmology departments in Israel. Accordingly, the time of arrival differed, with a higher tendency of patients to arrive in the afternoon-evening hours in 2020, probably because parents expected to find less crowding and shorter waiting times later in the day. These findings are in line with the study of Feral-Pierssens et al. (2020) [8], which showed that during the outbreak of the pandemic, people were afraid to leave their home and seek for medical consultations at clinics. It was also shown in a study by Cordoba et al. [9] demonstrating a reduction in adult trauma cases presenting to the emergency department, which could be somehow linked to the same fear. This apprehension may have led to a delay in the diagnosis and treatment of children requiring emergency medical care.

The rate at which patients were examined by a resident and still needed senior physician consult was significantly higher in 2020. This finding was not unexpected given the reduction in ambulatory activity of senior physicians and the closure of community clinics, which are usually responsible for the routine treatment of children. Nevertheless, when necessary, a senior physician was consulted, and the quality of patient care was not compromised.

Regarding the types of ocular diagnoses, more than 40% of the examinations yielded normal findings and an equal percentage revealed an urgent ocular problem. Most of the patients with negative findings had been referred for exclusion of papilloedema or corneal erosion in cases of baby restlessness.

Eye injury was the most common reason for ophthalmic consults from the PED. We found that the probability of ocular trauma was highest in children aged 1–5 years: 41.1% in 2020 and 31.2% in 2019 ($P < 0.001$). This frequency may be attributable to the large amount of time children spent indoors during lockdown. Over a long period of confinement, the home may become a less safe environment, especially in families with working parents or many children. Accordingly, household cleaners, sharp-edged toys, and domestic items were the leading causes of ocular trauma ($P < 0.001$), while there was a decrease in blunt trauma, probably a consequence of the absence of organized outdoor sports activities that usually take place during school hours.

Although the second most common diagnosis in both periods was conjunctivitis, there was a significant decrease in 2020 in the number of children presenting with conjunctivitis of any type ($P = 0.023$), and particularly viral conjunctivitis ($P = 0.035$). This could be attributed to the overall decreased incidence of respiratory viral infections due to the lockdown and distancing measures as reflected by the CDC weekly influenza report. Soo et al. [10] also found a decreased incidence of influenza during the lockdown times.

In addition, viral conjunctivitis is normally a mild self-limited disease that can be treated conservatively at home or by a community pediatrician. During lockdown, most patients may have opted to treat at home and bypass the PED.

We think that part of the solution may lie in telemedicine, which has drawn increasing attention from all fields of medicine, including pediatric ophthalmology [11]. This new method of communication makes it possible for physicians and other healthcare personnel to evaluate patients remotely and in many cases spare them the need to visit a crowded hospital. It also leads to reduced exposure time of patients and parents when hands-on care is necessary. The reduction in medical staff in community clinics because of the pandemic has considerably extended the wait time for appointments, and with telemedicine, treatment may be started in the interim, thereby reducing discomfort, risks, and patient and parental anxiety.

The results of the present study highlight areas that require further attention as the pandemic continues. Parental education on children's safety is particularly important during pandemics, when people are often confined to their homes for extended periods. This situation is especially true in households with many children or when parents are working from home while their children are also home. Childhood injury from sharp objects and abrasive chemicals can lead to irreversible ophthalmic damage. Primary care pediatricians and multimedia platforms can play a major role in alerting parents to the need to take appropriate prevention and treatment measures. In the event of urgent injuries, parents must not hesitate to bring children to the PED. Of equal importance to children's welfare is routine ophthalmic care, which should also be emphasized. Parents should ensure that such care is not neglected during a pandemic.

CONCLUSIONS

Our study shows that the COVID-19 outbreak had significant impact on the number of children presenting to the PED. At the time of this article, Israel was facing a fourth COVID-19 (Delta variant) wave, after nearly 5.5 million citizens were immunized with 2 doses of a COVID-19 vaccine. During the Delta wave, more than 1.5 million citizens received the third vaccine dose to halt the spreading of the virus and to reduce the number of critically ill patients [12]. It is imperative that we apply the knowledge gained from the first lockdown to help us stay safe and limit home traumatic injuries in children during the next one and convince healthcare professionals to utilize telemedicine modalities.

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Capsule

Self-inflicted damage protects tumors

Genotoxic treatments, such as radiation and some chemotherapy drugs, are a mainstay of cancer therapy, but they often fail to fully destroy tumor cells. Normal cells can protect themselves from genotoxic insults by activating the G1 cell cycle checkpoint, but this checkpoint is often dysfunctional in tumors. By contrast, **Larsen** and co-authors discovered that tumor cells can activate a nuclease that causes limited induction of DNA breaks at specific sites, which is coordinated with the process of DNA break repair. These self-inflicted DNA breaks trigger the G2 cell cycle checkpoint, preventing tumor cells from cycling and protecting them from death due to treatment-induced DNA damage.

Science 2022; 376; 476
Eitan Israeli