

# The effect of COVID-19 pandemic on the characteristics of patients presenting to the pediatric ocular emergency department in Türkiye: Demographic and diagnoses

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## ABSTRACT

**BACKGROUND:** This study aims to evaluate how the coronavirus disease 2019 (COVID-19) pandemic has impacted the demographics and diagnoses of patients presenting at a pediatric ophthalmology emergency department (POED) in Türkiye.

**METHODS:** The electronic medical records of patients <18 years old who presented at the POED from March 15 to May 31, 2020 (first stay-at-home period), and from November 15 to December 31, 2020 (second stay-at-home period), were retrospectively scanned. The demographic data and clinical diagnoses from those periods and the same periods in 2019 were compared.

**RESULTS:** No significant differences emerged regarding age ( $p=0.067$ ) or sex ( $p=0.268$ ) among the 839 pediatric patients who visited the POED in 2019 ( $n=510$ ) versus 2020 ( $n=329$ ). Compared with 2019, 50.63% of fewer patients visited the POED in the first stay-at-home period (i.e., 322 vs. 159) and 9.66% fewer visited in the second period (i.e., 188 vs. 170). The diagnoses in 2019 and 2020 were similar, with foreign body being the most common diagnosis, followed by ocular trauma.

**CONCLUSION:** Amid the COVID-19 pandemic, fewer pediatric patients visited the POED during the first and second stay-at-home periods than during the same periods in 2019, although the difference was less during the second period. Demographic data and diagnoses from year to year, however, were similar. These findings could aid clinicians in developing new strategies and guidelines for POED management in extraordinary situations such as pandemics.

**Keywords:** Coronavirus disease 2019; ocular emergencies; pandemic; pediatric ophthalmological emergency department.

## INTRODUCTION

In late 2019, ophthalmologist Li Wenliang informed the world about the outbreak of an illness that was causing clinical conditions similar to those observed in severe acute respiratory syndrome (SARS).<sup>[1]</sup> The illness was soon shown to derive from the rapidly spreading novel coronavirus disease 19 (COVID-19), which by late February 2020 had infected thousands of patients in 53 countries.<sup>[2]</sup> In Türkiye, the first case of COVID-19 was confirmed on March 11, 2020, the same day that the World Health Organization (WHO) named the disease a pandemic and warned governments “to take urgent and aggressive action.”<sup>[3,4]</sup> Above all, given the lack of a vaccine and proven treatment modalities, the WHO advised personal

protection against the virus and added that some national health-care systems would lack the capacity needed to treat the number of patients expected to contract COVID-19.<sup>[3]</sup>

In response, governments around the world began announcing strict protective policies, including stay-at-home orders, social distancing mandates, personal hygiene rules, and requirements for wearing masks.<sup>[5]</sup> On March 15, the Turkish government began enforcing such policies,<sup>[6]</sup> and once COVID-19's spread decreased in Türkiye, pre-existing policies were resumed on May 31.<sup>[7]</sup> However, as in other countries, the pandemic's second peak manifested in Türkiye in early November, and a second stay-at-home period began on November 20.<sup>[8]</sup>

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As access to medical care declined due to the stay-at-home orders, so did the number of patients who visited emergency departments (EDs) and pediatric emergency departments (PEDs) worldwide,<sup>[9,10]</sup> including for ophthalmological conditions. In an ophthalmology emergency department (OED) in Italy between March 10 and April 20, 2020, for instance, Pellegrini et al.<sup>[11]</sup> observed fewer visits and a significantly higher mean age of patients than during the same period in 2019. In the United Kingdom, Poyser et al.<sup>[12]</sup> found a 53% reduction in patients who presented at an OED between March 24 and April 23, 2020, than during the same period in 2019. Although those data provide some insights into trends in pediatric care during the COVID-19 pandemic, the characteristics of patients who visited pediatric ophthalmology emergency departments (POEDs) despite stay-at-home orders remain unknown.

Thus, the goal of the study presented here was to determine whether the number of patients who presented at a POED in Türkiye and the clinical diagnoses given changed due to the COVID-19 pandemic.

## MATERIALS AND METHODS

### Study Design and Sample

A retrospective study was conducted in the POED at BLIND-EDD. The institution's ethics committee approved the study, all procedures of which strictly followed the tenets of the Declaration of Helsinki.

The electronic medical records of patients who presented at the POED were accessed to collect data representing the effects of two periods of stay-at-home orders in Türkiye during the COVID-19 pandemic. For the first period, data were collected for the dates of March 15–31, April 1–30, and May 1–31, as well as overall from March 15 to May 31. For the second, data were collected for the dates of November 20–30 and December 1–31, as well as overall from November 20 to December 31. For comparison, data representing both periods in 2019 were collected as well. For inclusion for either year, patients had to be <18 years old and have completely filled medical charts, including with clinical diagnostic codes of the International Classification of Diseases (ICD-10).

### Demographic Data

Each patient's age, sex, and nationality (i.e., Turkish, Syrian, Afghan, Iraqi, Turkmen, and Chinese) were recorded to capture the COVID-19 effect on patients' visits to the POED in terms of demographics. Nationality was recorded because it has been identified as a factor of differences in visits to EDs.<sup>[13]</sup>

### Clinical Diagnoses

ICD-10 codes were used to categorize the diagnoses of the patients. For one, trauma to the orbit, globe, eyelid, conjunctiva, sclera, and head was coded as "trauma." For another,

infectious conjunctivitis was coded as "conjunctivitis," whereas atopic and allergic conjunctivitis were coded as "allergic conjunctivitis." Chalazion, blepharitis, and styne were coded as "blepharitis;" foreign bodies in the conjunctiva or cornea or around the eye were coded as "foreign bodies;" and keratitis, dry eye disease, and visual loss were each coded as themselves. Last, optic disk edema, cellulitis, uveitis, refraction error, and conjunctival hemorrhage were coded as "other."

### Statistical Analysis

The Statistical Package for the Social Sciences for Windows (version 22.0, IBM SPSS, Armonk, NY, USA) was used for the statistical analysis of the  $M \pm SD$ , frequency (%), and ratio as descriptive statistics. The distribution of variables was evaluated with the Kolmogorov–Smirnov test, quantitative values were compared between the groups with a t-test, and the Chi-squared test was used to compare qualitative variables. Any  $p < 0.05$  was considered to indicate statistical significance.

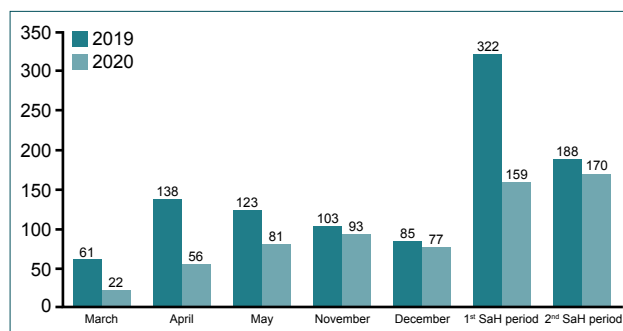
## RESULTS

### Number of Patients

Of the 839 pediatric patients who visited the POED during the two stay-at-home periods, 510 patients presented in 2019, whereas only 329 presented in 2020 during the stay-at-home orders for COVID-19. Figure 1 illustrates the number of patients by period and year. Compared with 2019, the number of patients dropped in 2020 in every month examined: By 63.94% in March, by 59.43% in April, by 34.15% in May, by 9.71% in November, and by 9.42% in December. The same trend also arose during the two periods overall in 2019 versus 2020, with 50.63% fewer patients in the first period and 9.58% fewer in the second.

### Demographic Features

Table 1 summarizes the demographic data of patients who visited the POED during each period and year studied. Overall, their mean age was  $8.90 \pm 5.73$  (0–17) years, and no significant differences in mean age emerged between 2019 and 2020 ( $9.19 \pm 5.51$  vs.  $8.44 \pm 6.03$ , respectively;  $p = 0.067$ ). Although the patients in April 2020 were younger than their counterparts in April 2019 ( $p = 0.006$ ), the patients in every



**Figure 1.** Histogram of the number of pediatric patients by period and year.

**Table I.** Demographic data of pediatric patients by period and year

		Age	p <sup>a</sup>	Gender	p <sup>b</sup>
		(years-Mean±SD)		(Male-%)	
Overall		8.90±5.73		572-68.2%	
2019		9.19±5.51	0.067	355-69.6%	0.268
2020		8.44±6.03		217-66%	
March	2019	9.54±4.74	0.443	40-65.6%	0.539
	2020	10.50±5.67		16-72.7%	
April	2019	9.52±5.77	<b>0.006</b>	91-65.9%	0.357
	2020	7±5.64		33-58.9%	
May	2019	7.98±5.14	0.635	91-74%	0.064
	2020	8.34±5.58		50-61.7%	
November	2019	9.09±5.99	0.328	68-66%	0.562
	2020	8.21±6.61		65-69.9%	
December	2019	10.30±5.30	0.247	65-76.5%	0.275
	2020	9.27±6.01		53-68.8%	
1 <sup>st</sup> SaH period	2019	8.93±5.38	0.15	222-68.9%	0.144
	2020	8.16±5.69		99-62.3%	
2 <sup>nd</sup> SaH period	2019	9.64±5.70	0.137	133-70.7%	0.783
	2020	8.69±6.35		118-69.4%	

SaH: Stay-at-home; SD: Standard deviation; a: Independent samples t-test; boldface, significant values, p<0.05; b: Chi-square.

other month and stay-at-home period were similarly aged in 2019 versus 2020.

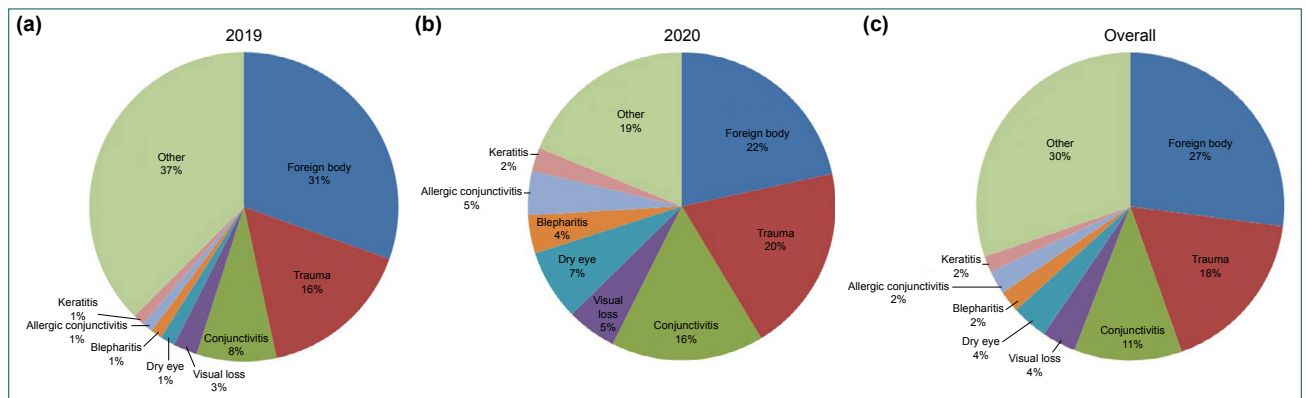
By sex, 572 patients (68.2%) were male, whereas 267 (31.8%) were female. The proportion of males was 69.6% in 2019 and 66.0% in 2020 (p=0.268), and the sex-based distribution of patients by month, period, and year did not differ (Table I).

By nationality, 733 children who presented at the POED were Turkish (87.4%), 99 were Syrian (11.8%), 2 were Iraqi (0.2%), 2 were Afghan (0.2%), 2 were Chinese (0.2%), and 1 was Turkmen (0.1%). Whereas the proportion of Turkish children decreased from 2019 to 2020 by 89.0% to 84.8%,

respectively, the proportion of Syrian children rose, from 10.2% to 14.3%. Even so, no significant difference emerged in nationality between 2019 and 2020 nor in the distribution of nationalities by month or period (p=0.790 for March, p=0.097 for April, p=0.163 for May, p=0.178 for November, p=0.170 for December, p=0.555 for first stay-at-home period, and p=0.098 for second stay-at-home period).

### Clinical Diagnoses

The presence of a foreign body (27.1%) was the most frequent diagnosis during the periods examined followed by trauma (17.5%) and conjunctivitis (11.3%). Although the rankings of diagnoses in 2019 and 2020 were similar, the proportions of



**Figure 2.** (a) Distribution of diagnoses in 2019. (b) Distribution of diagnoses in 2020. (c) Distribution of diagnoses overall.

diagnoses were not (foreign body: 30.8% in 2019 and 21.5% in 2020,  $p=0.002$ ; trauma: 16.3% in 2019 and 19.5% in 2020,  $p=0.237$ ; and conjunctivitis: 8.4% in 2019 and 15.8% in 2020,  $p=0.001$ ). Trauma was more common in April 2020 than in April 2019 (28.6% vs. 8.0%,  $p<0.001$ ), whereas foreign body was less common (16.1% vs. 35.5%,  $p=0.007$ ). Notably, the presence of a foreign body was more often diagnosed in males than in females ( $p=0.041$ ), whereas the opposite was true for conjunctivitis ( $p=0.012$ ). Figure 2 shows the distribution of clinical diagnoses in both years and overall.

## DISCUSSION

The aim of the study was to determine whether the COVID-19 pandemic impacted the number and characteristics of visits to a POED in Türkiye. During the first stay-at-home period, the number of patients decreased by 50.63% compared with the same period in 2019, with the greatest differences occurring in March 2020 (63.94%) and April 2020 (59.43%) versus those months in 2019. The number of patients was also lower during the second stay-at-home period than during the same period in 2019, though not by as much as during the first period (9.58%). Concerning demographic variables, although patients in April 2020, were younger than in April 2019, gender, nationality, and the ranking of clinical diagnoses did not differ among the various months, periods, and years.

Because the top reasons why patients visit EDs – infectious diseases, back pain, and sprains are generally self-limited, the characteristics of ED visits overall can be affected by various conditions,<sup>[13,14]</sup> including epidemics. For instance, Chen et al.<sup>[15]</sup> reported a 40% decline in the number of patients who visited EDs during the SARS outbreak in 2003 versus the same period in 2002. For an explanation, they attributed the drop to patients' fear of getting infected at hospitals, their felt responsibility to self-isolate at home, and their self-treatment at home using alternative methods. As during the SARS outbreak, the number of patients who visited EDs, PEDs, and OEDs also declined early on during the COVID-19 pandemic.<sup>[10,11,13,16]</sup> As shown by the study presented here, the number of patients who presented at the POED decreased during Türkiye's first and second stay-at-home periods versus the same periods in 2019. However, because the year-by-year difference was far less during the second period, it seems that patients and parents followed Türkiye's COVID-19 precautions more rigorously during the first period. In turn, the findings suggest that parents were more worried about their children becoming infected with COVID-19 during an ophthalmological examination in the first period than in the second, which may have prompted the parents to seek alternative modes of ophthalmological care (e.g., telehealth through videoconferencing and online consultations) more during the first than the second period. However, with shifts in behavioral habits and heightened awareness about protecting oneself from COVID-19, parents may have been less anxious during the second than the first period.

Another finding was that males presented more often than females to the POED in every time interval examined, regardless of year. Those results corroborated what Henríquez-Recine et al.<sup>[17]</sup> observed regarding the characteristics of children treated in a POED during a non-pandemic period in short, that males visited more than females (57% vs. 43%). As for reasons why, males are generally more active than females and thus more prone to becoming injured.<sup>[18]</sup> The difference in diagnoses between the sexes, namely, that the presence of a foreign body was more common in males, whereas conjunctivitis was more common in females is consistent with that proposition.

The mean ages of the pediatric patients were also similar in all periods except in April, when patients were older in April 2019 than in April 2020, during which time strict stay-at-home orders affected most aspects of social life, markets were closed, large industrial factories ceased production, and a variety of workers stayed at home.<sup>[6]</sup> As a recent survey has shown, the non-adult workforce in Türkiye is quite large, and 79.7% of working children are 15–17 years old.<sup>[19]</sup> The results thus suggest that Türkiye's stay-at-home orders reduced not only the number of work-related accidents, especially involving foreign bodies, but also the mean age of pediatric patients in April 2020. Others findings showing more diagnoses of trauma and few diagnoses of foreign bodies in April 2020 versus April 2019 support that idea.

In a literature review, Nicholson et al.<sup>[20]</sup> identified nationality as a possible factor of health-seeking behavior among adults. By contrast, the results presented here revealed that although the proportion of Syrians increased from 2019 to 2020, the nationality of patients who presented at the POED was not statistically significant. Among possible reasons for that difference, the more recent study involved evaluating not routine visits to a POED but ones made under extraordinary circumstances. If all people living in Türkiye generally obeyed the precautions, then of course, the nationality of patients would have not differed from period to period. In that light, nationality should be further investigated in other research under normal conditions.

The rankings of clinical diagnoses determined during the study contrasted those made by Henríquez-Recine et al.<sup>[17]</sup> who found that infectious conjunctivitis was leading diagnosis, followed by trauma and allergic conjunctivitis, within a sample of pediatric patients. However, the presence of a foreign body was the most common diagnosis overall and in each year followed by trauma and conjunctivitis in that order. The different classification of diagnoses could largely explain the difference between the studies. In the study presented here, ICD-10 codes were used to classify diagnoses, whereas Henríquez-Recine et al.<sup>[17]</sup> did not use any codes whatsoever, at least as reported in their paper. Somewhat remarkably, the study's results also show that the proportion of conjunctivitis was higher and the proportion of foreign body was lower in

2020 than in 2019. In contrast to those findings, Pellegrini et al.<sup>[11]</sup> detected fewer diagnoses of conjunctivitis and more diagnoses of foreign bodies. However, the study's sample selection, restricted to pediatric cases only, differed from that in past research, including Pellegrini et al.<sup>[11]</sup> which involved reviewing all patients' data regardless of age. In another notable finding, trauma was the leading diagnosis in April 2020, during the early days of the first stay-at-home period. According to Cariello et al.,<sup>[18]</sup> homes are the most frequent setting for the onset of ocular trauma, which may explain the shift in rankings of the diagnoses.

The study's greatest limitation was its retrospective design, whereas the relatively large sample for identifying significant differences was its greatest strength. The other limitation was not comparing visits to the POED by nationality under normal circumstances. A prospective study should be performed to characterize that factor of visits to POEDs.

## Conclusion

The study revealed that Türkiye's stay-at-home orders due to the COVID-19 pandemic altered the number of patients who visited the POED but did not generally alter their demographic characters, including mean age, sex, and nationality, which all remained similar during the stay-at-home periods. Even so, the results cannot be generalized to all PED visits. Additional studies to this present study examining the pandemic's long-term effects on POEDs could aid clinicians in developing new strategies and guidelines for POED management in extraordinary situations such as pandemics.

**Ethics Committee Approval:** This study was approved by the Kayseri City Hospital Clinical Research Ethics Committee (Date: 12.02.2021, Decision No: 47).

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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ORİJİNAL ÇALIŞMA - ÖZ

## COVID-19 pandemisinin Türkiye’de çocuk göz acil servisine başvuran hastaların özelliklerine etkisi: Demografik özellikler ve tanılar

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**AMAÇ:** 2019 koronavirus hastalığı (COVID-19) pandemisinin Türkiye’de pediatrik oftalmoloji acil servisine (POAS) başvuran hastaların demografik özelliklerini ve tanıları nasıl etkilediğini değerlendirmek.

**GEREÇ VE YÖNTEM:** 15 Mart–31 Mayıs 2020 (ilk evde kalma süresi) ve 15 Kasım–31 Aralık 2020 (ikinci evde kalma süresi) arasında POAS’ye başvuran 18 yaşından küçük hastaların elektronik tıbbi kayıtları, geriye dönük olarak tarandı. Bu dönemlere ait demografik veriler ve klinik tanılar 2019 yılının aynı dönemleriyle karşılaştırıldı.

**BULGULAR:** Sekiz yüz otuz dokuz pediatrik hastanın dosyası incelendiğinde POAS’yi 2019 yılında ziyaret edenler (n=510) ile 2020 yılında ziyaret edenler (n=329) arasında yaş (p=.067) veya cinsiyet (p=.268) açısından anlamlı bir fark bulunmadı. 2019 ile karşılaştırıldığında, ilk evde kalma döneminde (yani, 322’ye karşı 159) POAS’yi ziyaret eden hasta %50.63 daha az ve ikinci dönemde (yani, 188’e karşı 170) %9.66 daha az hasta ziyaret etti. 2019 ve 2020’deki tanılar benzerdi; en sık tanı yabancı cisimdi ve ikinci en sık tanı oküler travmaydı.

**TARTIŞMA:** COVID-19 pandemisinin ortasında, fark ikinci dönemde daha az olmasına rağmen, birinci ve ikinci evde kalış dönemlerinde 2019’un aynı dönemlerine göre daha az pediatrik hasta POAS’i ziyaret etti. Bununla birlikte, yıldan yıla demografik veriler ve teşhisler benzerdi. Bu bulgular, pandemiler gibi olağanüstü durumlarda POAS yönetimi için yeni stratejiler ve kılavuzlar geliştirmede klinisyenlere yardımcı olabilir.

**Anahtar sözcükler:** COVID-19; oküler aciller; pandemi; pediatrik oftalmolojik acil servis.

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