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Original research article

IMPACT OF COVID-19 PANDEMIC ON PEDIATRIC OCULAR TRAUMA DURING SUMMER BREAK

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Abstract: *The COVID-19 pandemic reshaped nearly every aspect of daily life, imposing restrictions that altered children's routines and environmental exposures.* ***Objective:*** *To study the impact of the COVID-19 pandemic on pediatric ocular trauma during summer break in a tertiary care eye hospital in Pakistan.* ***Methods:*** *This retrospective comparative study was conducted at the Department of Pediatric Ophthalmology and Strabismus at Al-Shifa Trust Eye Hospital, Rawalpindi during summer vacation, spanning from 1st June to 31st August of 2019 (a year before covid-19 pandemic, i.e pre-pandemic period) and same duration in 2020 (pandemic period). Data was collected from 385 pediatric patients who were admitted for ocular trauma treatment during these two study periods.* ***Results:*** *Among 385 patients, 190 cases arise from pre-pandemic and 195 from pandemic period. In both study periods, the majority involved male patients (60%), with female cases making up 40%. The average age of affected children remained consistent at 8.5 years, and the most frequently affected age group was 6-10 years. Blunt trauma cases increased from 45% (86 cases) pre-pandemic to 50% (98 cases) during the pandemic, likely due to increased time spent indoors with potential household hazards. Penetrating injuries, however, decreased from 30% (57 cases) to 25% (49 cases), possibly reflecting reduced outdoor play.* ***Conclusion:*** *It is concluded that the COVID-19 pandemic led to an increase in household-related pediatric ocular trauma, with a higher proportion of severe injuries and delayed treatment impacting recovery outcomes*

Keywords: COVID-19, Eye Injuries, Pandemics, Pediatric Ophthalmology, Wounds and Injuries.

Introduction

The COVID-19 pandemic reshaped nearly every aspect of daily life, imposing restrictions that altered children's routines and environmental exposures. These restrictions particularly affected their safety within the home and healthcare access. Child ocular injury, a major reversible cause of visual loss in a child, occurs usually during games, at school or play. However, as the pandemic limited the freedom of children to go out of doors, the sources of such injuries changed drastically (1). Even the well-endowed tertiary care eye hospitals involved in the study experienced disruptions in their normal patient care business, short staffing, and rerouting of resources to the COVID-19-affected patients. Therefore, the pandemic led to alterations in the frequency, types, and severity of pediatric ocular injuries; a closer investigation of these changes is critical to addressing the effects on pediatric eye health (2).

From the result it was noted that in the course of the lockdowns, children participated in many activities within the house, interacting with objects and substances within the house that can cause eye injuries among them kitchen utensils, cleaning agents, sharp toys and electronic gadgets (3). The probability of contact with hazardous domestic surroundings types also rose while being indoors, which altered the focus of frequent ocular trauma cases from sports-related mishaps to those that happen indoors. Furthermore, children's increased TV time caused by online school and entertainment also has its effects, such as eye fatigue and interaction with device-associated traumas (4).

On the side of healthcare, the pandemic disrupted many hospital patterns and practically all patients' traffic. Due to a shortage of resources and infection control measures, hospitals that are providing tertiary care for eye illnesses had to reorganize their admission policies where they received patients based on emergencies most of the time. This made patients wait until they reached their limits before seeking treatment likely jeopardizing the ocular recovery of children (5). Also, there was an important solution in telemedicine which allowed patients to get consultations to handle the minor injuries and first consultations, which helped to minimize the face-to-face attendance. Nevertheless, the omission to perform physical examinations for some cases, presumably, resulted in missed diagnoses, or improper treatments; especially dangerous in eye trauma cases that see the prognosis dependent on timely treatment (6).

These modality trends of ocular trauma documented during this period elucidate the different mechanisms through which the COVID pandemic has affected the eyes of children (7). Some of the findings of the latest investigations revealed that instances, wherein children sustained penetrating eye injuries, chemical burns, or foreign body injuries, were increased probably because kids truly spend more time on their own, playing with unfamiliar objects in alien settings (8). Further, parental care because of work-from-home had their children left alone thus increasing their vulnerability to accidents. The emotionally and mentally tough period together with the high stress of children and people who take care of them during the pandemic may be the reason for the increased rate of risky behaviors and accidents in indoor settings (9).

In Pakistan, summer break schedule is designed to align with the climate, providing children an opportunity to engage in sports and outdoor activities. This usually results in various kinds of ocular injuries and eventually visual loss in children. Considering the similarities between Covid-19

pandemic related stay-at-home periods and summer break, it is difficult to attribute eye trauma solely to one event. By acknowledging this complexity, we felt the need to evaluate both periods comprehensively in order to identify and distinguish the unique risk factors and health hazards associated with each event.

Objective:

The aim of the study is to evaluate the impact of the COVID-19 pandemic on pediatric ocular trauma specifically during summer break in a tertiary care eye hospital in Pakistan.

Methodology

This retrospective comparative study was conducted at the Department of Pediatric Ophthalmology and Strabismus at Al-Shifa Trust Eye Hospital, Rawalpindi. We evaluated pediatric ocular trauma cases presenting during summer-break time from 1st June to 31st August 2019 and labelled it as pre-pandemic period. We compared them to the cases presented during the same three months study period in 2020 and labelled it as pandemic period. Data was collected from 385 pediatric patients who were admitted to the department for ocular trauma treatment during these two study periods.

Data Collection:

Data were gathered from the HMIS system, which maintains comprehensive patient records, including demographic information, injury type, mechanisms of trauma, and treatment outcomes. Patient demographics include age, gender, and other relevant baseline characteristics of pediatric patients. Ocular kind of trauma, mechanism of injury, and severity classification (such as penetrating injuries, blunt trauma, chemical exposure, and foreign body incidents) were also noted. Initial treatment provided, whether the injury required surgical intervention or outpatient management, and the type of follow-up care given were noted. Visual acuity results at discharge, any documented complications, and final treatment outcomes were documented.

Data Analysis:

Data were analyzed using SPSS v29. Descriptive statistics were used to summarize patient demographics and injury characteristics, with categorical data presented as frequencies and percentages, and continuous variables as means and standard deviations.

Results

Data were collected from 385 patients with total cases rising from 190 pre-pandemic to 195. In both periods, the majority of cases involved male patients (60%), with female cases making up 40%. The average age of affected children remained consistent at 8.5 years, and the most frequently affected age group was 6-10 years. These stable demographic patterns indicate that while the overall number of cases increased, the age and gender distribution of pediatric ocular trauma patients did not significantly shift due to the pandemic. (Table 1)

Table 1: Patient Demographics

Period	Total Cases	Male (%)	Female (%)	Average Age (Years)	Most Affected Age Group
Pre-Pandemic	190	60%	40%	8.5	6-10 years
Pandemic	195	60%	40%	8.5	6-10 years

Blunt trauma cases increased from 45% (86 cases) pre-pandemic to 50% (98 cases) during the pandemic, likely due to increased time spent indoors with potential household hazards. Penetrating injuries, however, decreased from 30% (57 cases) to 25% (49 cases), possibly reflecting reduced outdoor play. Chemical burns saw a rise from 10% (19 cases) pre-pandemic to 15% (29 cases) during the pandemic, likely linked to greater exposure to cleaning agents. Foreign body incidents remained steady at 15% in both periods. (Table 2)

Table 2: Types of Ocular Trauma

Type of Trauma	Pre-Pandemic Cases (%)	Pandemic Cases (%)
Blunt Trauma	45% (86)	50% (98)
Penetrating Injuries	30% (57)	25% (49)
Chemical Burns	10% (19)	15% (29)
Foreign Body Incidents	15% (28)	15% (29)

Mild injuries decreased from 50% (95 cases) pre-pandemic to 45% (88 cases), while moderate and severe injuries increased, with moderate cases rising from 30% (57 cases) to 35% (68 cases) and severe cases from 20% (38 cases) to 25% (49 cases). Correspondingly, there was a higher rate of surgical interventions during the pandemic, increasing from 30% (57 cases) to 35% (68 cases), while outpatient management decreased from 70% (133 cases) to 65% (127 cases). (Table 3)

Table 3: Injury Severity and Treatment Approach

Injury/Treatment Type	Pre-Pandemic (%)	Pandemic (%)
Mild Injuries	50% (95)	45% (88)
Moderate Injuries	30% (57)	35% (68)

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Severe Injuries	20% (38)	25% (49)
Surgical Intervention	30% (57)	35% (68)
Outpatient Management	70% (133)	65% (127)

The rate of full recovery dropped from 70% (133 cases) pre-pandemic to 60% (117 cases) during the pandemic, while cases with partial recovery increased from 20% (38 cases) to 30% (58 cases). Permanent vision impairment also saw a slight rise, from 10% (19 cases) pre-pandemic to 10.5% (20 cases) during the pandemic. (Table 4)

Table 4: Visual Outcomes

Outcome	Pre-Pandemic (%)	Pandemic (%)
Full Recovery	70% (133)	60% (117)
Partial Recovery	20% (38)	30% (58)
Permanent Vision Impairment	10% (19)	10.5% (20)

The mechanisms of pediatric ocular injuries shifted notably during the pandemic, reflecting changes in children's environments and activities. Injuries from household objects increased from 20% (38 cases) pre-pandemic to 30% (59 cases) during the pandemic, likely due to more time spent at home. Chemical exposure injuries doubled, rising from 10% (19 cases) to 20% (39 cases), possibly linked to the increased use of cleaning agents. Conversely, sports-related injuries significantly decreased from 30% (57 cases) to 15% (29 cases), and falls reduced slightly from 25% (48 cases) to 20% (39 cases). These shifts underscore how home confinement altered the types of risks children faced.(Table 5)

Table 5: Mechanism of Injury

Mechanism of Injury	Pre-Pandemic Cases (%)	Pandemic Cases (%)
Household Objects	20% (38)	30% (59)
Falls	25% (48)	20% (39)
Sports-related	30% (57)	15% (29)
Chemical Exposure	10% (19)	20% (39)
Others	15% (28)	15% (29)

The pandemic led to delays in treatment for pediatric ocular trauma cases. Immediate treatment (within 24 hours) decreased from 60% (114 cases) pre-pandemic to 50% (98 cases) during the pandemic, while cases with a 1-3 day delay increased from 30% (57 cases) to 35% (68 cases). Extended delays (over 3 days) also rose, from 10% (19 cases) pre-pandemic to 15% (29 cases) during the pandemic. (Table 6)

Table 6: Time to Treatment

Time to Treatment	Pre-Pandemic Cases (%)	Pandemic Cases (%)
Immediate (within 24 hours)	60% (114)	50% (98)
Delayed (1-3 days)	30% (57)	35% (68)
Extended Delay (>3 days)	10% (19)	15% (29)

Discussion

The results of this retrospective comparative study highlight the significant impact of the COVID-19 pandemic on pediatric ocular trauma patterns, severity, and outcomes in a tertiary care eye hospital. The findings are discussed and suggest that Covid-19 restrictions, which included lifestyle alterations and limitations in access to healthcare services, resulted in changes to the characteristics of injuries as well as the frequency of new injuries during the pandemic (10). This section seeks to explain the possible causes of these results besides clarifying the meaning of these results to health systems, and prevention strategies in similar disasters. It should be noted that the main finding of this study is that, overall, there has been excess mortality during the pandemic period and in part of them, and the rate of household-related injuries, especially chemical burns and blunt trauma, has increased (11). During the COVID-19 crisis, children have been indoors due to lockdowns and school closures exposing them to household dangers including cleaning compounds, sharp objects, and gadgets. The reasons can be explained by the fact that more people use disinfectant solutions and domestic chemicals during the period of quarantine. This study points to the importance of appraising parents of safer storage and usage of such products especially when children are at home for long hours (12).

At the pandemic time, there is a slight increase of ocular trauma cases that accompanied by an increase of severe cases needing surgical treatment, thus highlighting the problem of limited access to healthcare services. In fact, the pandemic changed a lot in hospital regulations where many healthcare centers focused on COVID-19 patients and put off urgent consultation. This led to a higher proportion of severe injuries, and, patients who could have presented early for seek medical attention did not do it (13). Further evidence of this is provided by the data on time-to-

treatment, which show a significant increase on cases classified as having delayed or extended treatment. Early treatment is vital in ocular trauma if a disease is not to progress thus miss the Window of Opportunity and this may have led to the increased cases of partial recovery and permanent loss of vision during the pandemic. This is well explained by a decrease in sports Injuries and a rise in Household Injuries due to the changes in children's activities due to the pandemic (14). The movement of children was restricted and thus the impact sports-related injuries, which are often witnessed in structured events, were reduced. It raises a critical awareness concerning the lack of programming for the systematic instruction of indoor safety for children when spending many hours at home – for example, safety lists, types of hazards, and methods for creating safe play areas (15).

The poorer visual outcomes in the pandemic cohort indicate a cumulative influence of the timing of treatment and the magnitude of head and face injury. Despite achieving satisfactory visual outcomes in the majority of the patients, it is worth noting that the percentage of the patients who have regained full vision has significantly decreased if compared to the pre-pandemics data, it underlines the necessity of early management of patients with ocular trauma (16). In subsequent worldwide healthcare emergencies, striking a balance between readiness on one side and on the other by providing timely and available non-COVID treatment services might prevent such adverse effects on patients. In conclusion, the results presented in this article reveal the importance of preventive approaches to safety and the flexible organizational structures of health systems during crises (17). Hospital and healthcare facility managers should consider applying telemedicine admission and diagnostic assessment and advice on simple injuries, which could help avoid huge traffic congestion while addressing healthcare complications developed inside health care facilities (18). Moreover, messages that are aired during time when people spend most of their time indoors might be useful in reducing risks by informing parents and caregivers of ways in which dangers of pediatric injury can be averted.

Conclusion

It is concluded that the COVID-19 pandemic led to an increase in household-related pediatric ocular trauma, with a higher proportion of severe injuries and delayed treatment impacting recovery outcomes. The study emphasizes the need for proactive safety measures, timely access to healthcare, and parental education on indoor safety to mitigate similar risks in future public health crises.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.
Approved by the department Concerned. (IRBEC-SHE-0244/20)

Consent for publication
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Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

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Concept & Design of Study

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