



Characteristics of unintentional childhood injury during COVID-19: a single-center comparative study

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Background: There are many articles related to child injuries during the coronavirus disease of 2019 (COVID-19) in other countries, but only few studies in this field in China. This study analyzes the clinical characteristics of unintentional childhood injury during the pandemic, to provide reference for the prevention of unintentional childhood injury in the context of pandemic.

Methods: A comparative study was performed on the medical data of 2,497 children with unintentional injury who were hospitalized at Chengdu Women's and Children's Central Hospital between 1 January, 2018 and 31 May, 2021. The study period was divided into 2 periods, before the pandemic (1 January, 2018 to 31 May, 2019), during the pandemic (1 January, 2020 to 31 May, 2021). The number of unintentional childhood injuries and age distribution before and during the pandemic were compared. Group differences were examined using Mann–Whitney U for continuous variables and Chi-squared or Kruskal-Wallis tests for categorical variables.

Results: There were significant differences in age, accident location, hospitalization days, and medical expenses before and during the pandemic ($P < 0.05$). During the pandemic, the number of children's unintentional injuries increased by 34.24% (1,066 vs. 1,431, $P = 0.000$), and the significantly increased types of unintentional injuries included foreign bodies, falls, crush injuries, and sharp injuries. During the pandemic, the highest proportion of unintentional injury to children was foreign bodies, whereas the proportion of falls was the highest before the pandemic. During the pandemic, the number of foreign body injuries in toddler was significantly higher than before the pandemic ($P = 0.001$), but the number of falls, crush injuries, and sharp injuries in preschooler was significantly higher ($P < 0.05$).

Conclusions: In the circumstance of the COVID-19, the number of foreign bodies, falls, crush injuries, and sharp injuries, in children increased significantly. It is necessary to strengthen the prevention of foreign bodies in toddler, and falls, crush injuries, and sharp injuries in preschooler.

Keywords: Coronavirus disease of 2019 pandemic (COVID-19 pandemic); children; unintentional injuries

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Introduction

At the end of December 2019, severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was first reported in Wuhan, Hubei, China, which causes a disease that has been termed the coronavirus disease of 2019 (COVID-19). Since then, the infection has swept across over 216 countries and territories. The World Health Organization (WHO) announced that the COVID-19 had reached pandemic status on 30 January 2020 and, subsequently, declared a global pandemic in March 2020. The COVID-19 pandemic has infected millions of people and caused a significant number of deaths. According to the WHO, as of 29 May 2022, the number of infected people in the world had exceed 526 million, the number of deaths had exceeded 6.27 million, and the overall case fatality rate was about 1.2% (1). In China, in order to control the spread of the pandemic, several restrictions were enforced, for example, implementation of strict social distancing and mobility restrictions, including closure of public places such as schools, public offices, and gardens, stopping international flights and local transport, people were strictly advised to stay at home and work from home as much as possible, school students studied online at home due to school closure (2,3), and all large events were canceled, among other restrictions.

Due to children having less awareness of danger, underdeveloped safety awareness, and a strong curiosity about unknown things, unintentional injury is the leading cause of death. The above measures have limited the scope of children's activities, simplified recreational activities and experienced physical isolation from their classmates, friends, teachers, and other important adults (e.g., grandparents).

These factors might not only result in feelings of loneliness but could potentially lead to increase of unintentional injuries that most commonly occur in the home because they spend most of their time indoors.

As children were confined to their homes during the COVID-19 pandemic, the characteristics of unintentional injuries in children may have been different from those before the pandemic, which challenged the prevention of unintentional injury among children under these new circumstances. Some studies in other countries have reported that the COVID-19 has increased the proportion of unintentional injuries such as child poisoning, firearm injuries (4-6). However, there are few studies focusing on unintentional injuries of children under the pandemic in China. Tang's study showed that falls, crushing, collision and sharp injuries were the main reasons for children during the pandemic period (7), but this study only analyzed the data from March 2020. Another study found that the proportion of patients with trauma and unintentional injury during the pandemic increased (8), but it only analyzed the cases in intensive care unit (ICU). The latest research reported that under the COVID-19 pandemic, there is a reduction in the number of children with unintentional injury (9). This is inconsistent with the results reported in other articles and the study did not collect animal injuries, burns and scalds and other diseases. Therefore, in this study, we explored the occurrence of intentional injury of children and age distribution before and during the pandemic in our hospital. The purpose is to provide reference for the prevention of unintentional injury of children in the context of the pandemic. We present the following article in accordance with the STROBE reporting checklist (available at <https://tp.amegroups.com/article/view/10.21037/tp-23-79/rc>).

Highlight box

Key findings

- The COVID-19 pandemic has significantly increased the incidence of falls, crush injuries, and sharp injuries in preschoolers.

What is known and what is new?

- Toddler is the high incidence period of children's unintentional injuries.
- The COVID-19 has significantly increased the incidence of unintentional injuries in preschooler.

What is the implication, and what should change now?

- During the pandemic, while preventing the occurrence of foreign body injury in toddler, we need to prevent the occurrence of falls, crush, and sharp injuries in preschooler.

Methods

Study design and patient population

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Institutional Ethics Board of Chengdu Women's and Children's Central Hospital (No. 2023[29]). Informed consent was waived due to the retrospective nature of the study. This was a single-center comparative study conducted between 1 January 2018 and 31 May 2021 at Chengdu Women's and Children's Central Hospital. At the end of December 2019, SARS-CoV-2 was first reported; it reached pandemic status on 30 January 2020 and was

declared a global pandemic in March 2020. Therefore, we divided the time between January 2018 and May 2021 into 2 periods: the period from 1 January 2018 to 31 May 2019 was defined as before the pandemic, and that from 1 January 2020 to 31 May 2021 was defined as during the pandemic. In order to reduce the impact of winter and summer holidays and other special periods on children's unintentional injuries, the data from 1 June to 31 December 2019 were discarded.

We considered all pediatric patients aged 0–18 years who were hospitalized for unintentional injuries during both time periods, excluding children who were hospitalized for intentional injuries, illness related injuries and iatrogenic injuries and children who experienced unintentional injuries during hospitalization.

Data collection and analysis

We collected all cases data with external cause codes of injury and poisoning from the home page of electronic medical record. In our study, two independent authors extracted and reviewed all case data according to the inclusion and exclusion criteria (QT Tan and T Wang). Any disagreements were resolved either by discussion or by inviting a third author (N Xu). According to clinical experience of the investigators, the following data were selected: general clinical characteristics (for example, age, gender, home address, prognosis, hospitalization time, medical expenses, etc.), main diagnosis (ranking of the top 3 diagnoses), and external causes of injury and poisoning.

According to the external causes of injury and poisoning in the International Classification of Diseases (ICD-10 code), the unintentional injuries are divided into traffic injuries, falls, burns, electrical shocks, poisonings, drowning, sharp injuries, crush injuries, blunt injuries, animal bites, infant muggy syndrome, foreign body, sprain, asphyxia, and others. The classification of unintentional injury was determined by two authors in our study (QT Tan and T Wang). Any disagreements were resolved either by discussion or by inviting a third author (N Xu).

To compare the proportion of unintentional injuries at different ages and the age distribution of various unintentional injuries before and during the pandemic, we referred to the 8th edition of pediatric textbook published by the People's Medical Publishing House in China and divided the children into the following 5 age groups: Infant <1; 1≤ Toddler <3; 3≤ Preschooler <6; 6≤ School-aged child <12; and 12≤ Adolescent <18 years.

Then, we analyzed the general clinical characteristics, the number of children with different unintentional injury types, and the age characteristics of different unintentional injury types before and during the pandemic.

Statistical analysis

The statistical software Statistical Product and Service Solutions (SPSS) 21.0 (IBM Corp, Armonk, NY, USA) was used for all statistical analyses. The categorical variables were described as frequencies with percentages and were analyzed using the chi-squared test or Kruskal-Wallis test. The continuous variables were described as medians with interquartile ranges (IQRs) or median with minimum and maximum value and were analyzed using the Mann-Whitney U test. Statistical significance was set at two-sided P value less than 0.05 in all statistical tests. Missing or unknown data was excluded from the analysis.

Results

Patient cohort

Among all the patients from the electronic medical record system, 4,689 were hospitalized due to unintentional injuries such as injury and poisoning. A total of 871 patients were excluded as they were hospitalized between 1 June and 31 December 2019. A total of 1,321 patients were also excluded as they were hospitalized for intentional injuries, illness related injuries and iatrogenic injuries or experienced unintentional injuries during hospitalization or there have missing data [118 (4.5%)]. Finally, a total of 2,497 patients were included for further analysis. Among them, 1,066 cases occurred before the pandemic period and 1,431 occurred during the pandemic period (*Figure 1*).

Characteristic of cases with unintentional childhood injuries before and during the COVID-19 pandemic

Before the pandemic, a total of 1,066 children with unintentional injuries were admitted to our hospital, the youngest was 1 day old, the oldest was 16 years old, and the median age was 2.8 years old. Among them, 660 were boys and 406 were girls, with a male-to-female ratio of 1.63:1. There were 576 cases living in cities (54.03%) and 490 cases in rural areas (45.97%); unintentional injuries mainly occurred at home (63.98%). Among them, 116 cases were admitted to the ICU (10.88%); the length of hospitalization

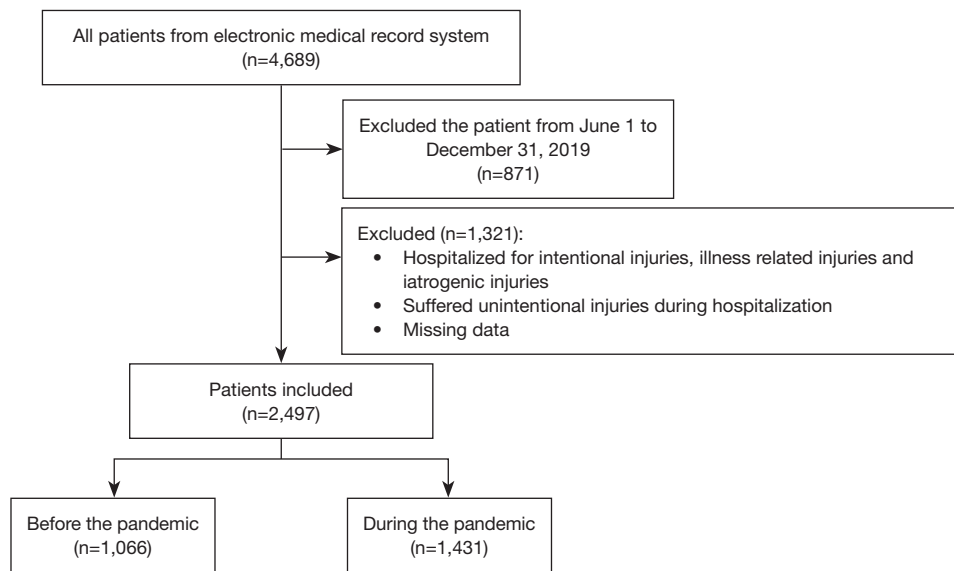


Figure 1 Flow chart of patient selection.

was at least 1 day, at most 39 days, and the median length of stay was 5 days; the minimum medical expenses were 30 yuan, the highest was 133,111.99 yuan, and the median medical cost was 6,010.02 yuan. The cure rate of unintentional injury was 94.09%, including 4 deaths (0.38%).

During the pandemic, our hospital received a total of 1,431 children with unintentional injuries, the youngest was 3 days old, the oldest was 16.7 years old, and the median age was 3.3 years old. Among them, 871 were boys and 560 were girls, with a male-to-female ratio of 1.56:1. There were 827 cases living in cities (57.79%), and 604 cases in rural areas (42.21%). Unintentional injuries mainly occurred at home (59.12%). Among them, 130 cases were admitted to the ICU (9.08%); the hospitalization days were at least 1 day, at most 115 days, and the median length of hospitalization was 6 days; the medical expenses were at least 97.8 yuan, the highest was 413,328.34 yuan, and the median medical expenses were 6,276.20 yuan. The injury cure rate was 92.87%, including 5 deaths (0.35%).

Before and during the pandemic, there were differences in children's age, accident location, hospitalization days, and medical expenses, and the difference was statistically significant ($P < 0.05$), but there was no statistical difference in gender, ICU admission rate, and disease outcome ($P < 0.05$) (Table 1).

Unintentional childhood injuries classification before and during the COVID-19 pandemic

The classification of unintentional injuries of children is mainly shown in Table 2. The top 5 causes were foreign matter, falls, traffic injuries, crush injuries, and poisoning. During the pandemic, the highest proportion of unintentional injury to children was foreign bodies, whereas the proportion of falls was the highest before the pandemic. The sites of foreign bodies in this study included digestive tract foreign bodies, airway foreign bodies, and nasopharyngeal foreign bodies. Common types of foreign objects include food (peanuts, walnuts, melon seeds, jujube stones, etc.), toys (glass beads, magnetic beads, etc.), daily necessities (batteries, coins, ear studs, buttons, embroidery needles, hairpins), and so on. Falls in this study included falls on the same plane, as well as falls from one plane to another (including chairs, sofas, beds, cars, balconies, rooftops, parents' arms, etc.). The total number of unintentional injuries before and during the pandemic was statistically different ($P < 0.05$). Compared with before the pandemic, during the pandemic, the number of unintentional injuries among children increased by 34.24%. Among them, the number of foreign bodies, falls, crush injuries, and sharp injuries, had a statistically significant difference ($P < 0.05$),

Table 1 Characteristic of cases with unintentional childhood injuries and their controls, before and during the COVID-19 pandemic

Characteristic	Before the pandemic	During the pandemic	Statistics	P value
Age [years, median (IQR)]	2.8 (3.8)	3.3 (3.9)	Z=2.764	0.006
Gender			$\chi^2=0.282$	0.595
Male (n, %)	660 (61.91)	871 (60.87)		
Female (n, %)	406 (38.09)	560 (39.13)		
Urban and rural distribution			$\chi^2=3.505$	0.061
Urban (n, %)	576 (54.03)	827 (57.79)		
Rural (n, %)	490 (45.97)	604 (42.21)		
Accident location			$\chi^2=6.071$	0.014
Outdoor (n, %)	384 (36.02)	585 (40.88)		
Home (n, %)	682 (63.98)	846 (59.12)		
Prognosis			Z=1.485	0.223
Heal (n, %)	1,003 (94.09)	1,329 (92.87)		
Sign out (n, %)	58 (5.44)	95 (6.64)		
Death (n, %)	4 (0.38)	5 (0.35)		
Transfer (n, %)	1 (0.09)	2 (0.14)		
Number of ICU admissions (n, %)	116 (10.88)	130 (9.08)	$\chi^2=0.989$	0.320
Hospitalization days [days, median (IQR)]	5 (5.0)	6 (4.0)	Z=2.290	0.022
Medical expenses [yuan, median (IQR)]	6,010.02 (8,248.27)	6,276.20 (10,194.74)	Z=3.159	0.002

COVID-19, coronavirus disease of 2019; IQR, interquartile range; ICU, intensive care unit.

but differences among other causes were not significant ($P>0.05$) (Table 2).

Distribution of unintentional childhood injuries in different age groups

The age distribution of unintentional injuries among children before and during the pandemic is shown in Table 3, Table 4, and Table 5. During the pandemic, the number of unintentional injuries in all age groups increased.

Before the pandemic, the number of unintentional injuries in toddler was the highest (45.12%), whereas the toddler and preschooler groups during the pandemic were both high (accounting for 38.57% and 32.00%, respectively) ($P<0.05$).

We analyzed the age distribution of 4 types of unintentional injuries including foreign objects, falls, crush injuries, and sharp injuries before and during the pandemic, from which we found that (Figure 2) during the pandemic, the high proportion age of foreign body injury was toddler,

the other causes were mainly preschooler, and the difference was statistically significant (Figures 3-5).

Discussion

Children are young and have underdeveloped safety awareness, leaving them prone to unintentional injuries, which threatens their health and life. Injuries to children are the leading cause of death and disability among children aged 0–14 years (10). In 2017, the Global Burden of Diseases project estimated that more than 2 million children died from injury in the whole world (11). In China, thousands of children die each year due to unintentional injuries, the proportion of childhood unintentional injuries ranges from 10.93% to 64.3%, which is the main cause of mortality for children between the ages of 1 and 14 years (12,13). Thus, childhood unintentional injuries are a public health problem worldwide. During the COVID-19 pandemic, the series of restrictions policies adopted by government affected children's lifestyles and living environment. In our study,

Table 2 Unintentional childhood injuries classification before and during the COVID-19 pandemic [n (%)]

Variables	Before the pandemic	During the pandemic	χ^2	P value
Foreign bodies	382 (35.83)	556 (38.85)	32.277	0.000
Falls	430 (40.34)	544 (38.02)	13.343	0.000
Traffic injuries	85 (7.97)	101 (7.06)	1.376	0.241
Crush injuries	44 (4.13)	84 (5.87)	12.500	0.000
Poisonings	59 (5.53)	55 (3.84)	0.140	0.708
Burns	20 (1.88)	30 (2.10)	2.000	0.157
Sharp injuries	6 (0.56)	21 (1.47)	8.333	0.004
Sprain	7 (0.66)	16 (1.12)	3.522	0.061
Drowning	10 (0.94)	9 (0.63)	0.053	0.819
Blunt injuries	6 (0.56)	6 (0.42)		
Animal bite injuries	11 (1.03)	5 (0.35)	2.250	0.134
Infant muggy syndrome	1 (0.09)	2 (0.14)	0.333	0.564
Electrical shocks	1 (0.09)	1 (0.07)		
Others	3 (0.28)	1 (0.07)	1.000	0.317
Asphyxia	1 (0.09)	0		
Total	1,066	1,431	53.354	0.000

COVID-19, coronavirus disease of 2019.

Table 3 The age distribution of unintentional childhood injuries before and during the COVID-19 pandemic

Variables	Infant	Toddler	Preschooler	School-aged child	Adolescent	χ^2	P value
Before the pandemic (n, %)	83 (7.79)	481 (45.12)	287 (26.92)	191 (17.92)	24 (2.25)	611.655	0.000
During the pandemic (n, %)	101 (7.06)	552 (38.57)	458 (32.00)	286 (19.99)	34 (2.38)	692.064	0.000
χ^2 value	1.761	4.880	39.25	18.920	1.724		
P value	0.185	0.027	0.000	0.000	0.189		

COVID-19, coronavirus disease of 2019.

whether before or during the pandemic, the proportion of unintentional injuries in the family is higher. And during the pandemic, the number of childhood unintentional injuries increased by 34.24% compared with before the pandemic, among them, 59.12% of unintentional injuries occurred at home.

The number of hospitalization days and medical expenses during the pandemic increased in comparison to before the pandemic, so the pandemic of novel corona virus pneumonia had a negative impact on the occurrence of childhood unintentional injuries and incurred heavy economic and psychological burdens on families and broader society.

In addition, during the pandemic, we observed differences in children's age at the time of injury. The age comparison showed that the age during the pandemic (median age of 3.3 years old) was older than before the pandemic (median age of 2.8 years old). Further analysis showed that, before the pandemic, toddler was the highest proportion age of unintentional injury (45.12%), which is consistent with the results of most studies (14-16). However, during the pandemic, the proportion of unintentional injuries in toddler and preschooler were both high (38.57% and 32.00%, respectively). This indicates that the pandemic increased the proportion of unintentional injuries

Table 4 Distribution of unintentional childhood injuries in different age groups before the COVID-19 pandemic [n, (%)]

Variables	Infant	Toddler	Preschooler	School-aged child	Adolescent	χ^2	P value
Foreign bodies	18 (4.71)	224 (58.64)	95 (24.87)	42 (10.99)	3 (0.79)	420.330	0.000
Falls	44 (10.23)	153 (35.58)	126 (29.30)	99 (23.02)	8 (1.86)	164.023	0.000
Traffic injuries	10 (11.76)	29 (34.12)	28 (32.94)	17 (20.00)	1 (1.18)	33.529	0.000
Crush injuries	–	19 (43.18)	7 (15.91)	15 (34.09)	3 (6.82)	14.545	0.002
Poisonings	2 (3.39)	28 (47.46)	19 (32.20)	4 (6.78)	6 (10.17)	42.780	0.000
Burns	3 (15.00)	15 (75.00)	2 (10.00)	–	–	15.700	0.000
Sharp injuries	–	3 (50.00)	–	2 (33.33)	1 (16.67)	1.000	0.607
Sprain	–	–	3 (42.86)	3 (42.86)	1 (14.28)	1.143	0.565
Drowning	1 (10.00)	4 (40.00)	1 (10.00)	4 (40.00)	–	3.600	0.308
Blunt injuries	–	2 (33.33)	2 (33.33)	2 (33.33)	–	0.000	1.000
Animal bite injuries	1 (9.10)	2 (18.18)	4 (36.36)	3 (27.27)	1 (9.10)	3.091	0.543
Infant muggy syndrome	–	1	–	–	–	–	–
Electrical shocks	–	1	–	–	–	–	–
Others	3	–	–	–	–	–	–
Asphyxia	1	–	–	–	–	–	–

COVID-19, coronavirus disease of 2019.

Table 5 Distribution of unintentional childhood injuries in different age groups during the COVID-19 pandemic [n (%)]

Variables	Infant	Toddler	Preschooler	School-aged child	Adolescent	χ^2	P value
Foreign bodies	25 (4.49)	299 (53.78)	154 (27.70)	72 (12.95)	6 (1.08)	513.802	0.000
Falls	58 (10.66)	148 (27.21)	184 (33.82)	138 (25.37)	16 (2.94)	176.809	0.000
Traffic injuries	4 (3.96)	31 (30.69)	44 (43.56)	21 (20.79)	1 (1.00)	65.089	0.000
Crush injuries	3 (3.57)	14 (16.67)	34 (40.48)	30 (35.71)	3 (3.57)	51.119	0.000
Poisonings	3 (5.45)	23 (41.82)	17 (30.91)	6 (10.91)	6 (10.91)	26.727	0.000
Burns	1 (3.33)	22 (73.33)	6 (20.00)	1 (3.33)	–	39.600	0.000
Sharp injuries	–	4 (19.05)	9 (42.86)	8 (38.09)	–	2.000	0.368
Sprain	–	3 (18.75)	5 (31.25)	7 (43.75)	1 (6.25)	5.000	0.172
Drowning	1 (11.11)	4 (44.44)	2 (22.22)	2 (22.22)	–	2.111	0.550
Blunt injuries	2 (33.33)	1 (16.67)	2 (33.33)	1 (16.67)	–	0.667	0.881
Animal bite injuries	2 (40.00)	1 (20.00)	1 (20.00)	–	1 (20.00)	0.600	0.896
Infant muggy syndrome	2	–	–	–	–	–	–
Electrical shocks	–	1	–	–	–	–	–
Others	–	1	–	–	–	–	–

COVID-19, coronavirus disease of 2019.

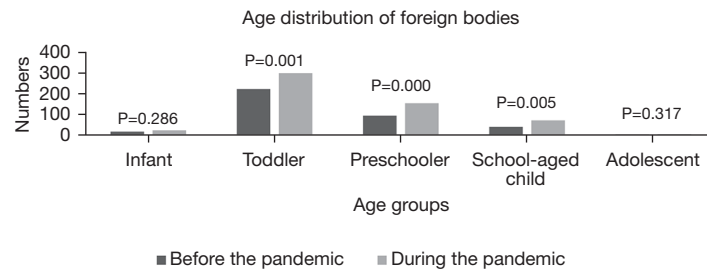


Figure 2 Age distribution of foreign bodies before and during the COVID-19 pandemic. COVID-19, coronavirus disease of 2019.

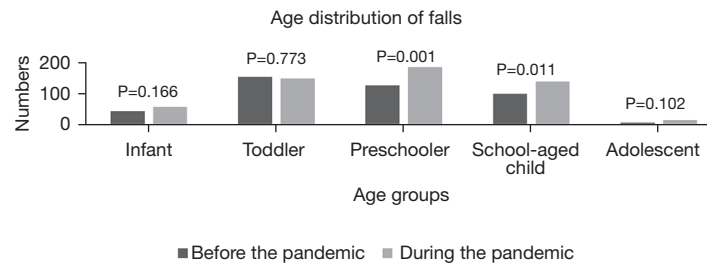


Figure 3 Age distribution of falls before and during the COVID-19 pandemic. COVID-19, coronavirus disease of 2019.

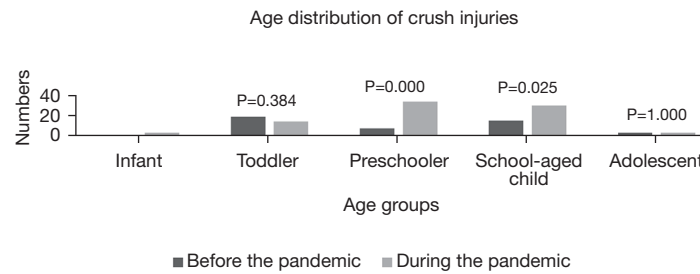


Figure 4 Age distribution of crush injuries before and during the COVID-19 pandemic. COVID-19, coronavirus disease of 2019.

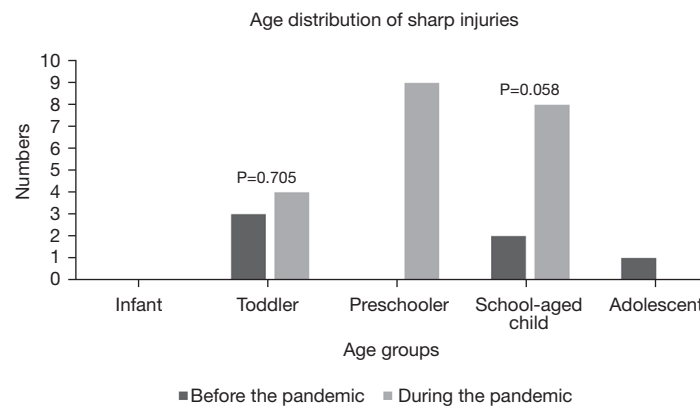


Figure 5 Age distribution of sharp injuries before and during the COVID-19 pandemic. COVID-19, coronavirus disease of 2019.

in preschooler, and it is necessary to strengthen the prevention of unintentional injuries in preschooler during the pandemic. Beyond that, except for the group under 1 year old, the number of unintentional injuries before and during the pandemic was negatively correlated with age. With the increase of age and the improvement of safety awareness, the proportion of unintentional injury decreased significantly.

To classify the unintentional injuries of children, the results of this study show that the top 5 intentional injuries were foreign bodies, falls, traffic injuries, crush injuries, and poisoning, both before and during the pandemic, which is similar to the results reported by Hu *et al.* (14). Before the pandemic, the number of falls was the highest, which was consistent with the findings of Hou *et al.* (15); but during the pandemic, the number of foreign object-induced injury was the highest. Compared the categories of unintentional injuries before and during the pandemic, we discovered that foreign bodies, falls, crush impacts, and sharp injuries, increased significantly during the pandemic.

With the large-scale outbreak of the pandemic, Wuhan adopted the prevention and control measures of closing the city. Immediately, the first-level response to major public health emergencies was launched in various parts of the country, and people across the country were encouraged to isolate at home. As a result, the scope of children's activities was limited. After the large-scale home isolation was lifted, for the protection of children, family members have also imposed certain restrictions on children's outings. Although the pediatric population has largely been protected from COVID-19-related illness, children have been significantly impacted by closure of schools, nurseries, and enforcement of social distancing (17). Children are naturally active, curious, and have an underdeveloped sense of self-protection, life experience, and object recognition. Therefore, during the pandemic, the number of foreign bodies in children increased by 45.55% year-on-year, ranking first. Long-term home isolation may increase children's risk of family accidents, increase the risk of domestic accidents in children such as foreign bodies in the stomach, esophagus, airways, and nasopharynx. The association between the COVID-19 pandemic and increasing trends in pediatric foreign body ingestion has been witnessed nationally and internationally. Before the pandemic, the main age of foreign body occurrence was toddler (58.64%), and the main age of foreign body occurrence during the pandemic was also toddler (53.78%), which is consistent with the results reported by multiple

clinical studies (18-20). No matter before or during the pandemic, for children aged 1–18 years, with the increase of age and the improvement of safety awareness, the number of foreign bodies is significantly reduced. Toddlers are in the oral period and like to put toys or food in their mouths. Inappropriate food, deliberately teasing, frightening, or beating and scolding when feeding are all important reasons for the occurrence of foreign body ingestion. Therefore, it is necessary to increase the safety awareness of toddler and their caregivers, accompany children more, keep them within sight, put away common small items, and reduce the consumption of choking items such as peanuts, walnuts, melon seeds, and so on, especially during the pandemic. In addition, mastering self-rescue skills and the ability to discharge foreign bodies on the first attempt to reduce damage to children is also very important. The findings from our study highlight the importance of raising awareness of the increasing rates of foreign body ingestion in toddler, especially during the pandemic.

According to the WHO, fall injuries are the leading cause of common unintentional injuries in children (21). A multicentric national level study on epidemiology of unintentional childhood injury in India indicated that fall-related injuries had the highest prevalence (22). Fall injuries are one of the common diseases in the pediatric emergency department, and the main cause of long-term disability in children (23). Before the pandemic, fall injuries ranked first in the unintentional injury of children. During the pandemic, it ranked second, but the total number has also increased significantly. As reported by Sexton *et al.* (24), approximately 5,000 fall injuries occur from windows each year. In New Zealand, falls dominated injury hospitalization. A large proportion of falls in preschoolers might involve furniture. Some 20% involved stairs, balconies, or windows, with 55% from fences, trees, or ladders. Baby walkers are associated with approximately 8% of falls. At least 4% of falls occurred when the child was picked up. Before the pandemic, toddler had a higher probability of falling (accounting for 35.58%); during the pandemic, preschooler had a higher probability (accounting for 33.82%, and toddler accounted for only 27.21%). This result indicated that the COVID-19 pandemic increased the number of fall injuries in preschooler. Chinese and international studies (25,26) have shown that the causes of fall injuries in children are largely related to improper care by caregivers and children's psychophysiological and behavioral characteristics. Therefore, during the pandemic, the implementation of certain safety measures, such as

placing furniture properly, modifying the physical attributes of furniture, strengthening guardians' supervision of children, and teaching children not to climb on objects, may have great impact on the burden of childhood fall injuries.

Nonfatal injuries account for significant morbidity among children, with falls being the most common, followed by contact injuries (i.e., being struck by or against an object). Among U.S. children, falls and being struck by or against an object or person were the leading causes of nonfatal unintentional injuries (27). The study showed that crush injuries and sharp injuries also increased significantly during the pandemic. Before the pandemic, the number was higher in toddler (crush injuries: 43.18%; sharp injuries: 50%), whereas during the pandemic, it was higher in preschooler (crush injuries: 40.48%; sharp injuries: 42.86%). This result shows that the pandemic has increased the occurrence of crush injuries and sharp injuries in preschooler. According to data from the Ministry of Education (28), there are about 47 million kindergarten children in the country who have delayed entrance to school due to the pandemic. During the pandemic, the state of living and learning at home has prompted changes in children's lifestyles, which may adversely affect children's physical and mental health (29). Preschooler is an important period for children's cognitive, social-emotional, and physical development. They are curious and like to imitate. Their range of activities is significantly expanded after they have learnt to walk. Besides, they are greatly affected by the external environment. They have an insufficient ability to recognize, avoid, and respond to danger. During the pandemic, these children were freed from the constraints of the school, and the caregivers did not supervise them properly. During home isolation, due to the limited range of activities, they become bored at home, and might begin to play with knives, glass, doors, windows, and electric vehicles, jump up and down and run around at home, resulting in a significant increase in sharp injuries and crushing injuries. According to Temsah's study (30), the educational childhood safety campaign for parents and caregivers resulted in a significant increase in the overall knowledge and attitudes toward childhood safety. Therefore, it is very important to strengthen the safety education for parents and caregivers of preschooler and take appropriate protective measures.

Our study had some limitations. First, this was a retrospective study without a more evidential design. Second, the study was a single-center study, the extrapolation of results is limited to a certain extent, and the data mainly

represent the Chengdu area or areas with a similar level of medical care. Future researchers should consider multicenter studies that include an extensive region and consider more comprehensive influencing factors. Third, the occurrence of unintentional injury in this study is only expressed by the number and proportion of cases. It is necessary to further use epidemiological methods to calculate the incidence rate of unintentional injury in Chengdu.

Conclusions

The number of unintentional injuries in children during the pandemic has increased by 34.24%, compared with before the pandemic. The main increases during the pandemic were injuries due to foreign objects, falls, crush, and sharp. The high proportion age was still toddler. However, during the pandemic the proportion of injury in preschooler was also high. During the pandemic, the highest proportion age of foreign body was toddler, however, that of falls, crush injuries, and sharp injuries was preschooler. Therefore, during a pandemic, we still need to pay attention to the prevention of foreign bodies in toddler; but for preschooler, attention should be paid to the prevention of falls, crushing injuries, and sharp injuries. In addition, safety education in supervision, knowledge of preventing injury, retrofitting hazardous environment, and the first aid skills training should be adapted in families, the community, and schools.

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Footnote

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have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Institutional Ethics Board of Chengdu Women's and Children's Central Hospital (No. 2023[29]). Informed consent was waived due to the retrospective nature of the study.

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