

Pediatric Traumatic Cataract in Southwest China: Epidemiological Profile

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Abstract

Background: Pediatric traumatic cataract is an important but preventable cause of acquired monocular blindness. Knowing the epidemiology of pediatric traumatic cataract is the prerequisite for prevention. This study aimed to characterize the epidemiology in the southwest of China.

Methods: The medical record of children with lens damage following open-globe injury managed in the West China Hospital (aged 1–14 years) from January 2011 to December 2020 were reviewed, and the demographic data, cause of injury, and post-traumatic complications were recorded and analyzed.

Results: A total of 716 eyes of 716 patients were enrolled in this study, including 488 (68.2%) male and 228 female patients in a ratio of 2.14:1; 117 patients were from a minority nationality region. The pediatric traumatic cataract was more likely to occur in winter (40.2%). Sharp metal object–related (scissors/knife/needle/sheet metal/dart) eye injuries accounted for the highest proportion, followed by botanic sticks (wooden /bamboo /bamboo skewers), and stationery (pencil/pen/ruler/paper). A majority (68.7%) of patients were 2–8 years old, with a higher frequency in the age group of 4–6 years. Penetrating trauma accounted for 64.9% of patients, and the remaining were accounted for blunt trauma (35.1%). 131 cases (18.3%) developed into post-traumatic endophthalmitis. The eye injuries caused by needles ($P=0.007$), wooden sticks ($P=0.016$), and bamboo skewers ($P=0.002$) have greater risk for developing into endophthalmitis. The most common organism identified was *Streptococcus*, which accounted for 42% (21/50) of all culture-positive specimens and was sensitive to vancomycin.

Conclusion: The epidemiology of pediatric traumatic cataract in the southwest of China, especially the causative agent, was different from that in other regions, therefore the emphasized educative measures such as informing guardian and children about the causative factors should also be different.

Background

Ocular injuries are the most common cause of acquired monocular blindness in developing countries, especially in the school-age pediatric population; it is a major etiology for unilateral cataract formation in a normal-sized eye [1-3]. Despite great advances in diagnostic and treatment methods, managing unilateral traumatic cataract in a visually immature child is a major challenge with usually unsatisfactory results; they sometimes result in permanent visual impairment. However, pediatric ocular trauma is more preventable than the adult form; 90% of pediatric ocular trauma can be prevented [4]. Most acute ocular injuries in children had a low risk of vision loss [5, 6]. However, an ocular injury related to lens damage was a significant source of preventable monocular blindness [6]. Therefore, for the pediatric traumatic cataract, prevention is more important than operative treatment. To prevent such serious conditions, evidence-based information on the causes of these injuries and education and prevention measures are necessary. Studies on pediatric ocular trauma have been performed in the east [7], south [8], and south-central [9] parts of China and other country, such as Egypt[10] and US[11]. However, the etiology and epidemiological characteristics are different based on the socioeconomic status [12]. The southwest of

China is a relatively economic underdevelopment and also a minority nationality population gathering area. Therefore, it is hypothesized that the measures based on the epidemiological characteristics of the southwest of China should be different from those in other regions.

Infectious endophthalmitis is one of the most devastating ocular complications of open-eye trauma [13], which may lead to irreversible blindness in the infected eye within hours or days of symptom onset. Some causative agents have a greater risk for developing into infectious endophthalmitis [14]. Knowing the causative agents having a greater risk for developing into infectious endophthalmitis, patients can resort to hospitals earlier and receive more attention, which perhaps improve the outcome of infectious endophthalmitis and even reduces the incidence rate of infectious endophthalmitis.

The Department of Ophthalmology, West China Hospital of Sichuan University, is one of the top eye centers in China and the biggest one in the southwest of China. The demographics of pediatric patients with ocular injuries at the hospital are likely representative of the general situation in Sichuan, even the southwest of China.

Methods And Materials

Data source and groups

The medical records of children (aged 1–14 years) who developed cataract following open-globe injuries hospitalized at the Department of Ophthalmology, West China Hospital, from January 2011 to December 2020 were reviewed. The inclusion criterion was patients aged 1–14 years with open-globe injuries and visually significant traumatic cataract. The exclusion criteria were as follows: patients with pre-existing ocular disease and poor visual acuity. Data included demographic information, objects causing an injury, type and location of wounds, post-traumatic complications, organisms identified in endophthalmitis, and sensitivity tests. This study was performed in line with the principles of the Declaration of Helsinki and approved by the Ethics Committee on Biomedical Research, West China Hospital of Sichuan University (No. 2020.955). All data were anonymous and retrospectively collected. The requirement of written informed consent was waived.

For the convenient display of causative agents, some causative agents with similar characteristics were classified into one group, as follows. The scissor, knife, needle, dart and sheet metal were included in sharp metal object group, and fine wire, nail, and syringe needle were regarded as needles; pencil, pen, ruler and paper were included in stationery group; wooden stick, bamboo stick and bamboo skewer were in the stick group. According to the Birmingham Eye Trauma Terminology [15], the open-globe injuries could be classified into two genres: one was penetration caused by sharp objects as scissors, knife, and needle; another was blunt rupture caused by fist, hit, fall, fireworks explosion, ball, and so forth. Depending on the OTS (Open Trauma Score) [16], the eye injuries were classified into three zones on the basis of the location of the wound: Zone I injuries occurred when the opening wounds of the eyeball were isolated to the cornea or corneoscleral limbus; Zone II injuries were those that involved the anterior 5 mm

of the sclera; and Zone III injuries were those in which full-thickness wounds extended into the sclera more than 5 mm posterior to the corneoscleral limbus.

Patients with one of the following symptoms were diagnosed with endophthalmitis in the present study: hypopyon, obviously cloudy vitreous, obscured retinal vessels, areas of necrosis of retina, culture positivity of the intraocular fluid.

Statistical analysis

Statistical analysis was performed using SPSS software (version 21.0.0.0, IBM Corp®. New York, US). Median and mean were recorded for continuous variables. Parametric tests were performed for continuous variables that fitted the normal distribution. However, nonparametric comparisons were performed for continuous variables that did not fit the normal distribution. The frequency and percentages were recorded for categorical variables. The chi-square test was used to compare when the frequency was greater than 5; Fisher's exact test was used when the frequency was smaller than 5. The statistical significance was set at a *P* value less than 0.05; for odds ratios (OR), 95% confidence intervals (95%CI) that not contain 1 was considered statistically significant.

Results

Baseline information

A total of 716 patients (age range 1 year to 14 years) were enrolled in this study, including 488 (68.2%) boys and 228 (31.8%) girls with a sex ratio of 2.14:1. All traumatic cataract cases were unilateral and needed cataract surgery. Of these, 117 patients were from a minority nationality region, including 76 Tibetan, 37 Yi nationality, 3 Qiang nationality, and 1 Bouyei nationality.

Distribution of children in different years

The frequency of pediatric traumatic cataract in different years is shown in Figure 1. In general, the frequency of pediatric cataract showed a downtrend, but the tendency was not obvious. A significant drop was observed in 2015, followed by an immediate rise in 2016. The annual incidence of hospitalization for pediatric traumatic cataract in west China hospital is showed in Figure 2. And the mean annual incidence was estimated to be 5.89 per million (95% confidence interval 5.21- 6.57 cases per million).

Distribution of children with traumatic cataract by age

As shown in Figure 3, the incident of pediatric traumatic cataract increased with age before the age of 5 years and decreased after the age of 6 years with a peak at the age of 5 years. There was a marked

decline at the age of 8 years. A majority (68.7%) of patients were aged 2–8 years. The proportion of boys was higher than that of girls in every age group, and the ratio of boys to girls was relatively higher after the age of 8 years with a peak at the age of 9 years.

Causes of ocular injuries

Table 1 lists the causes of injuries identified in the patients. The main causes were sharp metal objects (30.4%), botanic sticks (16.2%), and stationery (10.9%). Among the sharp metal objects, scissors were the leading causes, accounting for (112/218) 51.4%. The most frequent botanic sticks inducing ocular injuries were wooden sticks (78/116) (67.2%), and among the wooden sticks, branches were the main causes, accounting for 55.1% (43/78). Pencils were the leading causative agent among the stationery items (57.7%, 45/78). Further, 30 children were unable to recall the specific cause of their injuries, but 19 of them suffered a strike from something; 11 of them were stabbed by something.

Table 1

Causes of injuries leading to traumatic cataract.

Cause of Injury	Number(n)	All(n)	percentage
Sharp metal (scissors/knife/needle/sheet metal/dart)	112/54/33/14/5	218	30.4%
Botanic Sticks (wooden sticks/bamboo sticks/ bamboo skewer)	78/15/27	120	16.8%
Stationery (pencil/pen/ruler/paper)	45/20/9/4	78	10.9%
Glass/ceramic	43/8	51	7.1%
Toy (plastic toy/bullet/slingshot/marble)	27/4/7/2	40	5.6%
Fire cracker	37	37	5.2%
Hit	29	29	4.1%
Fall	24	24	3.4%
stone	20	20	2.5%
Iron rod	19	19	2.4%
Light explosion	11	11	1.5%
Drying pole	10	10	1.4%
Animal	8	8	1.1%
Ball/ball bat	3/5	8	1.1%
Fist	6	6	0.8%
Clothes	3	3	0.4%
Car accident	3	3	0.4%
Sport shoes	1	1	0.14%
Other	30	30	4.2%
All	716	716	100%

Change in causes in different age groups and years

Sharp metal objects and sticks were the main causative agents for traumatic cataract in children aged up to 6 years for both girls and boys. At an older age, obvious differences occurred in the distribution of the main causes between boys and girls. Botanic sticks accounted for a greater proportion in boys, but it was

stationery in girls. In the present study, fire crackers were the causative agent most for boys. Three main causative agents of traumatic cataract for boys and girls in each age group are listed in Table 2.

Table 2

The top three causative agents of traumatic cataract in different age group.

Gender	Boys			Girls		
	The first	The second	The third	The first	The second	The third
1-2	Sharp metal	Glass	Botanic sticks	Sharp metal	Botanic sticks	Fall
3-4	Sharp metal	Botanic sticks	Fire cracker	Sharp metal	Botanic sticks	Fall
5-6	Sharp metal	Botanic sticks	Stationery	Sharp metal	Botanic sticks	Stationery
7-8	Stationery	Sharp metal	Botanic sticks	Sharp metal	Toy	Stationery
9-10	Botanic sticks	Sharp metal	Stationery	Sharp metal	Toy	Stationery
11-12	Botanic sticks	Stationery	Fire cracker	Stationery	Glass	Sharp metal
13-14	Sharp metal	Fire cracker	Stationery	Stationery	Sharp metal	Botanic Sticks

In current study, sharp metal objects were the top reason for pediatric cataract every year,

followed by sticks and stationery, without a great change in the distribution of the three main reasons during the 10 years. As shown in Figure 4, sharp metal objects and sticks showed a downward trend, whereas stationery displayed an upward trend.

Distribution of children with traumatic cataract by season

As shown in Table 3, the pediatric traumatic cataract was more likely to occur in winter (40.2%) ($P = 0.017$, Rank sum test). However, the frequency showed no statistically significant differences in spring, summer, and autumn ($P = 0.219$, Rank sum test).

Table 3				
Distribution of the patients according to the seasons.				
Season	Spring	Summer	Autumn	Winter
Year	(March-May)	(June-August)	(September-November)	(December-February)
2011	6	12	16	22
2012	22	21	15	22
2013	23	13	9	23
2014	24	15	16	25
2015	7	5	14	28
2016	26	11	18	26
2017	24	21	13	15
2018	23	26	20	25
2019	19	10	9	13
2020	13	16	16	33
median	22.5	14	15.5	25
All	187(26.1%)	150(20.9%)	146(20.4%)	233(40.2%)

Complications associated with ocular trauma

This study included 465 (64.9%) cases with penetrating injuries and 251 cases with blunt rupture injuries. Table 4 shows the other complications associated with ocular trauma. Rupture had a significantly more possibility in anterior chamber hemorrhage ($P=0.004$, chi-square test), iridodialysis ($P<0.001$, chi-square test), vitreous hemorrhage ($P=0.002$, chi-square test), retinal detachment ($P<0.001$, chi-square test). No significant difference was found in the case of intraocular foreign body ($P=0.107$, chi-square test) infectious endophthalmitis ($P=0.451$, chi-square test) and the wound involving the sclera (Zone II and Zone III) ($P=0.537$, chi-square test).

Table 4

Complication associated with trauma.

Complications	Penetrating	Rate (%)	Rupture	Rate(%)	P value
Anterior chamber hemorrhage	39	8.4	38	15.1	0.004
Iridodialysis	31	6.7	43	17.1	0.000
Vitreous hemorrhage	31	6.7	34	13.5	0.002
Retinal detachment	19	4.1	29	11.6	0.000
Intraocular foreign body	39	8.4	29	11.6	0.107
Infectious endophthalmitis	84	18.1	47	18.7	0.451
Zone II or Zone III	56	12.0	30	12.0	0.537

Causative agents and microbiological features for infectious endophthalmitis

A total of 131 cases were diagnosed with endophthalmitis (95 boys and 36 girls). Further, 11 cases were admitted to the hospital within 8 h and 56 cases within 24 h. The median of the duration from being injured to being admitted to the hospital was 1 day (range 3 h to 20 days). The median size of wounds was 4 mm (range 0.5–20 mm).

Table 5 shows the causative agents for endophthalmitis. The odds ratio (OR) of wooden sticks ($P=0.016$, chi-square test), bamboo skewer ($P=0.002$, chi-square test), and needle ($P=0.007$, chi-square test) were higher than 1, and the 95% CI of OR did not contain 1, indicating that ocular injuries caused by wooden sticks, bamboo skewers, and needles had more possibility to develop into endophthalmitis. Among cases with endophthalmitis, 5 were caused by syringe needle; the OR of the syringe needle was 3.277, 95% CI (1.023–10.491) ($P=0.003$, chi-square test). Therefore, the pediatric traumatic cataract caused by a syringe

needle had a greater risk for developing into endophthalmitis in the present study. The

interval from being injured by a hypodermic needle to being admitted to the hospital was 20

days, 15 days, 7 days, 5 days, and 9 h.

For the 131 cases diagnosed with infectious endophthalmitis, 86 vitreous samples were taken for bacterial culture and sensitivity tests. Culture positivity was observed in 50 cases (58.1%). A single bacterial species was isolated in 48 eyes, and multiple organisms were isolated in 2 eyes. The most common germ in the present study was *Streptococcus*, accounting for 42% (21/50). The secondary

germs were *Staphylococcus* (6/50) and *Enterobacter* (6/50). Among *Enterobacter* species, five were *Enterobacter cloacae*, and all the causative agents were wooden sticks. A majority of the organisms were sensitive to vancomycin.

Table 5

The display of causative agent for infectious endophthalmitis and the odd ratio

Cause	frequency	OR (odds ratio)	P value
Scissor/knife/needle/sheet metal	18/6/14/2	0.832/0.537/3.112/0.740	0.507/0.156/0.007/0.756
Wooden sticks/bamboo Skewer/bamboo sticks	22/11/4	1.907/3.260/1.64	0.016/0.002/0.495
Glass/ceramic	4/2	0.441/1.496	0.116/0.643
Iron rod	4	1.197	0.763
Animal	3	2.719	0.166
Fire cracker	7	1.104	0.920
Pencil/ pen/ruler	12/2/3	1.687/0.488/2.262	0.134/0.401/0.377
Fall	3	0.629	0.597
Hit	2	0.320	0.105
Stone	2	0.488	0.401
Sport shoes	1	-	-
Plastic toy	5	1.016	1.00
Light explosion	1	0.442	0.497
Other	3	0.230	0.484
All	131	-	-

Discussion

This study was motivated by the lack of data on pediatric ophthalmological trauma in the southwest of China. The study aimed to obtain and summarize the etiological and clinical characteristics of severe ocular injuries from the children admitted to the West China Hospital.

Etiological and epidemiological profile

The frequency of pediatric traumatic cataract treated in the hospital followed a decreasing trend, which was not obvious. Hence, the pediatric traumatic cataract remained a major source of blindness. A sudden drop in the frequency in 2015 might be partly because a sudden ban on fireworks was enforced. In all age groups, the traumatic cataract occurred predominantly in boys, which was consistent with previous findings in Shanghai [7], but had some differences compared with the results in China Taiwan [17] and Lithuania [18], which showed that the risk of eye injury was significantly higher in girls than in boys in the younger age group (≤ 1 year old and < 7 years old, respectively). These findings could be explained by the more aggressive and violent nature of activities in which boys were involved compared with girls. Also, the ratio of boys to girls increased after the age of 8 years. The reason was that the psychological maturity in boys lagged behind that in girls, and hence the boys were less aware of self-protection. In the present study, the risk of eye injury was the highest in the age group of 5 years, which was consistent with previous findings [9, 19]. Children aged 4–6 years had a higher risk of getting traumatic cataract. This was possibly because children of this age could walk independently, and their guardians were not always close by, resulting in insufficient supervision. In addition, children of this age were very curious and eager to explore their external environment, yet with limited awareness of danger. Despite the inadequate ability to self-protect, children eventually learn the concept of danger through daily observation. Thus, the occurrence of ocular injuries appears to decline with age, as shown by the data. The marked decrease in the frequency of traumatic cataract observed in children older than 6 years might be attributed to schooling and homework. A regular presence at school could reduce their time participating in dangerous activities.

The causes of ocular injuries were diverse and tended to vary among different countries due to different socioeconomic backgrounds and living environments. The main causes of pediatric traumatic cataract in the present study were sharp metal objects, followed by botanic sticks and stationery. The result of this study was different from the findings of Yu Du [7] on the pediatric traumatic cataract in Shanghai, which showed toys as the second main cause. In Changsha, one of the main causes were fire crackers [9]. In India, the main causes were wooden splinter, bow, and arrow [20, 21]. And in Egypt, the main causes was wooden sticks [10]. In the present study, toy and firecracker accounted for a smaller percentage.

The main causative agent seems to vary according to the physical development of children. For boys and girls aged less than 6 years, sharp metal objects were the major cause, followed by botanic sticks. It was concluded that boys and girls were engaged in almost similar daily activities before the age of 6 years [22], which also explained the relatively lower ratio of boys to girls in the frequency of traumatic cataract in younger ages. The decreasing contribution of sharp metal objects but the increasing contribution of stationery might result from universalized compulsive education and increasing attention on sharp metal objects. The higher the level of education, the less the risk of getting an ocular injury. A previous study confirmed that more ocular injuries occurred at rural places because of low-level education [9].

In 2020, an outbreak of a new coronavirus infection occurred in China. The children had more time spending at home with their parents, but the frequency of pediatric traumatic cataract increased instead

of being decreased. The phenomenon could be explained by the fact that the pediatric traumatic cataract occurred most frequently at home, which was confirmed by other studies. The home was the most common place where pediatric ocular injuries happened, followed by outdoor and school [23, 24]. In addition, the most common causes in the present study were scissors and knives usually found in every household, which also confirmed that home was the main site of occurrence of ocular traumas. Therefore, it was necessary to emphasize the importance of preventive measures in the home environment.

The results of the present study also pointed to a seasonal difference among the injuries. A majority of the injuries occurred in winter (40.2%). Other studies conducted in different areas reported that injuries most commonly occurred during the summer months in Wenzhou of China[9], and Canada[25], and the autumn months in southwestern Turkey [22]. Of course, these seasonal differences might result from the climatic characteristics and the lifestyle of people in the region where the study was conducted. In Sichuan, China, where the present study was performed, the second longest vacation was in winter; children generally spent a lot of time playing, while parents usually were busy in preparing for the Spring Festival. In addition, fire crackers were set off as a traditional custom. These conditions above accounted for the higher frequency of ocular trauma in winter. The reason for comparatively fewer injuries in the spring and autumn seasons was that the children were in school and busy with homework. Summer, being the hottest, limited the activity of the children.

In this study, the penetrating injury was the most common type of open-globe injury in children, followed by blunt rupture, which was similar to the results reported by others in Chinese cities such as Shanghai [7], Wenzhou, and Changsha [9], and other countries as Iran [26], the US [11], and Tunisia [27]. However, the result perhaps was contrary if all kinds of ocular injuries were included; the main cause was a blunt strike to the eye [18, 28, 29]. Rupture had a significantly more possibility in vitreous hemorrhage, and retinal detachment compared with penetration. Retinal detachment was associated with a poor visual outcome. Therefore, for children with blunt trauma or rupture, it was necessary to examine the fundus so as to treat the retinal disease earlier.

Endophthalmitis profile

This study found that needle, wooden stick, and bamboo skewer injuries have more possibility for post-traumatic endophthalmitis. The reasons for a needle injury developing into endophthalmitis were as follows: greater contamination and deeper penetration into the eye; and repair or delayed therapy because of the ignorance of parents or doctors. As shown in the present study, most patients hurt by a syringe needle and developing into endophthalmitis approached the hospital more than 24 h after getting injuries. Wooden sticks, as organic matter, had a greater risk of getting contaminated [30]. Thus, injuries caused by wooden sticks had a greater possibility for developing into endophthalmitis. As for bamboo skewers, deeper penetration, ignorance, and easy contamination could explain the result.

The most commonly isolated organism related to post-traumatic endophthalmitis in the present study was *Streptococcus*, which was consistent with the Alfaró [31] and Al-Rashaed' [32] findings, but different from the Yan Sheng systematic review study on Chinese pediatric post-traumatic endophthalmitis, which showed that the most common organism was *Staphylococcus epidermidis* [33]. In the present study, a more virulent species, *E. cloacae* [34], was involved. The isolated organism was reported to be a commensal organism of the gastrointestinal tract instead of the ocular surface [35], and was found in soil and plants. Hence, it was clear that *E. cloacae* was identified in post-traumatic endophthalmitis caused by wooden sticks. The patients and doctors should pay more attention to injuries caused by wooden sticks.

Measures for prevention

As for the prophylaxis for pediatric trauma, we should emphasize educative and legislative measures such as informing parents, teachers, and children about the causative factors and potential hazards of ocular injuries and restricting the availability of dangerous items to children. Some suggestions are as follows: (1) Younger children should be kept away from sharp metal objects or be paid attention to when they use sharp metal objects. Tips of scissors should be made blunt at the time of manufacturing. (2) Since the home was the main place where pediatric ocular trauma happened, children should be provided a safe home surrounding. (3) Children should be helped to develop an earlier sense of safety. (4) Children should wear protective spectacles when playing with toys, such as marble and slingshot. (5) Laws should be implemented for manufacturers to inform consumers of potential dangers and minimize the inherent risks associated with particular products by including child-resistant packaging, printed warnings, and age recommendations. (6) The sale of fire crackers to underage children should be forbidden; also, they should not set off crackers without permission. (7) Boys and children aged 4–6 years had a higher risk of traumatic cataract, and hence need more attention.

This study had several limitations. First, it had some inherent biases because of its retrospective design. Second, the data were limited to what was provided in the patients' medical records. Third, the study probably slightly underreported the actual incidence rate of pediatric traumatic cataract in the Sichuan province because only injuries treated at the West China Hospital were included. So multicenter research is expected. Finally, only injuries associated with the open-globe traumatic cataract were included in this study. Close-globe injuries and those not involving the traumatic cataract were excluded. Therefore, the epidemiological characteristics shown in this study could not represent characteristics of other kinds of ocular trauma. Therefore, more comprehensive research is needed.

Conclusion

Some differences were found in the epidemiology of pediatric traumatic cataract between the southwest of China and other regions, and therefore the measures for prevention should be different.

Declarations

Ethics approval and consent to participate

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee on Biomedical Research, West China Hospital of Sichuan University (No. 2020.955). All data were anonymous and retrospectively collected, and the requirement of written informed consent was therefore waived by the Ethics Committee on Biomedical Research, West China Hospital of Sichuan University.

Consent for publication

Not applicable for that section.

Availability of data and materials

The data that support the findings of this study are not publicly available due to their containing information that could compromise the privacy of research participants but are available from the corresponding author [Longqian Liu, Email:b.q15651@hotmail.com] upon reasonable request.

Competing interests

The authors have no conflicts of interest to declare.

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Author Contribution

The study was designed by Longqian Liu, Hongbo Yin, Lin Wang, and Pingping Wang. Material preparation, data collection, and analysis were carried out by Pingping Wang and Hongbo Yin. The manuscript was written by Pingping Wang and Hongbo Yin, and reviewed and edited by Longqian Liu and Lin Wang. All authors read and approved the final manuscript.

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Figures

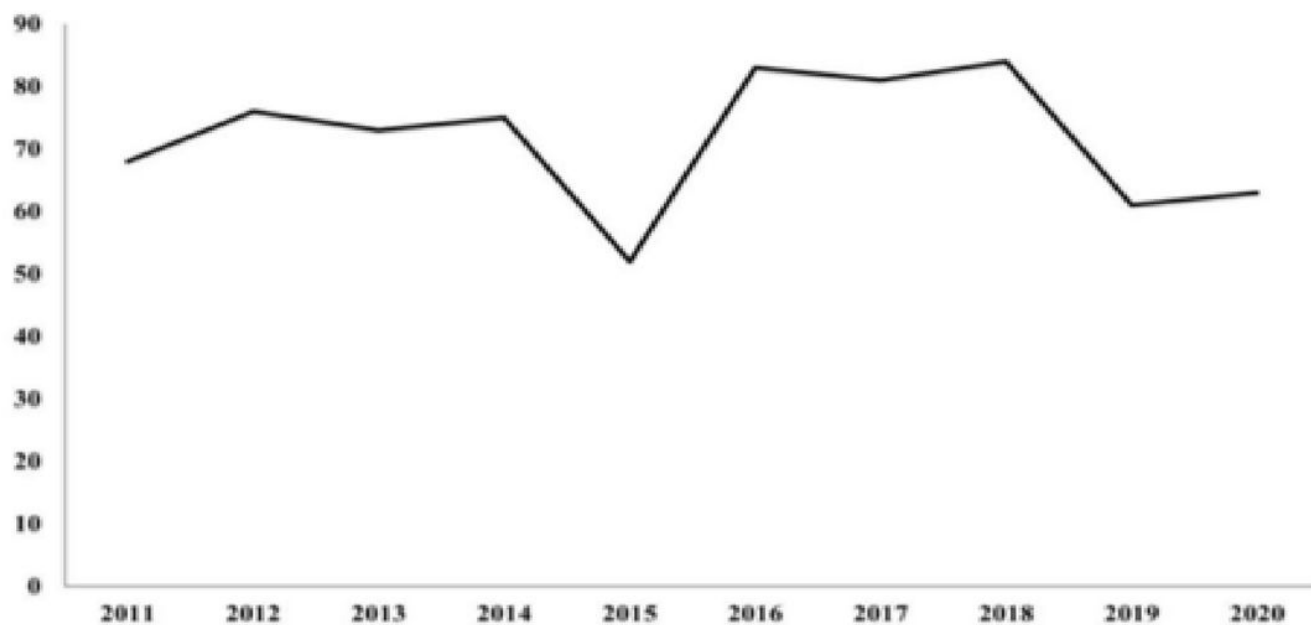


Figure 1

Frequency of pediatric traumatic cataract in different years. The line chart of the frequency of pediatric traumatic cataract in different years.

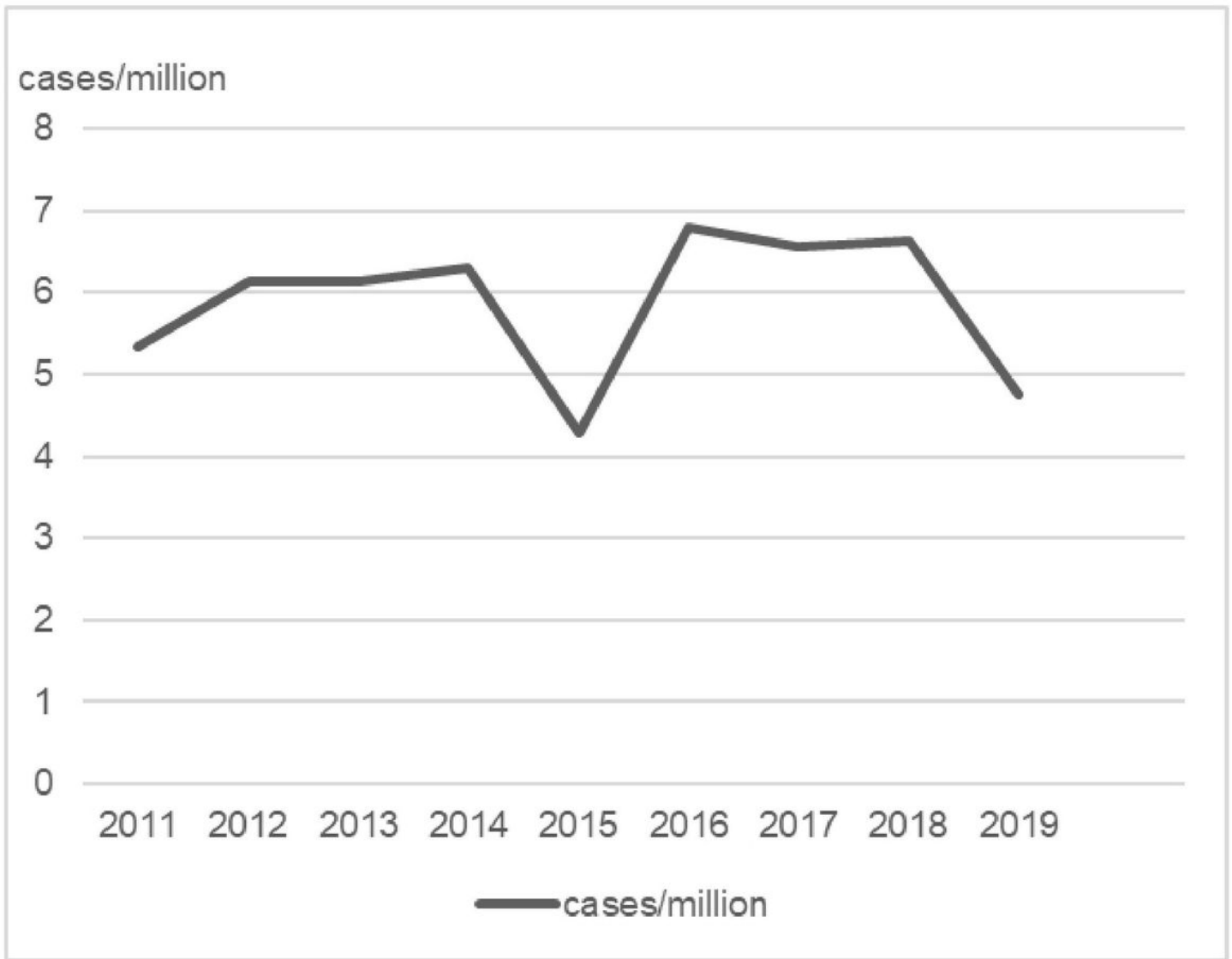


Figure 2

Annual incidence rate of pediatric traumatic cataract in different year. The annual incidence of hospitalization for pediatric traumatic cataract in west China hospital .

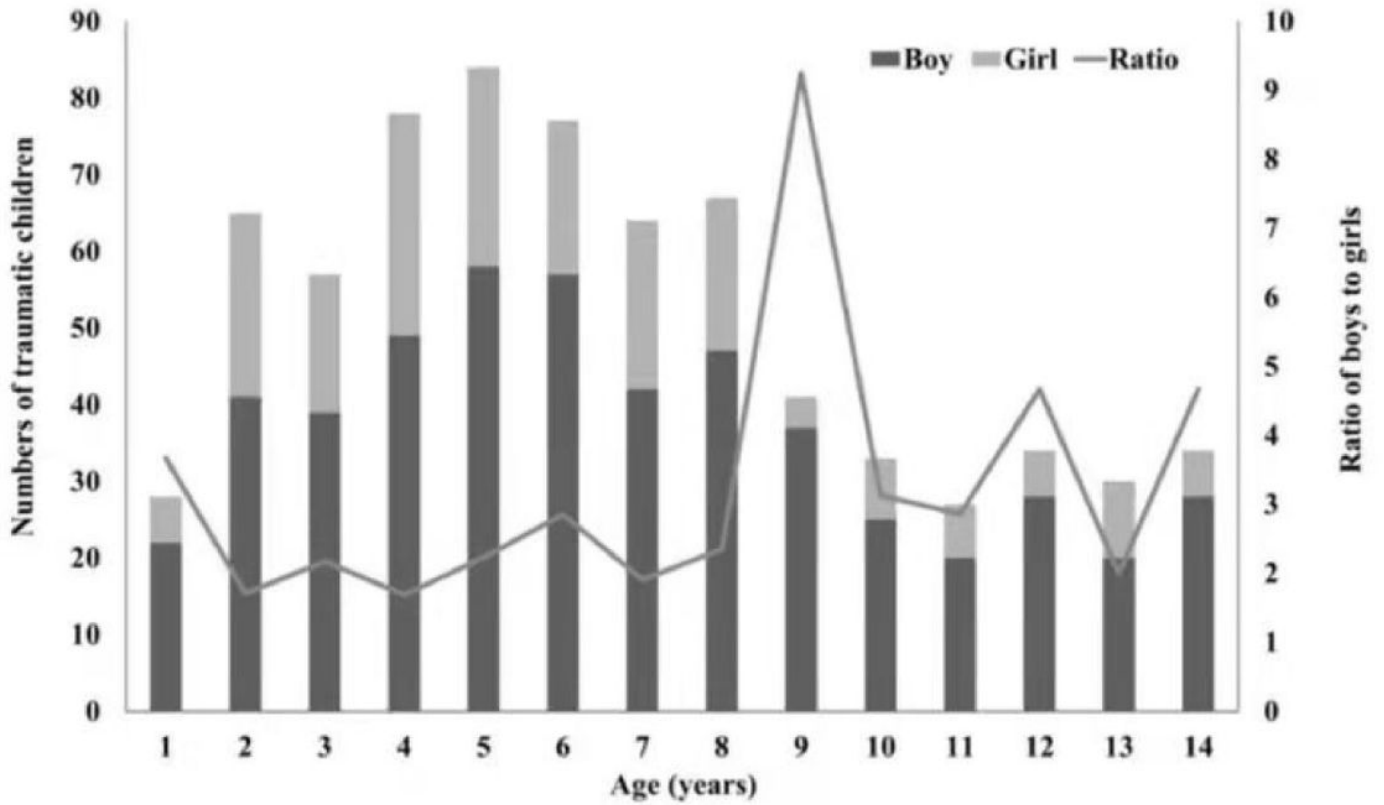


Figure 3

Distribution of traumatic cataract in boys and girls among different age groups. The bar chart of the frequency of traumatic cataract in boys and girls among different age groups, and the line chart of ratios of boys to girls suffering traumatic cataract among different age groups.

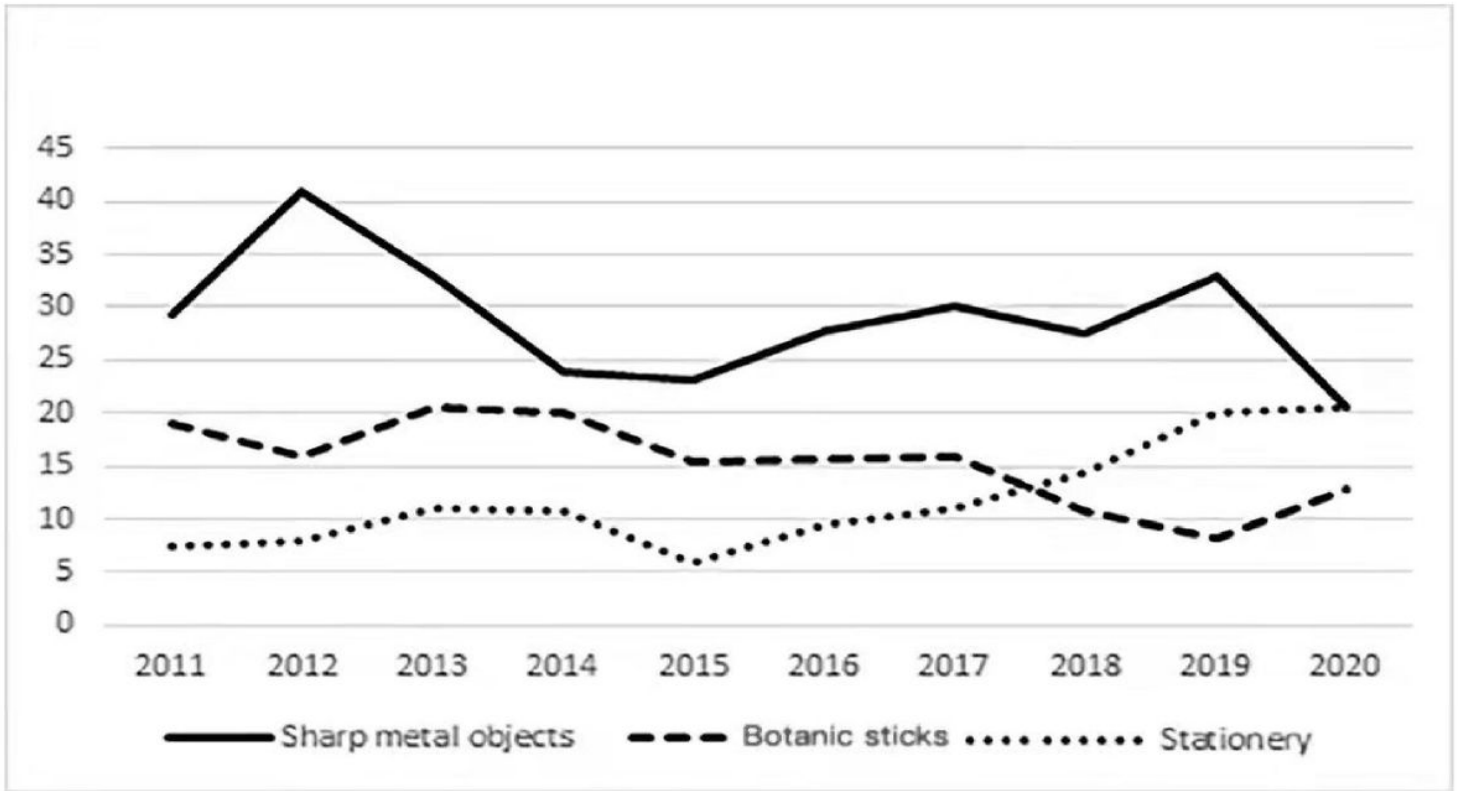


Figure 4

Percentage of three top causative agents in different years The line chart of percentage of three top causative agents in different years.