

Research Article

Etiological Factors of Ocular Trauma in Children and Adolescents Based on 200 Cases at the Pediatric Ophthalmology Unit of the Bouaké University Hospital

Ouattara Y^{1*}, Bilé PEFK¹, Godé LE¹, Diabaté Z¹, Nougou EYMB^{1,2}, Koffi KHK¹, Babayeju ROI¹, Goulé M¹, Diomandé GF¹, Diomandé IA¹

¹Service d'Ophtalmologie du Centre Hospitalier Universitaire (CHU) de Bouaké, Ophthalmology Department of the University (Teaching) Hospital of Bouaké, 01 BP 1130 Bouaké 01, Côte d'Ivoire

²Investigator, Côte d'Ivoire

*Correspondence author: Ouattara Y, Service d'Ophtalmologie du Centre Hospitalier Universitaire (CHU) de Bouaké, Ophthalmology Department of the University (Teaching) Hospital of Bouaké, 01 BP 1130 Bouaké 01, Côte d'Ivoire; Email: yvesouatta@yahoo.com

Citation: Ouattara Y, et al. Etiological Factors of Ocular Trauma in Children and Adolescents Based on 200 Cases at the Pediatric Ophthalmology Unit of the Bouaké University Hospital. J Ophthalmol Adv Res. 2023;4(3):1-7.

<https://doi.org/10.46889/JOAR.2023.4308>

Received Date: 05-11-2023

Accepted Date: 27-11-2023

Published Date: 05-12-2023



Copyright: © 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CCBY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract

Background: Eye trauma is serious and very often has a poor prognosis in our environment. The aim of this study was to contribute to improving the prevention of ocular trauma in children and adolescents in central and northern Côte d'Ivoire.

Methods: This was a cross-sectional study with a descriptive aim on 200 patient files received at the pediatric ophthalmology unit of the ophthalmology department of the Bouaké University Hospital from January 6, 2021, to July 7, 2023. In these patients, the questioning and clinical examination revealed ocular lesions linked to trauma. The parameters studied were socio-demographic characteristics (age, sex, origin, educational status), reason for consultation, ophthalmological history and etiological factors (circumstances of occurrence, vulnerating agent and mechanism of occurrence). Data analysis was carried out using epi-info 7.0 software.

Findings: The average age of the patients was 8.45 ± 4.62 years with a range of 1 to 19 years. Boys were the most affected (71%) and this male predominance was found in all age groups. The 5-9-year-old age group was the most represented (31%). Children in primary school were the most numerous (40%), followed by those in secondary school (26%) and those not in school (25%). Almost all the children came from urban areas (75%). Ocular trauma was the main reason for consultation (75%) and the most common ophthalmological history (80%). The circumstances of occurrence were dominated by gaming accidents (48.50%), domestic accidents (19.50%) and brawls (15.50%). The most common damaging agent found was metallic (25%) followed by the stone used as a projectile (18.50%) and the punch (17%). The mechanism of trauma was dominated by the reception of a moving object or liquid on the eye (96%).

Conclusion: Given the high proportion of school boys who are victims of eye trauma, school programs should include raising awareness among children at school about the risks of accidents and in particular eye trauma and the means of preventing them. Action should also be taken in rural areas and through the Chamber of Trades of Côte d'Ivoire with a view to preventing eye trauma in children and adolescents in farming activities and in craft workshops where those are often in apprenticeship.

Keywords: Trauma; Eye; Child; Adolescent; Etiology; Prevention

Introduction

Ocular trauma is defined as any injury to the eye that may be due to mechanical, chemical or physical agents such as radiation [1]. This is a global public health problem given the frequency of these injuries in pediatric patients and the preventable nature

of a large proportion of these injuries. Furthermore, the eye damage they cause is the main cause of monocular visual impairment and non-congenital unilateral blindness in children [2,3]. Children may be more predisposed to eye injuries due to their developing physical coordination, limited ability to detect environmental hazards and more vulnerable facial morphology [4]. In addition to this, the long-term consequences of pediatric eye damage are worse than those of adults due to the immaturity of the developing visual system of children with the major risk of developing amblyopia. Added to this are the consequences of a visual impairment which will affect these young subjects “with their whole life ahead of them” for a longer period [4]. In Africa, numerous hospital studies have shown that children represent a significant proportion of cases of ocular trauma [5-9]. Even if hospital prevalence does not necessarily reflect the epidemiology of ocular trauma in the general population, it could provide insight into the frequency of the most serious cases.

The pediatric ophthalmology unit has been open since September 2020 within the ophthalmology department of the Bouaké University Hospital Center, with a view to ensuring the specific management of ocular pathologies of children and adolescents in the center and northern half of Côte d'Ivoire. What is the sociodemographic profile of children and adolescents, victims of eye trauma received in this unit? Under what circumstances and by what mechanisms did these ocular traumas occur and what were the main damaging agents? Answering these questions would contribute to improving the prevention of ocular trauma in children and adolescents in this part of Côte d'Ivoire and this was the aim of this study.

Material and Methods

This is a cross-sectional, study with a descriptive aim which covered a period of two years and five months (January 6, 2021, to July 7, 2023) at the Pediatric Ophthalmology unit of the ophthalmology department of the University Hospital (CHU) of Bouaké, in the center of Côte d'Ivoire. We collected data from all the medical records of patients aged 0 to 19 years old admitted to the unit during the period covered by the study and in whom the observed eye lesions were linked to a traumatic cause. The variables studied were as follows:

- Socio-demographic characteristics (age, sex, origin and educational status)
- The reason for consultation
- Ophthalmological history
- The circumstances of occurrence
- The mechanism of occurrence of the trauma
- The nature of the damaging agent

The data was collected on anonymous survey forms and analyzed using EPI INFO version 7.0 software. Quantitative variables were expressed as averages while qualitative variables were expressed as proportions. The graphic representations were made using tables or figures respectively in Word and Excel 2013.

Results

Out of 1569 consultations during the period covered by the study, there were 200 cases of eye trauma, representing a frequency of 12.74%. The patients were aged 1 to 19 years with an average age of 8.45 +/- 4.62 years and the most represented age group, was that of 5 to 9 years with 31% of patients (Fig. 1). The males represented 71% or a sex ratio of 2.44. The male predominance was found in all age groups (Fig. 2). Patients who came from urban areas accounted for 75% while the other 25% came from rural areas. Regarding educational status, 25% of patients were not in school and the 75% who were (n=150) were distributed as follows: 53.33% primary level in the traditional education system, 34.66 % of secondary level, 4.66% of nursery level and 1.33% of higher level. Nine patients (6%) were at primary level but in Franco-Arab denominational schools. The reasons for consultation were dominated by the notion of “ocular trauma” (75%), followed by reduced visual acuity and ocular pain in respective proportions of 7.02 and 6.58% (Table 1) and the ophthalmological history found in 45 cases was dominated by ocular trauma which represented 80% of the ophthalmological history (Table 2). On the etiological level, gaming accidents represented 48.50% of the circumstances of occurrence followed by domestic accidents and brawls with respective rates of 19.50% and 15.50% (Table 3). The damaging agents were dominated by metal objects in 25% of cases, stones in 18.5% of cases, punches in 17% of cases and objects of a plant nature in 14% of cases (Table 4) and the main mechanism was the reception on the eye of an object or a moving liquid, in 96.00% of cases (Table 5).

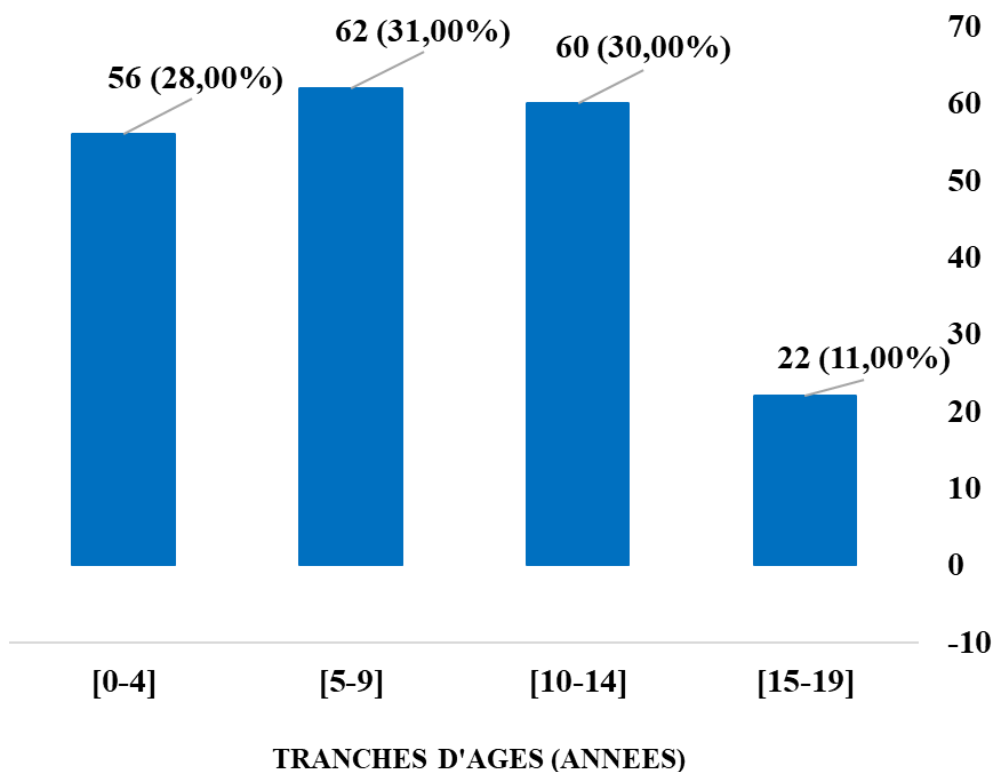


Figure 1: Distribution of patients according to age group. The average age was 8.45 ± 4.62 years, with extremes of 1 year and 19 years and the age group of 5 to 9 years ($n = 62$) was the most represented with 31% of cases.

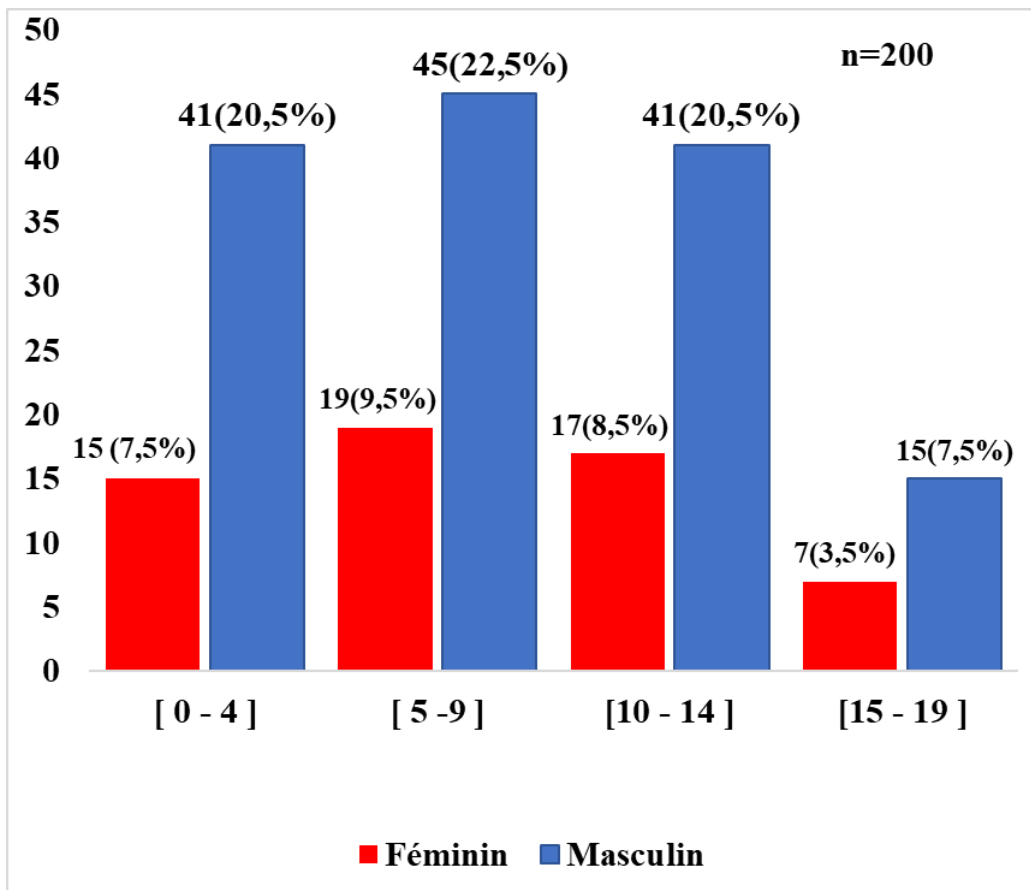


Figure 2: Distribution of patients by sex and age. There is a male predominance in all age groups.

Reason for Consultation	Numbers	Frequencies (%)
Eye Trauma	171	75.00
Decreased Visual Acuity	16	7.02
Eye pain	15	6.58
Eye redness	8	3.51
Tearing	5	2.19
Foreign Body Sensation	6	2.63
Others	7	3.07
Total	228	100%
NB: A patient could have more than one reason for consultation		

Table 1: Distribution of patients according to reason for consultation.

Ophthalmological History	Numbers	Frequencies (%)
Eye trauma	36	80.00
Wearing corrective glasses	5	11.12
Others	4	8.88
Total	45	100%

Table 2: Distribution of patients according to ophthalmological history.

Circumstances of Occurrence of the Trauma	Numbers	Frequencies (%)
Playground accident (playground, field, etc.)	97	48.50
Domestic accidents	39	19.50
Brawl	31	15.50
Traffic accident	11	5.50
Sports accident	5	2.50
Physical abuse	2	1.00
Assault	1	0.50
Others (country work, work in artisan workshops, etc.)	14	7.00
Total	200	100%

Table 3: Distribution of patients according to the circumstances of occurrence of ocular trauma.

Nature of the Vulnerant Agent	Numbers	Frequencies (%)
Metallic	Sharp (kitchen knife)	15
	Pointed (compass point)	15
	Blunted	18
	Metallic burst	2
Punch		34
Stone		37
Plant object (stem)		28
Sprayed liquid (chemical or thermal burns)		18
Others (wooden edge of a table, chair, concrete, etc.)		33
Total		200

Table 4: Distribution of patients according to the nature of the damaging agent.

Mechanism of Trauma	Numbers	Frequencies (%)
Receiving a moving object or liquid	132	66.00
Others (impact caused either by the fist or by the attacking agent held by the hand of the protagonist)	58	29.00
Fall with landing on the face	8	4.00
Shard projection	2	1.00
Total	200	100%

Table 5: Distribution of patients according to the mechanism of occurrence of the trauma.

Discussion

The average age of the patients was 8.45 ± 4.62 years, with extremes of 1 year and 19 years. This average age was comparable to that found by numerous authors such as Bodunde, et al., in Nigeria (8.56 ± 4.18 years) [10]. Mowatt, et al., al in the West Indies (8.3 and 8.7 years respectively for girls and boys), Ainé, in Jerusalem (8.2 ± 5.1 years) and Sadia, et al., in Pakistan with an average age of 8.1 ± 3.5 years [11-13]. Furthermore, the age group of 5 to 9 years found to be the most represented in our study would be the most exposed, as evidenced by the work of Podbielski, et al., who noted that children in the age group of 5 to 9 years were more likely to be injured [14]. The same is true for Lama, et al., in Guinea who found a peak in ocular trauma in the age group of 5 to 8 years (28.8%), Bodunde, et al., in Nigeria, Gatsey, et al., in Ghana, Meda, et al., in Burkina Faso, Lam, et al., in Senegal, Al-Bdour, et al., in Jordan who found that the age group from 6 to 10 years old was the most affected [10,15-19]. In Ivory Coast, Gbe, et al., in 2007 already reported a marked preponderance in the age group of 4 to 9 years [20]. The high frequency of eye injuries in children in this age group is believed to be because during this period of life, children demonstrate curiosity and a desire to explore the environment around them, which can expose them to serious dangers [21]. Furthermore, they very often escape parental authority for school, social and sporting activities with all the possible risks such as traffic accidents, play accidents, fights, etc. Indeed, studies carried out in Brazil and Colombia have shown that half of the children were unsupervised when the eye trauma occurred [22,23]. It follows that certain eye injuries could be avoided if children were under constant adult supervision.

The male predominance observed in our study (71%) and found in numerous studies including those of Bodunde, et al., (67.5%), Al-Bdour, et al., (71.5%), Sadia, et al., (72.25%), Sylves, et al., (78.8%) confirms that the male sex is the most affected by ocular trauma of the child and adolescent [10,13,19,24]. This is all the truer since in our series, the male predominance is found in all age groups (Fig. 2). The high frequency of eye injuries among male children and adolescents could also be explained by the fact that boys generally have more freedom than girls in our society and they tend to spend more time outside the home, which would again be due to the adventurous and aggressive nature of the boys [25]. Three out of 4 patients came from urban areas and were attending school. The higher frequency of eye trauma in this social category could be explained by the strong tendency to engage in dangerous games without supervision either in the playground or at home in the absence of parents for professional reasons. Could this culture of youth violence in urban areas not be a consequence of children's easier access to the violence conveyed by films in the media and other social networks? As for those not in school, they would be more exposed to eye trauma due to the high frequency, in this group, of manual, agricultural and craft activities (for which they are apprentices) without protective equipment [26].

Awareness and surveillance actions should target primary school children and especially in urban areas, with a view to reducing the incidence of childhood eye trauma in our environment. In 25% of cases, ocular trauma is not mentioned as a reason for consultation (Table 1) and it is during the continuation of the questioning that this notion appears. This highlights the value of careful questioning, especially in circumstances where parents or adults accompanying the injured child may have feelings of guilt. This feeling, which may be related to poor supervision of the child by adults or physical abuse that they may have inflicted on the child, may encourage them to hide the trauma that caused the eye damage observed by the examiner. Concerning the circumstances of occurrence of trauma, these are largely dominated by play accidents (48.50%) followed by domestic accidents (19.50%) [16,20,27-29]. Furthermore, ocular trauma occurs in children whose ophthalmological history is also dominated by ocular trauma. These findings raise the question of whether eye trauma does not generally occur in children or adolescents accustomed to violent or dangerous play without supervision and in children who live in family environments marked by adult

neglect. Indeed, Mensah et al in their study at Treichville University Hospital (Abidjan, Ivory Coast) found that 84% of eye injuries occurred during play and more than 85% of children were alone or without adult supervision at time of their accident [7].

At the top of the harmful agents, we note metallic agents in 25% of cases. These can be everyday tools such as kitchen knives or work tools. Proper storage of these “out of the reach of children” as mentioned on the packaging of certain dangerous products and the use of protective equipment adapted to children in learning situations in workshops would help to considerably reduce these cases of eye trauma. Following metallic agents, stone was the most frequent damaging agent in our study (18.50%). Stone thrown as a missile during play was also a common harming agent (18.1%) in northern Jordan [19]. The availability of stones in playgrounds, residential yards or even in the African street, as well as dry plant stems or sticks, would facilitate children's use of these objects, as confirmed by certain African studies [17,18,30]. However, we note certain differences with certain African studies such as that of Koki, et al., in Cameroon where the most common harmful agent found was punch with 21.39% of cases [31]. In our study, punching was the third most common ocular trauma agent in the pediatric population with a frequency of 17%. The difference between the two series could be explained by the fact that these authors worked on ocular trauma in general with the involvement of older subjects and a greater proportion of cases of brawls among the circumstances of occurrence.

The mechanism of occurrence of the trauma was dominated by the reception on the eye of a projectile, an object held in the hand or the punch of a protagonist or, finally, a moving liquid (96%). The predominance of this mechanism suggests the possibility of prevention using protective glasses. But as such a measure is not within the reach of most people, it could be recommended in the context of certain sports.

Conclusion

Eye trauma constitutes a public health problem in low-income countries due to their high frequency and the lack of qualified human resources and suitable and sufficient hospital structures for their treatment. Priority must be given to prevention based on the risk factors identified by this study. Indeed, the characteristic sociodemographic profile was that of a male schoolboy, aged 5 to 14, most often. The trauma most often occurred during play accidents or during domestic accidents when a moving object hit the eye. Most of the eye injuries found in our study can be avoided through reasonable limitation of the child's or adolescent's access to objects inappropriate for their age and through the vigilance of adults at home and at school. Furthermore, given the high proportion of students in our study, school programs should include raising students' awareness of the risks of accidents and in particular eye trauma and the means of preventing them. Action should also be taken in rural areas and through the Chamber of Trades of Côte d'Ivoire with a view to preventing eye trauma in children and adolescents in rural areas and in craft workshops where those -they are often in apprenticeship.

Conflict of Interest

The authors have no conflict of interest to declare.

References

1. Meilleurs pratiques BMJ. Traumatisme oculaires extrait. 2016. [Last accessed on: November 27, 2023] <http://bestpractice.bmj.com.ezproxy.ums.edu.my/best-practice/monograph/961.html>
2. Jannndek C, keellner U, Bomfeld N, Foester MH. Blessures du globe ouvert chez les enfants. Graefes Arch Clin Exp Ophthalmol. 2000;238:422220-6.
3. May DR, Kuhn FP, Morris RE, Witherspoon CD, Danis RP, Matthews GP, et al. L'épidémiologie des blessures oculaires graves du registre des lésions oculaires des Etats-Unis. Graefes Arch Clin Exp Ophthalmol. 2000;153-7.
4. Hoskin AK. Prévention des blessures oculaires pour la population pédiatrique. Asie-pacifique J Ophthalmol. 2016;83:933-6.
5. Gaboune L, Benfdil N, Sayouti A, Khoumiri R, Benhaddou R, Moutaouakil A, et al. 425 Ocular trauma: clinical and epidemiological aspects at the university hospital of Marrakech. French J Ophthalmol. 2007;30:2S275.
6. Soliman MM, Macky TA. Pattern of ocular trauma in Egypt. Graefes Arch Clin Exp Ophthalmol. 2008;246:205-12.
7. Mensah A, Fany A, Adjorlolo C, Touré ML, Gbe MK, Mhluendo KA, et al. Épidémiologie des traumatismes oculaires de l'enfant à Abidjan. Cahiers d'études et de recherches francophones/Santé. 2004;14(4):239-43.
8. Ahnoux-Zabsonre A., Keita C., Safede K. Traumatismes oculaires graves de l'enfant au CHU de Cocody d'Abidjan en 1994. J Fr Ophtalmol. 1997;20(7):521-6.

9. Eballe AO, Epée E, Koki G, Bella L, Mvogo CE. Unilatérale child- hood blindness: a hospital-based study in Yaoundé, Cameroon. *Clinical Ophthalmology* 2009;3:461-4.
10. Bodunde OT, Alabi AD, Ayeni OA. Blessures oculaires chez les enfants l'expérience Sagamu. *Niger J Paed.* 2014;41(3):215-8.
11. Mowatt L, McDonald A, Ferron-Boothe D. Admissions pédiatriques en traumatologie oculaire à l'hôpital universitaire des Antilles 2000-2005. *West Indian Med J.* 2012;61(6):598-600.
12. Ainé MJ. Lésions oculaires pénétrantes chez les enfants de cisjordanie et de la bande de gaza. *Eye.* 1993;7:429-32.
13. Sadia B, Mahar PS, Umair Q, Israr AB, Abdul SM. Traumatisme oculaire chez les enfants. *Pak J Ophthalmologie.* 2011;27(4):208-13.
14. Podbielski DW, Surkont M, Tehrani N, Ratnapalan RS. Blessures oculaires pédiatriques dans un service d'urgence canadien. *Can J Ophthalmol.* 2009;44:519-22.
15. Lama PL, Sagno C, Fofana I, Sylla A, Camara S, Sovogui B, et al. Traumatisme oculaire pédiatrique : aspects épidémiologies, cliniques et thérapeutiques chez CADESSO à Donka, Guinée. *Open J Ophthalmol.* 2022;12:284-93.
16. Gatsey PSN, Tchiakpe MP, Kumah DB, Kwabla MP, Mireku FA, Yeboah KG. Lésions oculaires pédiatriques associées aux activités récréatives ghanéennes dans la municipalité d'Ashaiman, au Ghana. *JOJ Ophthal.* 2017;3(3):555615.
17. Meda N, Gbe K, Sankara P, Ahnoux-zabsonre A, Boni S, Coulibaly F, et al. Aspects épidémiologiques, cliniques et thérapeutiques des traumatismes oculaires graves de l'enfant au centre Hospitalier Universitaire de Ouagadougou (Burkina Faso). *Revue SAOn°2.* 2008;14-9.
18. Lam A, Seck SM, Agboton G, Seck CM, Gueye NN, Andriamaroa H, et al. Traumatismes oculaires chez l'enfant de 0 à 15 ans au Sénégal. *J Français d'Ophthalmologie.* 2007;30(2):P2S212.
19. Al-Bdour, Azab MA. Blessures oculaires chez les enfants dans le nord de la jordanie. *Int Ophtalmol.* 1998;22:269-73.
20. Gbe K, Fanny A, Coulibaly F, Boni S, Coulibaly RB, Ouattara A, et al. 253 Clinical aspects and management of corneoscleral wounds in children: about 100 cases. *French J Ophthalmol.* 2007;30:2S222-3.
21. Dalia ME, Wael S. Lésions oculaires pédiatriques en Haute-Egypte. *Ophtalmologie Clinique.* 2011.
22. Moreira CA, Debert-Ribeiro M, Belfort R. Epidemiological study of eye injuries in Brazilian children. *Arch Ophthalmol.* 1988;106(6):781-4.
23. Serrano JC, Chalela P, Arias JD. Epidemiology of childhood ocular trauma in a northeastern colombian region. *Arch Ophthalmol.* 2003;121:1439-45.
24. Sylves P, Chen CY, Premadeva CS, Shuaibah AG. Traumatisme oculaire chez les enfants a l'hôpital pour femmes et enfants (hôpital Wanita Dan Kanak-Kanak), Sabah, Malaisie. *Borneo J Med Sci.* 2016;10(2):1-14.
25. Niiranen M, Raivio I. Blessures oculaires chez les enfants. *Br J Ophthalmol.* 1981;65:436-8.
26. Morrongiello BA, Klemencic N, Corbett M. Interactions between child behavior patterns and parent supervision : Implications for children's risk of unitentional injury. *Child Develop.* 2008;79(3):627-38.
27. Makita C, Nganga Ngabou CG, Madzou M. Traumatismes oculaires de l'enfant: aspects épidémiologiques, cliniques et thérapeutiques. *Revue SOAO.* 2016;2:46-50.
28. Doutetien C, Oussa G, Nokiatchop-Noumi M, Deguenon J, Tchabi S. Les traumatismes oculaires de l'enfant au CNHU de Cotonou. *Bénin Médical.* 2000;14:66-71.
29. Yaya GG, Bobossi S, Gaudeille A. Les traumatismes oculaires chez les enfants Agés de 0à15 ans : aspects épidémiologiques et cliniques au National Hospitalier Universitaire de Bangui. *J Fr Ophtalmol.* 2005;28(7):708-12.
30. Limaïem R, El Maazi A, Mnasri H. Penetrating eye trauma of the child in Tunisia. *J Pediatr Childcare.* 2009;22:97-101.
31. Koki G, Epee E, Eballe AO, Ntyame E, Nsoh CM, Bella AL, et al. Ocular trauma in urban Cameroon: about 332 cases evaluated according to the Ocular Trauma Score. *French J Ophthalmol.* 2015;38(8):735-42.

Journal of Ophthalmology and Advance Research



Publish your work in this journal

Journal of Ophthalmology and Advance Research is an international, peer-reviewed, open access journal publishing original research, reports, editorials, reviews and commentaries. All aspects of eye care health maintenance, preventative measures and disease treatment interventions are addressed within the journal. Ophthalmologists and other researchers are invited to submit their work in the journal. The manuscript submission system is online and journal follows a fair peer-review practices.

Submit your manuscript here: <https://athenaeumpub.com/submit-manuscript/>