Frequency and determinants of ocular trauma in the Kimpese Rural Health Zone, Kongo Central, Democratic Republic of Congo

Fréquence et Déterminants des traumatismes oculaires dans la Zone de santé de Kimpese, Kongo Central, République démocratique du Congo

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Résumé
Contexte et objectifs. Les traumatismes oculaires sont très fréquents et ses facteurs étiologiques varient selon les régions et les tranches d'âge. Cette étude a pour objectifs de décrire le fardeau et rechercher les déterminants des complications des traumatismes oculaires en milieu rural. ***Méthodes***. Nous avons mené une étude documentaire sur les patients admis à l'hopital de Kimpese pour un traumatisme oculaire entre janvier 2014 et décembre 2016. La régression logistique univariée a été utilisée pour rechercher les déterminants des complications des traumatismes oculaires. Le seuil de signification statistique est p<0.05. ***Résultats***. La majorité des participants était des hommes (69,5%), de la tranche de plus de 18 ans (70 %), avec une mauvaise acuité visuelle (57,8%) et une atteinte oculaire bilatérale (51,1%). Les objets de nature végétale (44,8%) et les objets métalliques (15,2%) ont constitué les agents traumatiques les plus rencontrés. Après traitement, une amélioration de l'acuité visuelle a été constatée chez 64,3% des patients ayant précédemment une acuité visuelle mauvaise (p< 0,001). Le délai de prise en charge > 7 jours [ORa : 2 ,286 (IC 95% : 1,302-4,012), p= 0,004] et la mauvaise acuité visuelle à l'admission [ORa : 5,906 (IC 95%: 3,231-10,796), p < 0,0001] ont émergé comme déterminants de la survenue des complications. ***Conclusion***. Les efforts de sensibilisation en faveur de la consultation précoce après les traumatismes oculaires et une intégration des soins oculaires au niveau primaire sont à promouvoir pour une efficience dans la prise en charge.
Mots-clés : traumatisme, oculaire, rural, complication, déterminant

Summary

Context and objective. Ocular trauma is very common and its etiological factors vary by region and age group. This study aims to describe the magnitude and determinants of ocular trauma complications in rural areas. ***Methods***. We conducted a retrospective study of patients admitted for ocular trauma at Kimpese Hospital between January 2014 and December 2016. Univariate logistic regression was used to assess the determinants of ocular trauma complications. The statistical significance level is p< 0.05. ***Results***. A total of 223 patients were included. The majority of participants were men (69.5%), over 18 years of age (70%), with poor visual acuity (57.8%) and bilateral ocular involvement (51.1%). Plant objects (44.8%) and metal objects (15.2%) were the most common traumatic agents. After treatment, an improvement in visual acuity was observed in 64.3% of patients with previously poor visual acuity (p < 0.001). The delay of care > 7 days [aOR: 2.286 (95% CI: 1.302-4.012), p=0.004] and the poor visual acuity on admission [aOR: 5.906 (95% CI: 3.231-10.796), p< 0.0001] emerged as determinants of the onset of complications. ***Conclusion***. Awareness-raising efforts for early consultation after ocular trauma and integration of eye care at the primary level should be promoted for efficiency in care.

Introduction

Ocular trauma is very common (1-2) at all ages and often overlooked as a cause of blindness (3) worldwide in general and in rural areas. In many countries including the Democratic Republic of Congo (DRC), ocular care is not integrated into primary health care, and there is a shortage of trained personnel for its management. Etiologies of ocular trauma are diverse and differ from one region to another and by age (4-6). Injuries most often affect children and young adults (7-8) because of intense physical activity in these age groups. Several studies have noted a predominance of ocular trauma in men than in women of all ages (4, 8-12) and an association with socio-economic status (13-

15).

The adequate care is usually late and the outcome is often bad. It is estimated that around 55 million ocular trauma occur worldwide every year, of which 19 million end up with unilateral loss of vision while 1.6 million become blind (16). Studies on the epidemiology of ocular trauma in developing countries have identified the delay between trauma occurrence and first aid as a risk factor for deleterious outcome (17-20). This study aims to determine the frequency of ocular trauma and the determinants of its complications in rural areas of the Kimpese Rural Health Zone (ZS), Kongo Central Province, DRC.

Methods

Design, setting, and study period

This is a retrospective study conducted in the ophthalmology department of the Kimpese Evangelical Medical Institute (IMEK) hospital, which is the referral eye care facility for approximately 500,000 inhabitants of the 16 Rural heath Zones in the western part of the Kongo Central Province.

The study population included all patients admitted to the IMEK hospital for ocular trauma between January 2014 and December 2016. Patient records containing most of the information sought were retained and patient's records with incomplete data were excluded. A total of 267 patients visited the ophthalmic department during the study period.

Variables

The following variables were searched for in each of the selected patients' records: age, sex, visual acuity on admission and at discharge, the nature of the traumatic object, the time interval between trauma onset and the date of consultation and post traumatic complications.

Data analysis

The collected data were entered on an Excel 2013 file before being exported and analyzed using the Statistical Package for Social Science (SPSS) Version 21 software. Averages (or medians) were calculated for the quantitative variables and proportions emerged for the qualitative variables. Univariate logistic regression was used to search the determinants of the complications of ocular trauma. The statistical significance level is $p<0.05$.

Bias

A number of biases may have affected the data in our study. Social desirability bias: some patients were able to provide answers with erroneous information on certain questions, such as the delay between the accident and care, so as not to appear negligent.

Ethical considerations

The study obtained the authorization of the Ethics Committee of the Protestant University in Congo (N° CEUPC0060), as well as the authorization of the Board of the General Reference Hospital of IMEK through which the access Patient records were obtained.

Results

A total of 223 patients were included. The study consisted of 155 men (69.5 %) and 68 women (30.5 %), most of whom were over 18 years of age (70%) and had poor visual acuity< 6/60 – Non Light Perception (NLP) on admission (57.8%, Table 1).

Table 1. Characteristics of patients admitted with ocular trauma at the Kimpese Evangelical Medical Institute Hospital

	n= 223	%
Age (years old)		
<18	67	30.0
>18	156	70.0
Sex		
Male	155	69.5
Female	68	30.5
Visual Acuity at admission		
Good (6/6 - 6/60)	94	42.2
Bad (<6/60 - NPL).	129	57.8
Visual Acuity after treatment		
Good (6/6 - 6/60)	177	79.4
Bad (<6/60 - NLP).	46	20.6
Ocular Damage		
Unilateral	109	48.9

	n= 223	%
Bilateral	114	51.1
Duration since trauma (in days)		
≤ 7	91	40.8
> 7	132	59.2
Complications		
Yes	145	65.0
No	78	35.0

Vegetable (44.8%) and metallic (15.2%) traumatic objects were the most found in our series (Table 2). The mean duration for presenting at the hospital was of 77.5 days with the extremes of 1 and 2190 days. The most commons complications were Cataracts (12.6%), Para central leucoma (7.2%), open globe (4.5%) and Iridocyclitis (3.1%).

Table 2. Nature of trauma agent in ocular trauma patients admitted to Kimpese Evangelical Medical Institute Hospital

Trauma Agent	*n*=223	Percentage
Vegetable/Plant based	100	44.8
Metallic	34	15.2
Road traffic accident	20	9.0
Insect	14	6.3
Fist punch	14	6.3
Crystal	12	5.4
Pebble	14	6.3
Heat	4	1.8
Chemical Agent	2	0.9
Ball	2	0.9
Rifle Bullet	1	0.4
Pen	1	0.4
Sand	5	2.2

Figure 1 shows the distribution of traumatic agents by sex, with vegetable and metallic natures of objects being the most predominant in both sexes.
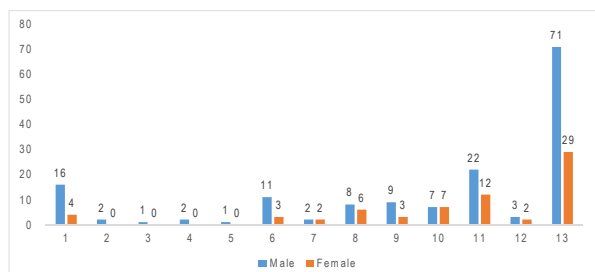
Figure 1. Distribution of the nature of the traumatic object by sex (1 = road traffic accident, 2 = chemical agent, 3 = rifle bullet, 4 = ball, 5 = pen, 6 = pebble, 7 = heat, 8 = fist punch, 9 = crystal, 10 = insect, 11 = metal, 12 = sand, 13 = vegetable)

According to age, plant-based traumatic objects are the most observed both in patients > 18 years and those <18 years (Fig.2).
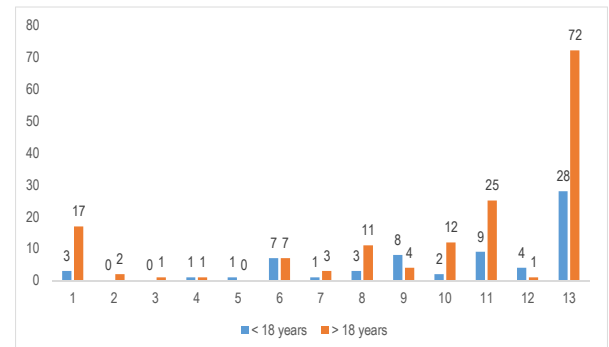
Figure 2. Distribution of the nature of the traumatic object by age (1 = road traffic accident, 2 = chemical agent, 3 = bullet, 4 = ball, 5 = bic, 6 = pebble, 7 = heat, 8 = punch, 9 = crystal, 10 = insect, 11 = metal, 12 = sand, 13 = vegetable)

Visual acuity data showed that 57.8% of patients were admitted with poor visual acuity compared to 42.2% of patients with good visual acuity. After treatment, of the 129 patients who consulted with poor visual acuity, 85 patients had improved acuity, the difference being statistically significant (p < 0.001) (Table 3).

Table 3. Visual acuity before and after treatment of patients admitted for ocular trauma at Kimpese Evangelical Medical Institute Hospital, 2014-2016

	After Treatment			
	Total	Good	Bad	P-value
Before Treatment	*n*=223	*n*=177	*n*=46	
Good	94 (42.2)	92 (52.0)	2 (4.3)	
Bad	129 (57.8)	85 (48.0)	44 (95.7)	<0.0001

The delay of care > 7 days and poor visual acuity at admission emerged as the determinants of the occurrence of complications in the management of ocular trauma in the Kimpese health zone (Table 4).

Table 4. Determinants of post-traumatic complications of patients admitted for ocular trauma at the Kimpese Evangelical Medical Institute Hospital

	n = 223 (%) Complications		Aor	95% CI	p-value
	No N=78	Yes N=145			
Delay of care (days)					
≤ 7	42 (53.8)	49 (33.8)	1		
> 7	36 (46.2)	96 (66.2)	2.286	(1.302-4.012)	0.004
Visual Acuity before treatment					
Good	54 (69.2)	40 (27.6)	1		
Bad	24 (30.8)	105 (72.4)	5.906	(3.231-10.796)	< 0.0001
Age (years)					
< 18	23 (29.5)	44 (30.3)	1		
≥ 18	55 (70.5)	101(69.7)	0.960	(0.526-1.752)	0.894
Sex					
Female	51 (65.4)	104 (71.7)	1		
Male	27 (34.6)	41 (28.3)	0.745	(0.413-1.344)	0.327
Affected Eye					
One	35 (44.9)	74 (51.0)	1		
Two	43 (55.1)	71 (49.0)	0.781	(0.450-1.357)	0.380

Discussion

The majority of participants were men (69.5%), over 18 years of age (70%), with poor visual acuity (57.8%) and bilateral ocular involvement (51.1%). Plant-based (44.8%) and metal objects (15.2%) constituted the most frequently encountered traumatic agents. After treatment, an improvement in visual acuity was observed in 64.3% of patients with previously poor visual acuity (p < 0.001). The delay of care > 7 days [OR: 2.286 (95% CI: 1.302-4.012), p= 0.004] and the poor visual acuity on admission [adjusted OR: 5.906 (95% CI: 3.231-10.796), p < 0.0001] emerged as determinants of the onset of complications.

Several studies have identified the male predominance of ocular trauma in both patients under 18 years of age and those over 18 years of age (4, 8-12). This trend can be explained in our context by the nature of the predominantly agricultural and mechanical work to which men are more exposed than women. Injuries are more noticeable in patients over 18 years of age. Most of the studies that considered only one or the other age group could not be compared to ours.

Poor visual acuity was noted in 57.8% of patients. In a study in Ghana, Gyasi *et al.* found 50% of patients with poor visual acuity. This difference may be due to the delay it took patients to present themselves to the hospital. Moreover, in our context, service provision is rare and patients often reach the hospital late after traveling long distances. Improvement of visual acuity was observed in 64.3% of patients admitted with poor visual acuity. Recovery was observed more in patients who consulted within 7 days of the trauma. This level of recovery has also been noted by other authors and attributable, depending on the context, to early treatment (9, 21-22). This recovery in our environment is explained by the fact that most traumas is of plant origin and has not resulted in an opening of the ocular globe (9).

The adverse outcome was associated in our study with better visual acuity on admission and

a short delay between the onset of trauma and the consultation at the hospital. These 2 determinants of complications have also been identified by other authors (22-24). In our community, a delay in hospital visit increases the risk of trauma patients applying traditional plants, which will sometimes complicate the situation and reduce the chances of recovery.

The nature of traumatic objects is similar to that found by some authors even if the frequency of occurrence is not the same and remains largely influenced by the context of life. Plant objects, metals and road traffic are the most traumatic in our study, while other authors mostly found blunt and metals objects (12-13, 25) and a small proportion, road traffic injuries. This disparity is certainly related to the work and life context. The IME-K hospital receives a significant share of traumatized victims of road accidents, being within distance to the first national road.

Limitation of the study

The limitations of this study are those recognized in retrospective data collection in which any missing data from records reduce sample size and representativeness.

Analysis concerned only data of patients having presented themselves at the IMEK hospital and whose files had all the information sought; data from patients who did not consult or whose files were excluded could have been different from those of patients included in this study.

Conclusion

Ocular trauma is common in Congolese rural areas and knowledge of traumatic objects allows preventive measures to be taken to reduce their impact on ocular health. Early consultation and visual acuity on admission are determinants of the outcome. Outreach efforts for early consultation are critical in the context of lack of or limited resources and low availability of trained eye care providers. At the time of universal health coverage, approaching the care to population by involving community workers

will allow faster access to health facilities for appropriate care for victims of ocular trauma.

Conflict of interest

The authors declare that they have no competing interests.

Authors´ contribution

LNP supervised the research and lead the redaction of the article

MLR made substantial contributions to the research work and in the writing of the manuscript

NNC Supervised collecting data process

All the authors reviewed the final version of the manuscript and gave their consent.

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