Patterns of Ocular and Adnexal Injuries at Guinness Eye Centre, Onitsha, Nigeria

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ABSTRACT.

Background: Eye injuries contribute significantly to the current public health dilemma. They resulted in 16 million cases of blindness, 23 million cases of low vision and 19 million cases of monocular blindness globally. **Objectives**: The aim of this study was to determine the pattern of ocular and adnexal injuries at the Guinness Eye Centre, Onitsha. **Materials and Methods**: A longitudinal survey was done among consecutive patients with ocular trauma. Information was obtained, from each new patient, using a structured questionnaire including history, examination, relevant investigations, treatment, assessment of Ocular Trauma Score (OTS) and visual outcome. **Results**: Eighty patients aged 3-83 years were studied with an incidence of 1.06%. Majority of the injuries were accidentally self-inflicted (43.7%). Thirty-five injuries were self-inflicted, 27 caused by sharp objects, 34 occurred at home and 22 were caused by assaults/fights. About 36 participants had closed globe injuries, 23 had open globe injuries and 21 adnexal-only injuries. No statistically significant association between type of injury and gender ($p>0.05$). There was a general improvement in the visual outcome of the injuries, but not statistically significant. ($p=0.28$). **Conclusions**: Eye injuries were common among the young and females in Guinness Eye Centre Onitsha. People should be educated on the preventive measures and appropriate management of these injuries.

Keywords: Ocular, Adnexal, Trauma, Injuries, Onitsha, Nigeria.

INTRODUCTION

Eye injuries are defined as damage to the eyeball, its adnexae, orbital and periorbital tissues, due to the transfer of energy of a greater magnitude than the tissues can withstand.[1] The energy could be of physical form including mechanical, thermal, chemical, electrical, and radiant energy.[1] It could be through direct contact with the objects which may be mobile or fixed, sharp or blunt, cold or hot.[1] Ocular and adnexal injuries contribute significantly to ocular morbidity.[2] The type of injury and the amount of damage sustained are usually dependent on the mechanism and force of the injury.[2] Ocular and adnexal injuries are common and can occur as a separate entity or as part of a larger maxillofacial injury.[3]

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A global review of eye injuries noted that 55 million cases of ocular trauma occur annually worldwide.[4] Of these, 750,000 patients required hospital admission and 200,000 patients had open globe injuries.[4] Ocular and adnexal injuries were the third most common cause of uniocular blindness at the Nnamdi Azikiwe University Teaching Hospital Eye Clinic, Nnewi.[5] Onyekwe reported an incidence of 11.6% for ocular and adnexal injuries at Guinness Eye Centre, Onitsha.(6) Nwosu et al, reported that 64.6% of the ophthalmic emergencies presenting at Guinness Eye Centre, Onitsha was as a result of trauma.[7] All three studies were conducted in Anambra State, in the South Eastern Nigeria. From the Southwestern Nigeria, Oluleye et al,[8] reported that ocular and adnexal injuries were the third most common cause of unilateral blindness after cataract and glaucoma, at the University College Hospital, Ibadan, Oyo State. Ajayi et al[9] reported an incidence of 3.8% for eye surgeries, at Ekiti State Teaching Hospital, Ado-Ekiti. In Northwestern Nigeria, Rafindadi et al,[10] reported an incidence of 0.9% for orbital and ocular trauma at Ahmadu Bello University Teaching Hospital, Shika-Zaria, Kaduna State. Omoti[11] observed that ocular and adnexal injuries caused 11.7% of unilateral and 4.7% of bilateral blindness, among 376 blind patients at the University of Benin Teaching Hospital, Benin, Edo State, in South-South Nigeria.

The pattern of ocular and adnexal injuries depends on the victim's location and the activities of the residents in such location.[2] This pattern varies with different geographical location affecting developing countries most.[12] Ocular and adnexal injuries are related to certain professions and culture which subsequently determine the type and prognosis of the injuries.[1] The age-specific prevalence peaked at the age groups of 5-25years and 70years and above.[13] There is a higher risk of ocular and adnexal injuries in males than female by a ratio of 4:1.[12,14,15]

The causes of ocular and adnexal injuries depend on the victim's place of residence, country of origin, the demographic and socioeconomic strata[16], way of life and community clashes.[17] Road traffic accidents (RTA) have also resulted in an increasing incidence of ocular and adnexal injuries worldwide[14,18] and in Nigeria.[19,20] Ocular and adnexal injuries also occur during sport and leisure activities[14] and several domestic accidents and activities.[14,21]

Some factors that affect the visual outcome of ocular and adnexal injuries include the severity of the injury, the nature of the first aid treatment given, the onset of definitive treatment, the quality of the treatment, and any pre-existing eye disorder.[1] Ocular and adnexal injuries caused by plants, vegetable and soil materials have worse prognosis than other agents of injury.[22]

The aim of this study was to determine the pattern of ocular and adnexal injuries among patients presenting to Guinness Eye Centre, Onitsha, Anambra State, Nigeria including the current agents, causes and circumstances surrounding eye injuries in the centre.

MATERIALS AND METHODS

The study was a longitudinal study conducted from November 2020 to August 2021 in Guinness Eye Centre Onitsha. Eighty consecutive patients were recruited, and ethical clearance obtained from the institution board. A written informed consent was obtained from all the participants, and they were interviewed and evaluated using a pre-tested, structured, interviewer-administered questionnaire. Information was sought on the socio-demographic variables, injury history, physical examination, diagnosis, investigations, interventions, and outcome were assessed at a monthly interval for 3 months. A comprehensive general examination was also done on each participant.

The ocular examination included visual acuity assessment using the Snellen's chart, refraction using a Grand Seiko GR-3100K Autorefractor and anterior segment examination using a pen torch and a Sun Kingdom Slit lamp biomicroscope. Patient's intraocular pressure was then measured, with a Goldmann applanation tonometer, if the globe was intact and a dilated fundoscopy was done using a Welch-Alynn binocular indirect ophthalmoscope. On the other hand, closed globe injuries with hazy optical media were examined with an ocular B-scan using minimal probe pressure and patients with blunt trauma and sunken globe were examined for features of a blow-out fracture. Ancillary investigations such as orbital x-ray and computed tomography (CT)

scan, the primary imaging test in orbital trauma[23] were performed where applicable.

The patient's injury was classified, the Ocular Trauma Score calculated,[24] and a diagnosis was made based on the clinical findings and the results of the requested investigations. Treatment involved the use of topical and/or systemic medications or surgery as needed. The patients requiring surgical interventions, including those with open globe injuries, were immediately scheduled for emergency surgeries after informed consents were obtained. The details of the surgeries were adequately documented. All the scheduled surgeries were performed by the consultant ophthalmologists involved in the study. Patients with severe ocular injuries including lacerations, burns and hyphema were admitted while others with mild injuries were treated on an out-patients basis. Follow up evaluation was scheduled for 1 week, 1 month, 2 months and 3 months after presentation. Thereafter the patient was discharged from the study. The follow up visits, which were ensured by proper counselling and education and reminder via phone calls, involved the documentation of the clinical features, complications, and visual outcomes of the injuries. Photographic documentation of all the injuries was also done during the study, with the patients' permission.

The data from the study protocol were coded, cleaned, and inputted into the Microsoft Excel spread sheet immediately. These data were analysed using the Statistical Package for the Social Sciences version 25.0 (SPSS Inc., Chicago, IL, USA, 2017) developed by the IBM Corporation. Relationships between variables were tested using inferential statistics with alpha level at 0.05.

RESULTS

A total number of 7576 new ophthalmic patients were seen during the study period of which 80 (82 eyes) consecutive new patients with ocular and adnexal injury were recruited. The study incidence was 10.6 per 1000 ophthalmic patients (1.06% per 100). This comprised 26 (32.5%) males and 54 (67.5%) females. Two (2.5%) participants had injuries involving both eyes. There was no significant difference between the age distribution of the male and female participants (p= 0.934). The age of the participants ranged from 3-83 years with a median age 25 years. Majority, 52 (65%) of the participants were 30 years old or younger while 28 (35%) were above 30 years old, as illustrated in Table 1 that also shows other socio-demographic characters.

Table 1: The socio-demographic characteristics of the participants

Age (years)	**Male (%)**	**Female (%)**	**Total (%)**	**Df**	**χ^2**	**P value**
≤10	6 (7.50)	13 (16.25)	19 (23.75)			
11 – 20	5 (6.25)	8 (10.00)	13 (16.25)			
21 – 30	3 (3.75)	17 (21.25)	20 (25.00)			
31 – 40	4 (5.00)	8 (10.00)	12 (15.00)	8	2.650*	0.934
41 – 50	3 (3.75)	6 (7.50)	9 (11.25)			
51 – 60	2 (2.50)	1 (1.25)	3 (3.75)			
61 – 70	1 (1.25)	0 (0.0)	1 (1.25)			
71 – 80	1 (1.25)	1 (1.25)	2 (2.50)			
81 – 90	1 (1.25)	0 (0.00)	1 (1.25)			
Total	**26 (32.50)**	**54 (67.50)**	**80 (100.0)**			
Occupation			**Total (%)**			
Student			34 (42.5)			
Artisan			20 (25.0)			
Trader			10 (12.5)			
Civil servant			7 (8.7)			
Farmer			6 (7.5)			
Unemployed			2 (2.5)			
Housewife			1 (1.3)			
Total			**80 (100.0)**			
Education			**Total (%)**			
Non-formal			14 (17.5)			
Primary			39 (48.7)			

Secondary	19 (23.8)
Tertiary	8 (10.0)
Total	**80 (100)**

*Yates correction Df: Degree of freedom

Majority 56 (70%) of the participants were single, 21 (26.3%) were married, 2 (2.5%) widowed and 1 person (1.3 %) was separated from his/her spouse. All the participants (100%) were of the Christian religion. Forty-three (53.8%) participants resided within 10km from the study location while 5 (6.3%) participants travelled more than 90km to the study location. The participants travelled a varying range of distance of 5 - 230 km from their places of residence to the hospital, with a mean distance of 28.3 ± 49.4 km.
All the participants had multiple symptoms which are presented in Figure 1. The lid problems included lid swellings and discolorations (ecchymoses) while the cut on the eye includes the lid, corneal and sclera lacerations.

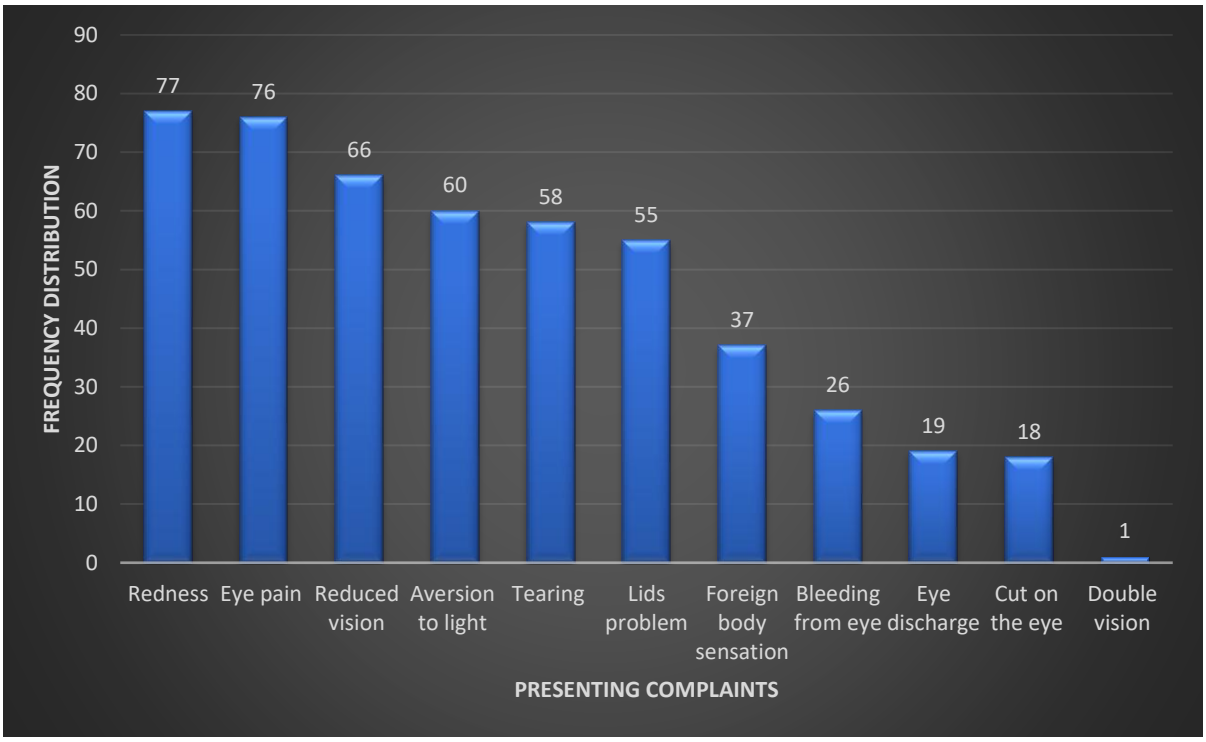

Figure 1: The participants' presenting complaints.

The duration of the injuries before presentation ranged from 1 day to 1 month post injury; mean 4.6 ± 6.8 days. The relationship between the estimated distance travelled by each participant, from their places of residence, and the time of presentation to the study location was compared and analysed. This is presented in Table 2. There was a significant relationship between the distance travelled and the time of presentation (p = 0.012). Participants living within 20km of the study location were more likely to present within 24hrs of injury.

Table 2: The analysis of the distances travelled and the time of presentation of the participants.

	≤ 20km	20–50km	>50km	Total	Df	χ^2	P value
Time to Presentation							
Within 24hrs	35 (62.5)	5 (33.3)	2 (22.2)	42 (52.5)			
Day 2 – 7	18 (32.1)	4 (26.7)	3 (33.3)	25 (31.3)	4	12.823*	0.012
>Day 7	3 (5.4)	6 (40.0)	4 (44.4)	13 (16.3)			

*Yates correction Df: Degree of freedom

The agents of injury as reported by the study participants are presented in Table 3. Sharp objects were implicated most while vegetative matter was implicated least among the participants.

Table 3: The agents of injury between the male and female participants

Agent of Injury	Male (%)	Female (%)	Total (%)	χ^2	Df	P value
Sharp objects	12 (44.4)	15 (55.6)	27 (100.0)	2.650	1	0.104
Metallic objects^{+}	3 (16.7)	15 (83.3)	18 (100.0)	1.805*	1	0.179
Missiles^{+}	5 (27.8)	13 (72.2)	18 (100.0)	0.236	1	0.627
Blunt objects^{++}	4 (33.3)	8 (66.7)	12 (100.0)	0.072	1	0.788
Fall on a hard surface^{+++}	2 (20.0)	5 (80.0)	7 (100.0)	0.036*	1	0.850
Chemical burns	1 (25.0)	3 (75.0)	4 (100.0)	0.048*	1	0.827
Vegetative matter	1 (25.0)	2 (100.0)	3 (100.0)	0.000*	1	1.000

$^{+}$*Missiles include objects that hit the eye at a speed.* $^{++}$*Blunt objects refer to the finger, elbow, or fist of the perpetuators.*
$^{+++}$*Fall on a hard surface refers to the participants hitting their eyes on the ground, edge of the step or car dashboard*
**Yates correction.*

The causes of injuries were as follows; 35 (43.7%) were accidentally self-inflicted, 20 (25.0%) were caused by unknown assailants, 11 (13.7%) by playmates, 5 (6.3%) by parents or guardians, 4 (5%) by siblings, co-workers 2 (2.5%), victims' children 2 (2.5%) and 1 (1.3%) by a teacher.

Table 4 shows the locations where the various injuries occurred. Thirty-four (42.5%) of the injuries took place at home, 18 (22.5%) on the road and 16 (20.0%) in workplaces; sports centre was least 2 (2.5%).

Table 4: Locations where the injuries occurred.

Locations where injuries occurred	Male (%)	Female (%)	Total (%)	χ^2	Df	P value
Home	15 (44.1)	19 (55.9)	34 (100.0)	3.638	1	0.056
Road	5 (27.8)	13 (72.2)	18 (100.0)	0.236	1	0.627
Workplace	3 (18.8)	13 (81.2)	16 (100.0)	1.029*	1	0.310
School	1 (25.0)	4 (75.0)	5 (100.0)	0.015*	1	0.903
Farm	2 (40.0)	3 (60.0)	5 (100.0)	0.015*	1	0.903
Sports centre	1 (100.0)	1 (100.0)	2 (100.0)	0.000*	1	1.000

**Yates correction* *Df: Degree of freedom*

Table 5 shows the activities leading to the injuries. The most frequent activity leading to injury was assaults/ fights 22 (27.5%), followed by play 20 (25.0%).

Table 5: The activities leading to the injuries in the participants.

Activity leading to injury	Male (%)	Female (%)	Total (%)	χ^2	Df	P value
Assault/ Fights	8 (36.4)	14 (63.6)	22 (100.0)	0.035*	1	0.852
Play	5 (25.0)	15 (75.0)	20 (100.0)	0.684*	1	0.408
Vocational work	1 (11.1)	8 (88.9)	9 (100.0)	1.156*	1	0.282
Domestic chores	6 (66.7)	3 (33.3)	9 (100.0)	3.784*	1	0.052
Flogging	3 (60.0)	2 (40.0)	5 (100.0)	0.745*	1	0.388
Fall	2 (40.0)	3 (60.0)	5 (100.0)	0.007*	1	0.933
Farm work	2 (40.0)	3 (60.0)	5 (100.0)	0.007*	1	0.933
RTA	3 (60.0)	2 (40.0)	5 (100.0)	0.745*	1	0.388

The vocational works here include construction and carpentry works. The domestic chores include chopping firewood and kitchen works. The farm work includes clearing farmlands and planting.
**Yates correction* *Df: Degree of freedom* *RTA Road Traffic Accident*

Figure 2 shows the frequency of the affectation of the different adnexal, and ocular tissues in the participants. The conjunctiva 39 (23.2%) and the cornea 39 (23.2%) were the 2 most affected while the optic nerve 1 (0.6%) and the orbit 2 (1.2%) were the least affected.

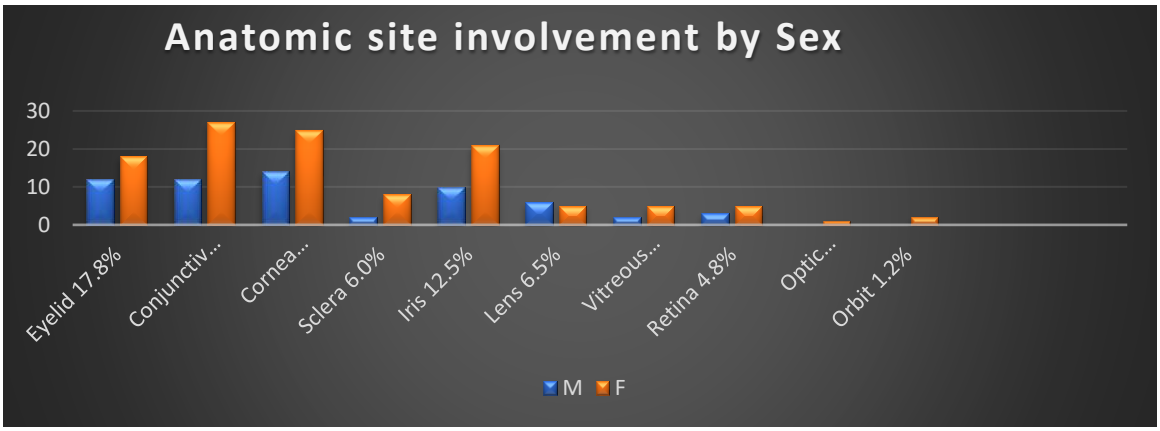

Figure 2: The frequency of the involvement of the various ocular and adnexal tissues

Thirty-six (45.0%) participants had closed globe injuries, 23 (28.8%) had open globe injuries and 21 (26.2%) had injuries that did not involve the globe (i.e. adnexal-only injuries). There was no statistically significant association between type of injury and gender ($P > 0.05$). There was also no statistically significant difference in the distribution of injuries based on gender ($P > 0.05$). Broadly all the injuries were classified into local (79.3%), associational (4.4%) and environmental (16.3%) classes of injuries.

Thirty-eight (47.5%) participants were treated on out-patient basis while 42 (52.5%) were admitted into the wards as in-patients. Furthermore, 4 (5%) participants received surgical treatment only, 32 (40%) medical treatment alone and 44 (55%) received both.

There was a general improvement in the visual acuity of the participants, from presentation to the 3 months follow up visits as shown in Table 7 below. There was a 6.1% increase in no or mild visual impairment, 7.0% increase with the moderate to severe visual impairment and 13.1% reduction in the blindness among the participants in the present study.

Table 7: Comparing the visual outcome with the presenting and final distance visual acuity.

Category of vision	Distance VA	At Presentation	At Discharge	χ^2	Df	P value
Mild or no VI	6/5 to 6/18	33 (41.3)	36 (47.4)	0.591	1	0.442
Moderate to Serious VI	6/24 to 3/60	6 (7.5)	11 (14.5)	1.952	1	0.162
Blindness I	CF, HM, LP,	33 (41.2)	21 (27.6)	3.194	1	0.074
Blindness II	NPL	8 (10.0)	8 (10.5)	0.012	1	0.914

VI visual impairment, CF Count Finger, HM Hand movement, LP Light perception, NPL No perception of light, Df: Degree of freedom

DISCUSSION

The incidence of ocular and adnexal injuries among patients recorded in the present study (1.06%) is lower when compared with rates reported in the developed countries like United States of America[25] and some developing countries like Tanzania.[26] In southern Nigeria, rates lower than that of the present study were reported by Ajibode et al[27] in Sagamu and Ajayi et al[9] in Ekiti but higher rates by Kolawole et al[28] in Oshogbo and Olawale et al[29] in Ibadan. In northern Nigeria, Rafindadi et al[10] in Shika-Zaria and Ayanniyi et al[30] in Birin-Kebbi reported lower rates. This disparity in the incidence rates in Nigeria could be because of the different socio-cultural practices like health-seeking behaviours as well as the level of socio-economic and infrastructural developments such as good road network and availability of eye care facilities. In addition, the varying incidence rates across the developed and developing countries could be due to several factors including the

availability of safety measures against injuries at workplaces, sports centres, schools, and homes. It could also be due to differences in the study methodology and study tools used by the different studies.

The median age (25 years) and age range (3-83 years) of the participants in the present study were similar to those previously reported by several studies.[2,9,12,17] In addition most of the participants were aged below 30 years and this was also consistent with the findings of previous studies.[2,3,15,31,32]The increased incidence of eye injuries at this age range is due to the fact that the people within this age range frequently engage in high risk activities.

Eye injuries were found to be more prevalent in females than males in the present study. This is contrary to reports in several studies [9,12,14,15,17,32] that found higher rates in males. This could be because more females are increasingly engaging in hitherto male-dominated high-risk activities and occupations such as professional athletes. In addition, factors like lower charges in public hospitals, higher education rates and better healthcare seeking behaviour among females could increase their accessibility to healthcare subsequently leading to this outcome. The relative economic independence of Igbo women in Nigeria could also explain the prevalence obtained in this study.

Students were the group most affected by the eye injuries in the present study. This confirms the fact that the young and active individuals are most affected by ocular and adnexal trauma, and this is supported by several studies [2,12,17,27,28,30,32] with similar findings. On the contrary, the findings of the hospital-based studies by Ajibode *et al*[19] in Sagamu reported that technical workers were at the highest risk while the groups identified by Okoye[33] in Enugu were artisans and farmers.

Most of the participants' current or highest educational status was the primary school level which is like the findings by Adamu et al [12] in Gusau. Most of the participants of the present study were found to be single which is consistent with the findings of a hospital-based study by Omolase et al[2] in Owo. In addition, majority travelled less than 20km from their places of residence to the study location to receive treatment, similar with the findings of a study by Omolase et al[2] in Owo.

Almost all (97.5%) of eye injuries were found to be uniocular and 2.5% binocular in the present study as seen in most studies.[2,9,12,17,28,30,33] Majority of participants (52.5%) presented within 24 hours of injury to the hospital in the present study. This is consistent with the findings of the studies in Nigeria,[27,28] in Libya[18] and in India.[3] These early presentations by over a half of the participants in the present study could be attributed to the fact that majority of the participants travelled only 10km to the study location and an association was found between the distance travelled by the participants and the time of presentation.

The most common agents of injury in the present study were sharp objects including broomsticks, vegetable matter, pen etc. This is like the findings of various studies in different parts of Nigeria.[28,30,32] There was no statistical significance in the relationship between the agent of injury and the gender of the participant in the present study. This is like the findings by Ayanniyi *et al*.[30] Majority of the injuries were found to be accidentally self-inflicted (43.8%) and did not differ between males and female participants. This result, however, differs from the findings of Ashaye[34] among children and adolescents in Ibadan where majority of the injuries were not self-inflicted. This is not surprising when one considers the age of the participants in the study by Ashaye.[34] Persons unknown to the participants (assailants), in the present study, were the second highest number of the persons causing injuries in the present study. This corresponds with the fact that the highest number of activities leading to the eye injuries was assault and fights. This could be because of the prevailing insecurity situation of the country Nigeria.

The location where most of the injuries occurred was at home and this finding was consistent with existing literature on ocular injury.[2,10,28,30] There was no difference in the distribution of the location of injury between male and female participants in the present study. This is like the findings in the studies by Adamu *et al*[12] in Gasau and Ayanniyi et al[30] in Birnin Kebbi. Attention should be drawn to the fact that some leisure accidents or even economic activities at home can predispose to eye injuries such

as children playing with sharps, plucking fruits, frying garri (cassava flakes), cracking palm kernels, accidental falls and chastising an erring child.

Assaults and fights were the most frequent activity leading to injury in the present study among the participants. This is similarly seen in the studies by Ajayi et al,[9] Okoye[33] and Ezegwui[32] who also reported assaults and fights/combats as the leading activities associated with the eye injuries.

The injuries involving the globe occurred more than those involving only the ocular adnexae and this is consistent with the findings by Ezegwui[32] where only 5.6% of the participants had injuries involving only the ocular adnexae while the remaining injuries involved the globe with or without the adnexae. This could be because of the nature of most of the agents of injury reported by Ezegwui[32] and this present study. Ezegwui[32] noted sticks, objects associated with RTA and fist/hand as the main agents of injuries while this present study reported sharp objects, metallic objects and missiles. In addition, the closed globe injuries occurred more than the open globe injuries in the present study and this finding is like the reports by Ajayi et al,[9] in the University Teaching Hospital Ado-Ekiti, where there was a higher proportion of closed globe injuries than open globe injuries (87.0% > 12.9%). The globe distribution of ocular injuries also did not differ significantly between male and females. This could be because of the similarities in the agents of injuries between the males and females.

Conjunctiva and cornea were the 2 most affected ocular/adnexal tissue in the present study. This is similar with the reports of various studies[2,9,12,31] where the cornea was the most affected ocular/adnexal tissue in the injuries. The distribution pattern showed clearly that the most superficial structures were most affected as they were more likely to encounter the agent of injury. Deeper structures were affected mainly by ruptures and penetrating injuries. There was no significant statistical difference in the gender distribution of the type of injury ($P > 0.05$) as similarly reported by Megbelayin *et al*.[17]

More participants were admitted for treatment than were treated as outpatients (52.5% vs 47.5%) in the present study and this was in contrast with the findings reported by Ayanniyi et al[30] where fewer participants were treated as inpatients than as outpatients (36.0% vs 64.0%). More participants, in the present study, also received medical treatment only than surgical treatment alone while a sizeable number of the participants had both medical and surgical interventions. This was like the findings by Ajibode *et al*[27] where more participants also received only medical treatment more than surgical interventions alone. On the contrary, Okoye[33] reported that majority of his study participants had surgical treatment for their injuries. All these could be because of the nature of varying agents and different levels of severity of the injuries in the present study.

The proportion of the participants, in the present study, with visual acuity in the range of 6/5 to 6/18 (no or mild visual impairment) and 6/24 to 3/60 (moderate to severe visual impairment) increased from the presentation to the final follow up visit while those with visual acuity of <3/60 (blindness) including those with NPL reduced in number. Similar findings were found in the studies by Omolase et al[2] and Adamu et al[12] where the participants in the no or mild visual impairment category increased but those within the moderate to severe visual impairment and blindness categories reduced in number. There was a 6.1% increase in no or mild visual impairment, 7.0% increase with the moderate to severe visual impairment and 13.1% reduction in the blindness among the participants in the present study. This was similar with the findings by Okoye[33] and Ayanniyi *et al*[30] who equally reported the varying proportions of their study participants that recovered normal vision and those that remained blind at the end of their studies. Therefore, the final visual outcome of participants in the present study improved compared to the presenting visual status but this did not reach statistical significance. The reasons for the improvement could be due to the early presentation and early intervention in the treatment of majority of the participants. Other reasons could be because the ratio of the anterior segment to the posterior segment injuries was approximately 5:2, posterior segment injuries being more linked to poorer final visual outcome than anterior segment injuries. Finally, the improved final visual outcome could also be because of a greater proportion of closed globe injuries than open globe injuries (36>23) among the participants.

Open globe injuries are associated with poorer visual outcome more than closed globe injuries.

From the results of this study, it is concluded that patients with ocular and adnexal injuries frequently present at the Guinness Eye Centre Onitsha and were commonly individuals under the age of 30 years; females tend to be more affected. Most of the injuries were accidentally self-inflicted, occurring during assaults and fights and at home. Sharp objects were the most common agent of injury. The type of injury as well as the extent of the ocular and the adnexal tissues damage were determined by the agent of injury; sharp objects led to open globe injuries while blunt objects led to closed globe injuries. Closed globe injuries were commoner than open globe injuries, but the latter led to more severe ocular morbidity. Finally, compared with presenting visual acuity, there was a significant improvement in the final visual outcome post intervention.

It is thus recommended that there should be extensive creation of awareness and health education of the public on the causes of eye injuries, as well as the safety and preventive measures. This could be achieved via print and social media, radio and television stations and church and community gatherings. In addition, the most vulnerable group who are the young people should be educated and counselled on the need to embrace the culture of being very careful in their daily lives in schools and homes and actively avoid physical altercations.

Sports and recreational centres should have adequate eye safety measures in place to reduce the rate of injuries and first aid facilities to manage injuries before proper referral. Finally, governments should establish functional and well-equipped eye healthcare services at every level of healthcare including in all general hospitals, comprehensive and primary healthcare centres. This will reduce the delays encountered in accessing specialist treatment and will lead to better final visual outcome following injuries. They should also strengthen the already existing tertiary eye healthcare facilities to improve the final visual outcome of the eye injuries managed in there.

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All authors were involved in the revision of the manuscript. The authors read, approved the final manuscript and agree to be accountable for all aspects of the work.

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The data used to support the findings of this study are available from the corresponding author upon reasonable request.

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