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# Visual outcome of pressurised bottled drinks related eye injuries in Ibadan

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## Summary

Records of 15 patients presenting with pressurised bottled drinks related eye injuries between January 1996 and 2001 were reviewed to identify factors contributing to accidental eye injuries from pressurised bottled drinks, reason for poor outcome and to make recommendations. In all, 16 eyes of 15 patients were studied out of which 7 were males (M:F, ratio 1:1.1). Age range, 3 years-49 years, mean 23.6 years. The majority of those affected were students 46.7%, and traders 26.7%. The commonest activity leading to injury was explosion during the process of arranging the bottles or crates of drinks (43.8%) and accidental fall of bottle from hand or height (37.5%). Drinks implicated include, Coca-cola 50%, beer 25%, others (Fanta, Legend stout, Mirinda, Grape juice) 25%. Complications arising from the injury included, hyphema 43.8%, vitreous haemorrhage 12.5%, and retinal detachment 12.5%. The globes were retained in 12 (75%) cases, 3 defaulted and one eye became phthisical. The final visual acuity was 6/18 or better in 25%, between 6/24 and 6/60 in 12.5% and less than 6/60 in 31.3%. The final visual acuities of three patients who were lost to follow up were unknown. Reason for poor visual outcome include severity of injury with resultant serious complications, and delay with instituting surgical treatment. Eye injuries resulting from exploding bottled drinks are potentially very serious and therefore best prevented. It is recommended that conversion of bottled drinks to canned or plastic containers be considered by the manufacturers. Greater care should be taken with the handling of bottled drinks by the sellers, factory workers and consumers. High risk occupations such as bottled drink sellers and factory workers may need to wear protective goggles during handling. Public health education on need to seek prompt and proper treatment as well as need for Government to institute the National health insurance scheme to cater for indigent patients.

**Key words:** Ocular trauma, bottle fragment injury, bottle cap injury, exploding carbonated drinks, occupational eye injury.

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## Résumé

Le registre de 15 patients ayant des problèmes des yeux lié à l'explosion des bouteilles de boissons à pression entre janvier 1996 à 2001 étaient revu pour identifier les causes contribuant à ces blessures des yeux source du faible rendement et des recommandations ont été faite. Seize yeux de patients d'un ratio male :femele 1 :1.1, agés entre 3 à 49 ans (moyenne :22.6 ans) étaient étudiés. La majorité des affectés étaient les étudiants(46.7%) et les commerçants (26.7%). L'activité la plus commune conduisant à ce problème était l'explosion durant le processus d'arrangement des bouteilles ou dans les casiers. Ces boissons inclus coca cola 50%, bière 25%, autres (fanta, guinness, mirinda, jus de grappe : 25%). Les complications emmanant de ce problème incluses :l'hyphème (43.8), hémorragie vitreuse (12.5%), détachement rétinale (12.5%). Les globes oculaires étaient retenu chez 12 (75%) des cas, 3 défauts et un oeil devenait phthisicale. L'acuité visuelle finale était de 25%, entre 6/24 - 6/60 à 12.5% et moins de 6/60 à 31.3%. Trois patients qui ont perdu l'acuité visuelle et suivit étaient inconnu. La raison du faible rendement visuelle inclus la sévérité de la blessure résultant des complications sévères et retard dans la chirurgie. Les blessures des yeux résultant de l'explosion des bouteilles de boissons sont potentiellement très dangereux et serait mieux d'être prevenu. Il est recommandé que les bouteilles des boissons soit en bois ou en plastique soit considéré par les fabricants ; et que plus d'attention soit prise avant l'emploi des bouteilles de boissons en verre par les vendeurs, les employes et les consommateurs. Les grand risques d'occupation telsque les vendeurs de bouteilles, les employés d'usine doivent utiliser les gangs de protection durant le service. Aussi l'éducation de la santé publique au besion du patient de demander un traitement juste et précis ainsi que la nécessité pour le gouvernement d'instituer un plan d'assurance de sante nationale.

## Introduction

Ocular trauma is an important cause of ocular morbidity and visual loss [1]. Previous studies have identified and commented on the role of occupational hazards in their causation [2,3]. The risk of blindness or poor visual outcome has been linked to the severity of the injury with penetrating injuries having a poor outcome [4]. Worthy of

note are injuries resulting from sharp, agricultural implements in farmers [4]. Children at play have also been associated with penetrating eye injuries from sharp pointed toys [10]. Other causes of severe eye injury include broken windscreen in road traffic accidents [5]. An equally important cause of ocular trauma which has been reported but has not been adequately explored in the study environment is eye injury associated with pressurized bottled drinks [6,7]. Bottle related eye injuries constituted 8.8% and 4.6% of the series by some authors in Nigeria a few years ago [3,8].

This study reviewed 15 patients with eye injuries resulting from exploding bottled drinks or flying caps with a view to identifying factors contributing to the accident and the poor outcome, and to make recommendations.

### Materials and methods

Case files of patients with eye injuries resulting from exploding pressurized or carbonated drinks during a 5-year period 1996-2001 were identified from the eye clinic emergency register, ward admissions register and theatre operations register of the Department of Ophthalmology, University College Hospital and Ojulowo Eye Hospital Ibadan were reviewed. Incoming patients were also recruited into the study. Information collected included, age, sex, occupation, duration of injury, activity leading to injury, cause of injury (glass or bottle cap), vision at presentation, type of injury, laterality, complication of injury, treatment given, type and timing of surgery, reason for delay if any, visual and ocular outcomes. Data obtained were analysed and studied.

### Results

A total of 16 eyes of 15 patients were studied. In all, 7 were males and 8 were females (ratio, 1:1.1). The age ranged from 3 years to 49 years, mean 23.6 years. Figure 1 shows details of the age/sex distribution of the 15 patients studied. Seven (46.7%) of the patients were students, others were

traders 4 (25%), factory workers 2 (12.5%), and automobile mechanics 2 (12.5).

The majority of the patients (75%) presented within 24 hours of the injury. The rest presented between 2 and 7 days. The range of drinks associated with the accident included, Coca-cola 8 (50%), unspecified lager beer 4 (25%), Fanta tonic 1 (6.25%), Mirinda 1 (6.25%), Legend Extra Stout 1 (6.25%) and none alcoholic wine 1 (6.25%).

The activities leading to the accident included, explosion while arranging the drinks 7 (43.8%), bottle accidentally fell from hand or height 6 (37.5%), attempt to open drink caused flying cap 2 (12.5%), and not recorded 1 (6.25%).

The cause of injury was due to bottle fragments in 11 (68.8%) of the cases and to bottle caps in 4 (25%). It was not stated in one case.

There were 2 main types of ocular injuries. Corneo-scleral laceration was found in 14 (87.5%) and contusion injury in 2 (12.5%) cases. Right and left eyes were equally represented.

The majority (75%) of the injured eyes required surgery. About 12.5% were managed conservatively in outpatient while 12.5% defaulted and could not have surgery for financial reasons. All those who had surgery had a repair of the corneoscleral laceration. Three eyes needed additional secondary operations; 2 for cataract extraction and 1 for cornea graft.

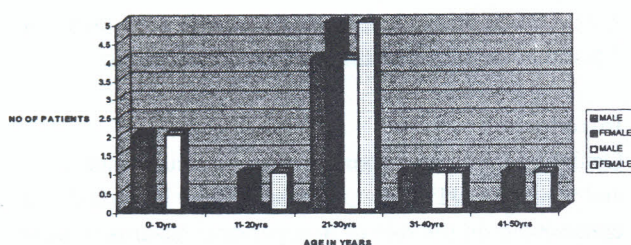
Timing of surgery varied from within 24 hours to 7 days of presentation. About 25% were operated within 24 hours while the rest were within 2-7 days of presentation. The reason for delay among 9 patients was financial constraint (55.5%), lack of theatre space (22%) and patient not being accompanied 12.5%. The reason was not stated in one case. The complications arising from the trauma are as shown in Table 1.

**Table 1:** Complications of pressurized bottled drinks related eye injuries.

Complication	No.	Percent
Hyphema	7	43.8
Cornea Opacity	7	43.8
Vitreous Haemorrhage	2	12.5
Retina Detachment	2	12.5
Macular Scar	1	6.25
Glaucoma	1	6.25

Twelve patients (75%) had retained globes, 1 (6.25%) eye became phthisical while the status of 3 (21.4%) could not be ascertained due to default by the patients. Three-quarters (75%) of the eyes at presentation had visual acuity of between 6/60 and light perception, 12.5% had 6/18 or better while 6.25% had no light perception.

**FIGURE 1: AGE/SEX DISTRIBUTION OF 15 PATIENTS WITH PRESSURIZED BOTTLE RELATED EYE INJURY**



**Fig. 1:** Age/sex distribution of 15 patients with pressurized bottle related eye injury.

The number of patients with postoperative visual acuity of 6/18 or better was 4 (25%); those with vision of between 6/24 and 6/60 was 2 (12.5%), 5 eyes (31.3%) had vision of between 6/60 and light perception while 1 (6.1%) did not have perception of light vision. Three patients (20%) were lost to follow up and could not have a final visual acuity assessment. Therefore 6 eyes had an improvement in visual acuity post-operatively.

### Discussion

Eye injuries arising from exploding pressurized bottled drinks are potentially very serious. Those affected are mostly children and young adults, the majority being students or traders. Traders and bottled drink factory workers are particularly at risk as an occupational hazard. A study reported from Kuwait also suggested a preponderance of these accidents in children and young adults [1].

The mechanism of injury from bottle fragments can be compared to that of high velocity flying objects in petrol bombs, pressure vessels [9] and exploding windscreen in road traffic accidents [6]. The bottles containing carbonated drinks have been said to be more hazardous than bottles filled with non-carbonated drinks (50% of our patients) because the internal pressure of the carbon dioxide (with or without agitation) may cause an explosion with high velocity flying glass fragments which easily penetrate the globe and adnexa [7,11]. There may be variation in the mechanism of the injury from the flying bottle cap which has been likened to that of the flying champagne cork [7], a contusion injury is more likely and may be associated with hyphema, vitreous haemorrhage and commotio retinae. This was the picture in two of the cases reviewed, one of which was complicated by a macular scar.

The seriousness of these accidents can be deduced from the need for surgery in all but 2 of the cases reviewed with 3 cases requiring additional surgery. Two of the patients also developed retinal detachment while one eye became phthisical. An earlier report from the United States showed the seriousness of these injuries with all 3 patients in a case report having corneal lacerations and traumatic cataract while one patient was left with an inoperable retinal detachment [12]. The relatively poor functional outcome with only 25% having normal vision of 6/18 or better and 50% of the eyes remaining visually impaired or blind can be attributed to the associated complications such as corneal opacity, vitreous hemorrhage, retinal detachment and macular scar associated with the injuries which were mostly penetrating. Delayed surgical treatment (for financial reasons in most cases) may also have a role to play in the poor visual outcome. In her report of visual loss in ocular trauma, Onabolu [1] identified perforating

eye injuries and late presentation as reasons for poor visual outcome. An earlier study in Nigeria [13] and a more recent study in Asia [16] also identified ocular perforation as a poor prognostic factor for eye injuries. Late presentation was however identified as a cause of poor visual outcome by a study from Lagos Nigeria [17]. A quarter of the patients who presented within 24 hours compared to a third of those who presented after 24 hours of injury had a final visual acuity of 6/18 or better suggesting that severity of injury as noted by some investigators [1,15] more than time of presentation was more associated with poor visual outcome. The final visual acuities were evenly distributed between those who were operated within 24 hours of presentation and those that were delayed beyond 24 hours except in one case in which surgery was delayed for 72 hours for financial reasons and had a final visual acuity of no perception of light due to total retinal detachment. Delayed presentation /surgical repair has been noted to be a factor for poor outcome because prolonged exposure of intra ocular contents is associated with an exaggeration of intra ocular inflammation as well as increased likelihood of microbial ocular infection [14].

A review of the activities leading to the injuries showed that in 43.8% of the cases, the victims had no direct control and the accident occurred due to the pressure build up within the drinks with movement as the bottles or crates were being arranged. A further 37.5% of the cases probably could have been prevented if greater care had been taken with handling since these occurred when the bottles dropped from somebody's hand or from a height. Factors which have been identified by previous studies [6,7] as contributing to these accidents in the past include, high ambient temperature, deliberate shaking of the drinks by children and adults to cause pressure build up and opening the drinks in an abnormal way. These accidents would probably have been prevented if the drinks had been canned rather than bottled. It is therefore recommended that manufacturers of bottled drinks consider canning or using plastic containers as an alternative to bottling to prevent these accidents. The amount of gas in Coca-cola should also be reduced to reduce the chance of pressure build up in high temperatures. In the interim, bottled drink factory workers, and traders should take greater care when handling pressurised bottled drinks. They may also need to wear protective goggles when arranging these drinks. Consumers also need to take greater care when handling drinks. They must use an opener and direct the drinks away from their face and other people's faces when opening. Bottled drinks manufacturers should include in their advertisement a warning against shaking the bottles and the danger of rough handling. Finally, there is the need for adequate public health education on the necessity of seeking prompt and

proper treatment when there is an eye injury. The Government also needs to institute the national health insurance scheme to cater for indigent patients.

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