

Traumatic dental injuries and associated factors in permanent incisors among 8 to 14 years old pupils in Ndola, Zambia

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Abstract

Background: Traumatic dental injuries in children are increasingly becoming a serious dental public health problem worldwide. Despite this fact, less attention has been directed to this problem compared to other common oral problems like dental caries.

Aims: To determine the prevalence, causes and correlates of traumatic dental injuries among grades 4 to 7 pupils in Ndola Urban.

Design: A cross-sectional study was conducted in May 2015.

Methods: Multistage sampling technique was adopted to select participants from 9 zones of Ndola District. Traumatic Dental Injuries (TDI) were classified according to modified Ellis classification. A pretested structured questionnaire was used to collect data on socio-demographic, prevalence, causes, treatment and consequences of trauma. Clinical examination was done using a mouth mirror under natural light. Epi Data version 3.1 was used for data entry while SPSS version 16.0 was used for data analysis. Chi-square test was used to determine correlates for TDI. P-value ≤ 0.05 was taken as significant.

Results: Out of 1570 children, 49 (3.1%) had TDI. Of the 49 children who had TDI, 44(89.9%) sustained one tooth injury. The most affected tooth was maxillary central incisors 47(95.9%) and class 1 was the commonest injury 35(71.4%). Most accidents occurred at home 31(63.3%) with the commonest cause implicated being playing sport (40.8%). None of the participants with TDI had received treatment following the injury at the time of examination.

Conclusion: Prevalence of traumatic dental injuries was low. None of the injured had been treated.

Key words: Traumatic dental injuries, prevalence, causes, permanent incisors

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Introduction

Traumatic Dental Injuries (TDI) among children has been associated with functional, aesthetic and psychological disturbances (1-3). Its prevalence among children has been reported to range between 4.1- 58.6% worldwide (4-16). However, reliable data on the prevalence and severity of TDI are still lacking in most countries, particularly in developing countries (17).

Socio-demographic characteristics such as sex and area of residence affect occurrence of these injuries among school going children. Studies have reported that more males than females are affected(2, 6, 10, 13, 16, 18) and the main etiological factors reported include falls, collisions, physical violence, sports, and traffic accidents(6, 10-11, 14-15, 19-20). Children residing in low socioeconomic areas tend to be affected more than their counterparts in high socioeconomic

counterparts (21-22). Maxillary incisors have been found to be more affected than mandibular incisors in most studies (4, 19, 23-25). The most reported injuries in are enamel fractures (6, 10, 19, 26-27) followed by enamel dentine fractures (18, 28-29) . Most studies have found a great proportion of pupils (more than 75%) with untreated traumatic dental injuries especially in developing countries(3, 10, 18, 24-25). Lack of adequate knowledge and motivation compounded by limitations due to socio-economic constraints could explain the high percentage of untreated injuries (19).

Despite children reporting to Arthur Davison Children Hospital with trauma to anterior teeth, our literature search did not come across any published data relating to these injuries in Ndola and Zambia at large. The study was therefore carried out in order to determine the prevalence of traumatic dental injuries to the permanent incisors and

associated factors among primary school children in Ndola, Zambia.

Methodology

A cross-sectional study was conducted among grade four to seven public primary school children in Ndola urban in May 2015. Ethical clearance was granted by Tropical Disease Research Centre and permission to conduct the study by the District Education Board of Copper belt Province. Parental consent was obtained through the head teachers of respective primary schools. A multistage sampling technique was adopted to select the children. The primary sampling unit consisted of nine zones (Zone 1 –9) of Ndola district. Within each zone, one school was randomly selected. In the second stage one class of grades 4-7 was randomly selected out of four classes in each grade. All children from the randomly selected classes were invited to participate in the study. The children were examined by a calibrated examiner (MU) in a classroom whilst lying on their backs facing natural light with their heads supported by a pillow on the examiners lap. Anterior teeth were cleaned and dried using a piece of sterile gauze. Injuries were classified according to the epidemiological classification given by Ellis and modified by Holland (30). Radiographic examination and pulp vitality tests were not performed. Only those affected by traumatic injuries were interviewed using a pretested structured questionnaire. The questionnaire collected information pertaining to socio-demographic data, prevalence, causes, treatment and consequences of trauma. Data entry was done using Epi data version 3.1 and analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0. Chi square test was used to determine the correlates for TDI. The cut off point for statistical significance was set at 5%.

Results

A total of 1570 primary school children participated in the study with a male to female ratio of 1.7:1. More than half of the children (59.4%) were in 8-11 age group and majority (76.3%) were residing in high density areas (Table 1).

Table 1 Distribution of study population by demographic characteristics

Demographic characteristics	Number	Percent
Sex		
Male	989	63.0
Female	581	37.0
Age(years)		
8-11	932	59.4
12-14	638	40.6
Grades		
4-5	927	59.0
6-7	643	41.0
Residential area		
High density	1198	76.3
Low/medium density	372	23.7

Out of 1 570 children 49 (3.1%) had sustained TDI and out of these none (0%) was taken to hospital. More than three quarters 44(89.8 %) of those found with TDI's had a fractured tooth and luxation was found in 18 (36.7%) of the respondents (Table 2).

Table 2 Distribution of study population by responses to specific questions related to TDI

Questions on TDI	Number	Percent
Have you ever sustained injury to teeth?		
• Yes	49	3.1
• No	1521	96.9
If yes, did the injury result into tooth fracture?		
• Yes	44	89.8
• No	5	10.2
Did any of your teeth become loose?		
• Yes	18	36.7
• No	30	61.2
• Don't remember	1	2.1
Did you miss school due to the said injury?		
• Yes	3	6.1
• No	46	93.9
Were you taken to hospital following injury?		
• Yes	0	0.0
• No	49	100.0

Most 44 (89.9%) children with TDI had one tooth affected and 47(95.9%) had injury to their maxillary central incisors. Class 1 was the commonest injury 35(71.4%) as shown in figure 1.

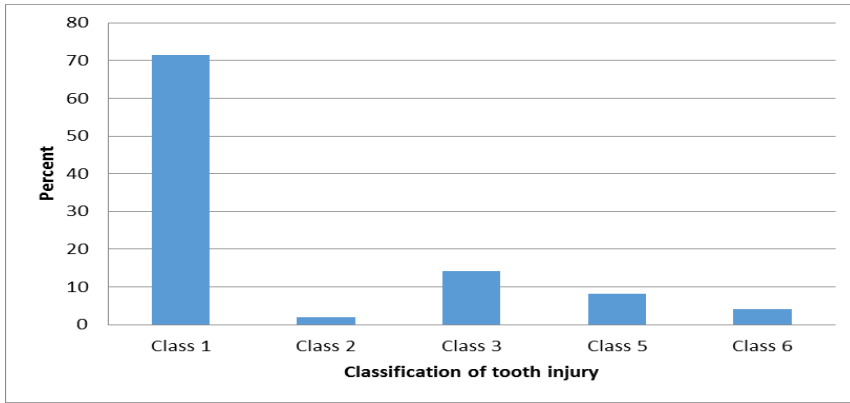


Figure 1 Percent distribution of TDI according to Elis classification as modified by Holl (1988)

Most of the TDI occurred at home 31(63.3%) as shown in figure 2. Figure 3 presents percentage distribution of TDI; playing was the most reported activity which resulted to TDI 20(40.8%).

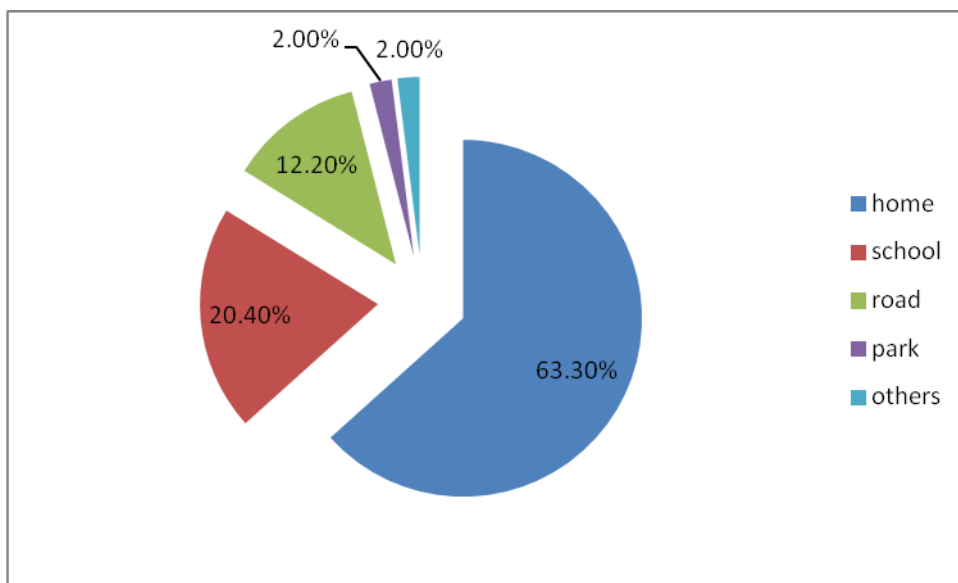


Figure 2 Percent distribution of TDI by place where injury occurred

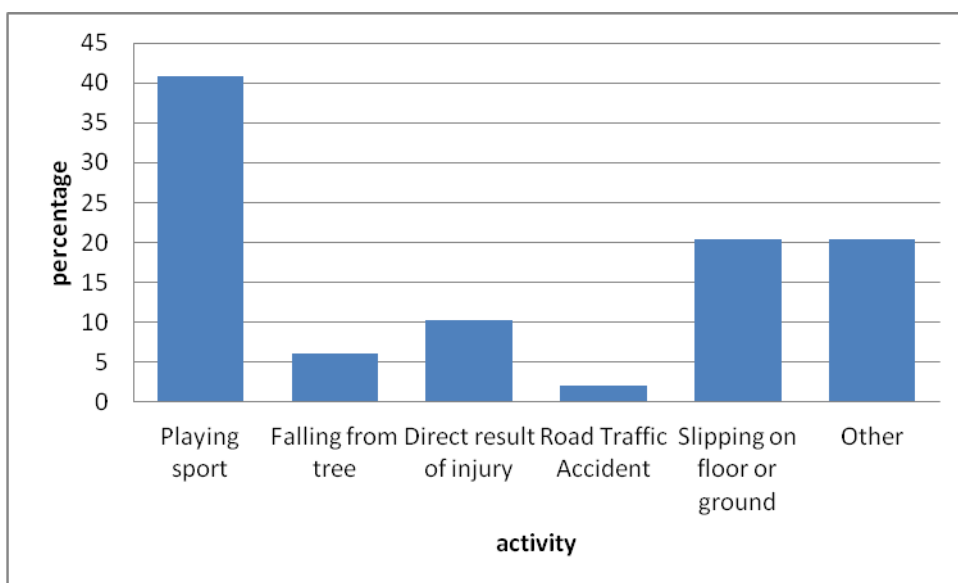


Figure 3 Percent distribution of TDI by cause of injury

The common consequence of trauma was the affected teeth becoming shorter 40(81%) as a result of fracture, (Figure 4).

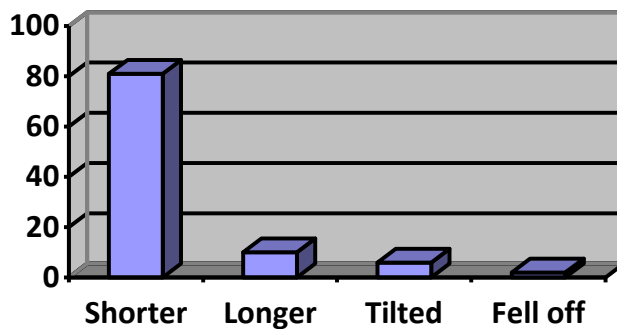


Figure 4 Percentages of reported outcomes of TDI

The difference of TDI by age was statistically significant ($p=0.0029$) whereby children aged 12-14 (4.7%) were more affected compared to the young ones (2.0%). There were no differences between sexes.

Larger proportions of older children (4.7%, $p=0.01$), higher grade (4.9%, $p<0.001$) and residents of low/medium density (6.7%, $p<0.001$) had sustained injuries than their counterparts (Table 3).

Table 3 Distribution of traumatic dental injury by socio demographics

Demographic characteristics	Traumatic dental injury		χ^2 -test	p-value
	Yes n (%)	No n (%)		
Age				
• 8-11	19(2.0)	913(98.0)	8.887	0.01
• 12-14	30(4.7)	608(95.3)		
Sex			0.0016	0.9688
• Male	31(3.1)	958(96.9)		
• Female	18(3.1)	563(96.9)		
Grade			12.402	0.001
• 4-5	17(1.8)	910(98.2)		
• 6-7	32(4.9)	611(95.1)		
Residence			20.889	0.001
• High density	24(2.0)	1174(98.0)		
• Low/medium density	25(6.7)	347(93.3)		

Discussion

A small proportion of the studied children were found to have sustained traumatic dental injuries. This finding is similar to those of studies done in India (9, 28) and Malaysia (25). It is contrary to the studies which reported higher prevalence of TDI both within (6, 11, 12) and outside Africa (5, 19, 21-22, 24, 26-27). There was no significant association between traumatic dental injury and sex contrary to findings from other countries (6, 11, 12).

Our finding revealed that most children who had sustained TDI had only one tooth affected. This was similar to findings reported in other studies (7, 13, 31). The most encountered traumatic dental

injuries were enamel fracture followed by enamel dentine fracture without pulp involvement. Our results are similar to those recorded in other countries (6, 10, 19, 27) but contrary to those of studies conducted in India (28) and East Iran (5). In these studies the most reported TDI were enamel dentine fracture with pulp exposure and luxation injury respectively.

Similar to other studies our findings reveal that most injuries occurred on the maxillary and maxillary central incisors were the most involved teeth. This is explained by the fact that maxillary incisors are anatomically placed anterior to mandibular incisors, therefore are the first to come into contact with blows (19).

Most accidents causing trauma to the teeth happened at home either due to playing activities or slipping. Probably pupils have less time for playing at school than at home hence less likely to get injured while at school. Similarly, studies done in India had reported home as the most common site for TDI (5, 19) but on the contrary, school was the common place of injury in Chile (31). An interesting finding was reported in Syria where violence was the main cause of TDI (32).

Majority reported their teeth to have become shorter following trauma. This indicates that a mere poor esthetic appearance does lead to seeking dental care among the studied children. This finding differs from that of De Carvalho Rocha and Cardoso (16) who reported the consequences of dental trauma to cause function, esthetic and psychological disturbances (16).

None of the children who sustained dental trauma to have had sought treatment may indicate lack of awareness on availability of treatment for such injuries. It may also mean that the society gives low priority to oral health issues. Children living with untreated dental trauma have been reported by other authors in a range of 11.8% – 97.7% (10, 13, 24-26, 28). Slightly different results were found in India, where 3.8% had received treatment (18).

Conclusion and recommendation: A small proportion of the studied children had sustained traumatic dental injuries. Most often, injuries occurred at home especially during playing. None had received treatment. Further studies to investigate the barriers to seek care following injuries are recommended.

References

1. Ilma de Souza Cortes M, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12–14-year-old children. *Community Dentistry and Oral Epidemiology*. 2002;30(3):193-8.
2. Traebert J, Peres MA, Blank V, Böell RdS, Pietruza JA. Prevalence of traumatic dental injury and associated factors among 12-year-old school children in Florianópolis, Brazil. *Dental traumatology*. 2003;19(1):15-8.
3. Fakhruddin KS, Lawrence HP, Kenny DJ, Locker D. Impact of treated and untreated dental injuries on the quality of life of Ontario school children. *Dental traumatology*. 2008;24(3):309-13.
4. Castro JCM, Poi WR, Manfrin TM, Zina LG. Analysis of the crown fractures and crown-root fractures due to dental trauma assisted by the Integrated Clinic from 1992 to 2002. *Dental traumatology*. 2005;21(3):121-6.
5. Rouhani A, Movahhed T, Ghodduzi J, Mohiti Y, Banihashemi E, Akbari M. Anterior Traumatic Dental Injuries in East Iranian School Children: Prevalence and Risk Factors. *Iranian endodontic journal*. 2015;10(1):35.
6. Lin H, Naidoo S. Causes and prevalence of traumatic injuries to the permanent incisors of school children aged 10-14 years in Maseru, Lesotho: scientific. *South African Dental Journal*. 2008;63(3):152-6.
7. Malikaew P, Watt RG, Sheiham A. Prevalence and factors associated with traumatic dental injuries (TDI) to anterior teeth of 11-13 year old Thai children. *Community dental health*. 2006;23(4):222.
8. Soriano EP, Caldas AdF, Carvalho MVDD, Amorim Filho HDA. Prevalence and risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dental traumatology*. 2007;23(4):232-40.
9. Aa J, MR J. Prevalence of dental health problems among school going children in rural Kerala. *J Indian soc pedo prev dent*. 2003;21(4):147-51.
10. Kahabuka FK, Plasschaert A, Van't Hof M. Prevalence of teeth with untreated dental trauma among nursery and primary school pupils in Dar es Salaam, Tanzania. *Dental traumatology*. 2001;17(3):109-13.
11. Oginni AO, Adekoya-Sofowora CA. Pulpal sequelae after trauma to anterior teeth among adult Nigerian dental patients. *BMC Oral Health*. 2007;7(1):11.
12. Kahabuka FK, Mugonzibwa EA. Risk factors for injuries to maxillary permanent incisors and upper lip among schoolchildren in Dar es Salaam, Tanzania. *International journal of paediatric dentistry*. 2009;19(2):148-54.
13. Marcenes W, Murray S. Social deprivation and traumatic dental injuries among 14-year-old schoolchildren in Newham, London. *Dental Traumatology*. 2001;17(1):17-21.
14. Otuyemi O. Traumatic anterior dental injuries related to incisor overjet and lip competence in 12-year-old Nigerian children. *International Journal of Paediatric Dentistry*. 1994;4(2):81-5.
15. Ankola AV, Hebbal M, Sharma R, Nayak SS. Traumatic dental injuries in primary school children of South India—a report from district-wide oral health survey. *Dental traumatology*. 2013;29(2):134-8.
16. De Carvalho Rocha MJ, Cardoso M. Traumatized permanent teeth in Brazilian children assisted at the Federal University of Santa Catarina, Brazil. *Dental traumatology*. 2001;17(6):245-9.

17. Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. *Bulletin of the World Health Organization*. 2005;83(9):661-9.
18. Chopra A, Lakhanpal M, Rao N, Gupta N, Vashisth S. Traumatic dental injuries among 12-15-year-old-school children in Panchkula. *Archives of trauma research*. 2014;3(1).
19. Patel M, Sujjan S. The prevalence of traumatic dental injuries to permanent anterior teeth and its relation with predisposing risk factors among 8-13 years school children of Vadodara city: An epidemiological study. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. 2012;30(2):151.
20. Nicolau B, Marcenés W, Sheiham A. Prevalence, causes and correlates of traumatic dental injuries among 13-year-olds in Brazil. *Dental traumatology*. 2001;17(5):209-13.
21. Soriano EP, Caldas AF, Góes PSA. Risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dental traumatology*. 2004;20(5):246-50.
22. De Frujeri M, Frujeri JA, Bezerra AC, Cortes MI, Junior ED. Socio-economic indicators and predisposing factors associated with traumatic dental injuries in schoolchildren at Brasilia, Brazil: a cross-sectional, population-based. *BMC oral health*. 2014;14(1):91.
23. Bastone EB, Freer TJ, McNamara JR. Epidemiology of dental trauma: a review of the literature. *Australian dental journal*. 2000;45(1):2-9.
24. Chen Z, Si Y, Gong Y, Wang JG, Liu JX, He Y, et al. Traumatic dental injuries among 8-to 12-year-old schoolchildren in Pinggu District, Beijing, China, during 2012. *Dental traumatology*. 2014;30(5):385-90.
25. Nik-Hussein NN. Traumatic injuries to anterior teeth among schoolchildren in Malaysia. *Dental Traumatology*. 2001;17(4):149-52.
26. Francisco SS, Pinheiro ET, Murrer RD, de Jesus SA. Prevalence of traumatic dental injuries and associated factors among Brazilian schoolchildren. *Oral health & preventive dentistry*. 2012;11(1):31-8.
27. Ravishankar TL, Kumar MA, Ramesh N, Chaitra TR. Prevalence of traumatic dental injuries to permanent incisors among 12-year-old school children in Davangere, South India. *Chin J Dent Res*. 2010;13(1):57-60.
28. Gupta S, Kumar-Jindal S, Bansal M, Singla A. Prevalence of traumatic dental injuries and role of incisal overjet and inadequate lip coverage as risk factors among 4-15 years old government school children in Baddi-Barotiwala Area, Himachal Pradesh, India. *Med Oral Patol Oral Cir Bucal*. 2011;16(7):e960-5.
29. Dua R, Sharma S. Prevalence, causes, and correlates of traumatic dental injuries among seven-to-twelve-year-old school children in Dera Bassi. *Contemporary clinical dentistry*. 2012;3(1):38.
30. Holland T, O'Mullane D, Clarkson J, O'Hickey S, Whelton H. Trauma to permanent teeth of children, aged 8, 12 and 15 years, in Ireland. *Journal of paediatric dentistry*. 1988;4(1):13.
31. Onetto J, Flores M, Garbarino M. Dental trauma in children and adolescents in Valparaiso, Chile. *Dental Traumatology*. 1994;10(5):223-7.
32. Marcenés W, Beirut NA, Tayfour D, Issa S. Epidemiology of traumatic injuries to the permanent incisors of 9–12-year-old school children in Damascus, Syria. *Dental Traumatology*. 1999;15(3):117-23.