Association between traumatic dental injuries (TDIs) and caries experience in a selected northern Nigerian population

Taiwo OO
Regional Centre for Oral Health Research and Training Initiatives for Africa, (RCORTI)
Jos,P. M. B. 2067 Jos, Plateau State, Nigeria

Email: taiwo25@yahoo.co.uk

Abstract

Objective: To determine the association between traumatic dental injuries (TDIs) and caries experience in a selected Nigerian population and the influence(s) of gender and location on this association.
Method: The sample size included 799 school children proportionately selected through multistage sampling technique. Caries experience (DMFT) and TDIs to the teeth were evaluated clinically by one examiner (intra-examiner reliability was 0.852 by Cronbach's Alpha test). The TDIs were classified according to the modified Ellis classification. Diagnosis of caries was at cavitation level. Analysis was by the use of SPSS v17.0.
Result: There were 450 (56.3%) males and 43.7% females. Subjects were aged 12 to 21 years (Mean 12.25 ± 0.93). About half (51.8%) were from the urban areas. Prevalence of TDIs and caries was 14.6% and 12.4% respectively. TDIs were more prevalent among males (P = 0.015, OR = 1.7, 95% CI = 1.103, 2.519), with enamel fracture (74.5%) being the commonest (74.5%) TDI seen. Dental caries was commoner in the rural areas (DMFT [ ] = 0.249, B = 0.029, 95% CI = -0.180, -0.009). There was no significant association between caries experience and TDIs (= 0.197, p = 0.944, 95% CI = -0.125, 0.117) and neither by gender nor location (P>0.05). The odds of having TDIs in those with dental caries was 1.04, 95% CI = 0.581, 1.885.
Conclusion: There was no association between TDIs and caries experience in the studied Nigerian population. Caries experience was more in the rural areas and being male was associated with a higher probability of having a traumatized tooth.

Key words: Dental caries, traumatic dental injuries, children,

Introduction

Dental caries is the most prevalent chronic disease among children worldwide. Most childhood tooth decay could be avoided through simple preventive measures such as screening, monitoring, combined use of fluorides, dental sealants and regular professional care [(1)]. While dental caries remains an important health issue among child populations and a significant source of disparity in oral health, increasing attention is being paid to other conditions affecting children. One of these is traumatic dental injuries (TDIs). These injuries range from minor fractures of the enamel to major damage involving the displacement or avulsion of teeth. They cause significant emotional and social costs to children and their families and constitute the most serious dental conditions experienced by children[(2)].
According to Glendor[(3)], there is a fourfold reason why traumatic dental injuries (TDIs) are a public dental health problem today. First is that trauma to the oral region occurs frequently and makes up 5% of all injuries for which people seek treatment in all dental clinics and hospitals in a country. Second, TDIs tend to occur at a young age during which growth and development takes place. Third, treating a TDI can often be complicated and expensive, frequently involving the participation of specialists in several disciplines. Fourth, a TDI is mostly irreversible and thus treatment would likely continue for the rest of the patient's life.
Having untreated fractured teeth had directly been related to the emotional state of children and their appearance. Children with fractured teeth experience difficulties with eating and enjoying food[(4,5)]. Although TDIs are not diseases; there had in the last decades been a dramatic increase in the number of research articles related to dental trauma among adolescents. This may indicate that TDIs has evolved into a major public health problem [(6)].
While traumatic dental injuries (TDIs) and dental caries had been extensively studied, a Medline search had shown that very few population based studies had been published relating the association between TDIs and dental caries. The three studies identified reported that children with trauma were more likely to have decayed teeth[(2, 7, 8)]. These studies were in Brazil(7) and Canada[(2, 8)]. Due to the limited information in this area, this study was therefore aimed at determining the association between Traumatic Dental Injuries (TDIs) and caries experience in Nigerian students and to ascertain the influence(s) of gender and location (urban and rural areas) on this association.

Materials and method

The sample size included 799 students from 36 public schools. They were proportionately selected through a multistage sampling technique from three states in the three geo-political zones of northern Nigeria. An interviewer administered questionnaire was used to collect data on demographic status, oral health practices, and causes of trauma and treatment history. An adapted form was used to record findings from oral examinations.

Oral examination was performed by an examiner. TDIs were scored using the modified version of Ellis classification[4]. Subjects were seated on a chair with a back rest and examined using plain mirrors and explorers under natural light. Examination was done within the school premises and during school hours. The examiner recorded the type of damage sustained, the tooth/teeth affected and treatment offered or not. The criteria and scoring for TDI is shown in **(Table 1).**

Diagnosis of caries was at cavitation level and recorded as the number of decayed (D), missing (due to caries) (M) and filled (F) teeth. Initial caries was not recorded. Students were considered to be caries free if they had a DMFT score of 0 and as having caries if they had a DMFT score greater than 0.

Ten percent of the students were re-examined at random to check for intra-examiner reliability. Intra-examiner reliability was 0.852 by Cronbach's Alpha test. Data entry and statistical analysis were carried out with SPSS for Windows version 17.0. Data analysis included descriptive statistics (frequency distribution and cross tabulation) and Student's t-test for independent samples. Statistical significance for differences was assessed using the chi-squared test, dichotomized logistic regression and Odds ratio. The level of significance was set at 5%.

Table 1. The modified Ellis classification, criteria and scoring for TDI

Code	Criteria	Description
0	No trauma	
1	Enamel fracture	Simple fracture of crown, enamel only; involving little or no dentine
2	Enamel and dentine fracture	Extensive fracture of the crown involving considerable dentine but with no pulp
3	Enamel and dentine fracture with pulp	Extensive fracture of the crown involving considerable dentine and exposing dental pulp
4	Non vital tooth with-discoloration	Traumatized tooth that is not vital, and is discoloured with or without loss of crown structure
5	Displacement	Extrusion, intrusion or lateral displacement
6	Total tooth loss	Absence of tooth due to complete ex-articulation
7	Fracture and restoration	Restored tooth with composite or crown following fracture of crown.

Result

There were 450 (56.3%) males and 349 (43.7%) females. aged 12 - 21 years. mean 12.25 ± 0.93 About half (51.8%) were from the urban areas. Prevalence of TDIs was 14.6%. Enamel fracture (74.5%) was the commonest type of TDI seen **(Table 2). Table 3** shows that TDIs were more prevalent among the males (P = 0.015, OR = 1.7, 95% CI = 1.103, 2.519). Prevalence of dental caries was 12.4%. Mean DMFT by gender was: 0.211 and 0.186 for males and females respectively. Caries experience was significantly higher (P = 0.029) in the rural areas **(Table 4).** A total of 160 teeth were either decayed or missing. The decayed teeth (122) accounted for 76.3% of this number. None of the students examined had received any restorative treatment on both the traumatized and decayed teeth. There was no significant association between caries experience and TDIs neither by gender nor location **(Table 5).** The odds of having TDIs in those with dental caries was 1.04, 95% CI = 0.581, 1.885.

Table 2. Frequency distribution of types of TDI in 117 subjects

Types of TDI	Frequency (%)*
Enamel fracture	108(74.5)
Enamel and dentine fracture	23(15.9)
Enamel and dentine fracture with pulp	5(3.4)
Non vital tooth with discoloration	4(2.8)
Total tooth loss	5(3.4)

*A total of 145 teeth were affected

Table 3. Frequency distribution of traumatic injuries in 799 Subjects by gender and location

	TDI [n (%)]	No TDI [n (%)]	Total [n (%)]	OR (95% CI)	p	Adjusted OR (95% CI)	p
Gender							
Male	78(17.3)	372(82.7)	450(56.3)	1.0	0.015	1.0	0.014
Female	39(11.2)	310(88.8)	349(43.7)	1.7 (1.103, 2.519)		1.7 (1.114, 2.555)	
Location							
Urban	62(15)	352(85)	414(51.8)	1.0	0.783	1.0	0.588
Rural	55(14.3)	330(85.7)	385(48.2)	1.1 (0.713, 1.565)		1.1 (0.750, 1.659)	
Total	**117(14.6)**	**682(85.4)**	**799(100)**				

Table 4. Frequency distribution of DMFT in 799 subjects by gender and location

Variable		[n (%)]	DMFT [x]	p	(95% CI)
Gender					
	Male	450(56.3)	0.211		
	Female	349(43.6)	0.186	0.571	(-0.061, 0.111)
Location					
	Urban	414(51.8)	0.155		
	Rural	385(48.2)	0.249	0.029	(-0.180, -0.009)
Total		**799**	**0.200**		

Table 5. Association between TDIs and DMFT in 799 subjects by gender and location

Variable	Trauma (n)Yes/No	DMFT[ ]	p	95% CI
Male	Yes (78)	0.192		
	No (372)	0.215	0.771	-0.177, 0.131
Female	Yes (39)	0.205		
	No (310)	0.184	0.835	-0.179, 0.222
Urban	Yes (62)	0.806		
	No (352)	0.168	0.218	-0.225, 0.051
Rural	Yes (55)	0.327		
	No (330)	0.236	0.378	-0.112, 0.293
Total	**Yes (117)**	**0.197**		
	No (682)	**0.201**	**0.944**	**-0.125, 0.117**

Discussion

This study did not show any significant association between traumatic dental injuries and dental caries experience in the studied population. The three studies reviewed reported otherwise, i.e. those with traumatic dental injuries had higher mean decayed, missing and filled teeth. Though the connection between the two variables is not clear, It was proposed that this association (apart from the possible influences of confounders) may reflect the fact that a subgroup of the children lived in environments or are prone to behaviours that place them at greater risk of multiple oral disorders[2, 7, 8].

The prevalence of TDIs in the studied population was 14.6%. This figure is higher than those previously reported in the western parts of Nigeria; 10.9% in Ile-Ife town[9] and 9.8% in Lagos[10]. These differences could be as a result of varying sampling techniques, diagnostic criteria, teeth involved (both studies were limited to anterior teeth while this study examined the whole dentition) and patterns of behaviour among the students. The 14.6% prevalence in our study is lower than that reported from findings in other parts of the world: 19.9%[11], 20.26%[12], 35%[13] and 58.6%[14]. These may also be due to the above mentioned reasons.

In most industrialized countries, the prevalence rates of dental caries and the mean dental caries experience in children have declined. Such changes are often ascribed to changing lifestyles, effective use of oral health services, implementation of school based oral health care programs, adoption of regular self care

practices and use of fluoride toothpaste[15]. This study gave the prevalence of dental caries to be 12.4% (DMFT = 0.200). This figure (0.200) is not consistent with previous studies in the western part of Nigeria 0.14 in Ile-Ife Town[16] and 0.72 in Lagos[17]. The former (0.14) being from a suburban student population while the latter is from an urban area. The dental caries prevalence of 12.4% in this study is far lower than for other parts of the world; 71.8% in Greece[18], 91.8% in Russia[19] and from 94.7% to 100% in Mexico[20]. The low caries status in this study may largely be attributed to the low socio-economic status of the population.

An important finding from this study is that none of the students with TDIs and caries have received any restorative care for the traumatized and carious teeth. The decayed component of the DMFT scores was the highest for both genders in this study and constituted the main part of the DMFT scores. Epidemiological studies had demonstrated that the treatment needs of TDIs are poorly met both in developing and rich developed countries[21]. The lack of treatment (in this study) maybe a result of ignorance of the availability of treatment options. This observation supports the statement that more than 90% of dentinal lesions in African countries are untreated[22]. Studies have attributed the low level of dental awareness in the African continent to ignorance, poverty and lack of education[23]. This is further compounded by the low capacity of oral health care workers and the lack of facilities needed for such care especially in the northern part of Nigeria where in some areas, the dentist to population ratio approximates 1: 950,000. Close to 80% of the dentists in Nigeria practice in the southern part of the country as most of the dental schools are. The located lack of treatment may also be due to nature of the injuries where most of the TDIs (74.5%) were slight injuries (enamel fractures). It may be that the children and the parents were not concerned about them since they are not disabling care.

There is a general consensus that boys have a higher risk of TDIs than girls[14,22,24]. This is because boys engage more in outdoor activities and sports than girls. Violence has also been suggested as a cause of more TDIs in boys[6]. Our study also shows that being male had a higher risk of having a traumatized tooth.

In conclusion, this study showed that there was no association between traumatic dental injuries and caries experience in the studied Nigerian population. Caries experience was more in the rural areas and being male was associated with a higher probability of having a traumatized tooth.

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