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Prevalence & risk-factors of traumatic dental injuries of anterior teeth among 11–15-year-old school going children in the district of East Medinipur, West Bengal, India.

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Abstract

Aims: The aim of this study was to determine the prevalence level & the risk factors of Traumatic Dental Injury (TDI) of school going children of Haldia, East Medinipur, West Bengal, India.

Settings and Design: A cross-sectional study was carried out among 11 to 15 years old school going children in Haldia city in private and public schools randomly.

Materials and Methods: A thorough case history and clinical examination were carried out on the full sample population. TDIs were recorded according to and reason's epidemiological classification of TDIs including World Health Organization codes.

Statistical Analysis Used: SPSS (Statistical Package for Social Sciences) Version 24.0 (IBM Corporation, Chicago, USA) was used.

Results: Male children were 2.383 times more probable for TDI than their counterpart. Children with inadequate

lip coverage were 4.549 times more probable for TDI than children with adequate lip coverage.

Conclusions: A "smile" is an inimitable asset that adds tremendously to one's personal self-esteem and social acceptance TDIs involving the anterior teeth lead to restriction in biting, phonetics, aesthetics and are further complicated by the enormous cost involved in their correction.

Keywords: Traumatic dental injuries, prevalence, risk factors.

Introduction

Traumatic injuries are the third largest cause for the mortality of teeth. With the so-called advanced civilized modes of teaching, children are more exposed to situations where trauma becomes a mandatory con sequence of involvement. During the school age, children actively indulging in outdoor play.

Though these activities are markers of growth and development of the child, but careless activities, loss of balance and impaired movements increase the possibility

of trauma. Dental trauma in addition to causing pain and loss of function has the potential for periapical squeal, which can adversely affect the development of the permanent teeth as well as the developing occlusion ^{1-2.}

Dental injuries to the deciduous teeth can result in problems to the underlying permanent teeth, such as hypoplasia, discoloration, and delay in eruption time, and tooth malformation 3 .

Along with pain and possible infection, the consequence of dental trauma includes alteration in physical appearance, speech defects, and emotional impacts; thus, affecting the child's quality of life ^{4-6.} Preschool children are more prone to TDI due to their poor stability, passive reflexes and indefinite movements ⁶⁻¹⁰.

Parents and home environment have a significant impact on the perception and attitude towards oral health among young children ^{11.} Delaying the treatment of the dental injuries in children are common in many Countries ¹²⁻¹⁵. This can be attributed to various factors such as short-lived primary dentition, memory bias, and lack of required attention because the child might not show any associated sign or symptom. Other determinants such as high cost, low standard of living and lack of knowledge also play a vital role ⁶.

Determining occurrence of trauma is the first step in providing prevention measures and programs. A significant number of oral and dental injuries result from participation in contact sports (sports in which children physically interact with each other, trying to prevent the opposing team or person from winning) and other organized sports ¹⁶. Children/students playing sports are not aware of the health implications of a traumatic injury to the mouth or of the potential for incurring severe head and oro-dental injuries while playing.

In a developing country like India, where economic constraints cannot be neglected, the need of knowledge

of health economics is even more important as a basis for judging health gain in curative and preventive care. Traumatic injuries to the anterior teeth among the young children are tragic but often an ignored problem. Children with injuries to their anterior teeth, and their concerned parents present a challenge for the dentist that is often unparalleled.

The dentist can play an imperative role in informing athletes, coaches and patients about the importance of preventing oro-dental injuries in sports. Most of the literature about occurrence of injuries is available from industrialized nations whereas from a developing country like India, data is scarce ¹⁶.

Materials and Methods:

The sample size was calculated based upon prevalence of the disease under study (Traumatic Dental Injuries = 10.7% in a study done by Gupta Met. Al^{17 in} 2016).

Sample Size Calculation Formula

 $N = Z^2 [P(1-P)] / E^2$

Were,

N = Sample Size

Z = level for confidence = 1.96 for 95% confidence (or confidence interval)

Z = 1.96

P = Estimated prevalence of the disease under study (Traumatic Dental Injuries = 10.7% in a study done by Gupta Met. al¹ in 2016). I.e., P=0.107

E = Permissible error = 1.6 % i.e., E = 0.016

 $N = (1.96 \times 1.96) [0.107 (1-0.107)] / (0.016 \times 0.016)$

- $= 3.84 \times 0.09555 / 0.000256$
- = 0.36669 / 0.000256
- = 1432.38

Sampling was done by stratified cluster method where the schools were selected randomly, stratification was done according to government and private schools, then a total of 7 schools (clusters) were selected, in which 4

government schools were selected using the simple random technique.

For selecting 3 private schools, private school near to the government school was chosen to obtain more representative sample. Total 1514 children were precipitated in this program.

- Study Area: East Medinipur, West Bengal, India.
- Study Period: 1.5 Year
- Sample Size: 1514

Armamentarium

- Mouth Mirror
- Community Probe
- 5.5 mm marked tooth pick

Inclusion criteria

• 11 to 15 years of school going children was chosen from the selected schools.

- Present at the day of examination.
- Subjects showing clinical evidence of trauma.
- Subjects who have received treatment for TDIs.
- Subject's parents who agreed to the participation of their children.

Exclusion criteria

- Primary teeth
- Special group children
- Supernumerary teeth
- Teeth with developmental defects
- Loss of teeth other than traumatic injuries
- Children with history of orthodontic treatment
- Children with all missing upper incisors.
- Subject's parents who did not agree to the participation of their children

Root fracture was not included in the study because radio graph was not included in the field study. A questionnaire was set to record sex, age, participation of sports and type of school. Also, we measured overjet, traumatic Dental Injury

(TDI), type of malocclusion.

Overjet was recorded by pre-marked sterilized wooden toothpick. History of dental trauma was also recorded with Andreasen's epidemiological classification (2004) including World Health Organization (WHO) codes ^{18.} Code 0: No injury.

Code 1: Treated dental injury.

Code 2: Enamel fracture only (N 502.50).

Code 3: Enamel/dentin fracture (N 502.51).

Code 4: Pulp injury (N 502.52, N 502.53, N 502.54, N 503.20, N 503.21).

Code 5: Missing tooth due to trauma (N 503.22).

Code 9: Excluded tooth.

Classification of malocclusion was classified according to Angle's classification and lip-closure competence was measured by using Jackson's method, which measures lip position at rest in relation to maxillary central incisors^{18.}

The children were examined on natural sunlight illumination seated on a normal chair with mouth mirror and a community probe and a type III examination (Dunning, 1986) was carried out ^{19.}

The survey was carried out by strict infection control measures.

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Variables				Variable	Ν	Present
Age (n=1514)	Mean	S.D.	Range	Place of TDI		
	12.35	1.18	11-15 Years	Home	35	20.3
Age Groups	n	%				
11 Years	487	32.2		School	64	37.2
12 Years	356	23.5		Road	10	5.8
13 Years	373	24.6		Others	9	5.2
14 Years	246	16.2		Don't remember	54	31.4
15 Years	52	3.4		Cause of TDI		
Sex				Fall	34	19.8
Male	779	51.5				
Female	735	48.5		Sports	53	30.8
Type of School				Collision	9	5.2
Private	619	40.9		Others (Road Accident, Assault)	6	3.5
Government	895	59.1		Don't remember	70	40.7

Table 1: Demographic details of the study population (n=1514)

Results

A total of 1514 children participated in the study. A total of 619 (40.9%) children were from private school and 895 (59.1%) from government school. A total of 172 (11.4%) subjects had experienced TDI.



Fig:1 Distribution of subjects according to traumatic dental injuries (n=1514)

 Table 2: Distribution of patients according to place and cause of TDI

Distribution of TDI among subjects categorized according to lip coverage

 $x^2 = 40.191; P < 0.001$

The chi-square test showed statistically significant differences (p<0.001) in proportions of TDI among subjects categorized according to lip coverage. More number of study participants with inadequate lip coverage had TDI [47 (25.1%)] compared to those with adequate lip coverage [125 (9.4%)].

Distribution of TDI among gender

 $x^2 = 36.927; P = < 0.001$

More males [126 (16.2%)] had TDI than females [46 (6.3%)].

Distribution of TDI among Age Group $x^2 = 8.316$; P = 0.081

The chi-square test did NOT show any statistically significant differences (p=0.081) in proportions of TDI among gender groups.

Distribution of TDI among subjects categorized according to overjet

 $x^2 = 0.039; P = 0.843$

NO statistically significant differences (p=0.843) was found in proportions of TDI among subjects categorized according to overjet.

Distribution of TDI among subjects with different types of malocclusions

The chi-square test showed statistically significant differences (p=0.002) in proportions of TDI among subjects with different types of malocclusions. More number of study participants with class I type I [37 (17.2%)] and Class I type II [11 (15.9%)] had TDI compared to other groups

Distribution of TDI among subjects categorized to active participation in sports

More number of study population who actively participated in sports had TDI [157 (13.0%)] compared to those who were not active in sports [15 (4.9%)].

Odds Ratio	95% C.I. of OR	P-Value
2.383	1.590-3.573	< 0.001
1		
1		
4.549	2.808-7.368	< 0.001
1.582	0.854-2.931	0.145
1		
	Odds Ratio 2.383 1 1 4.549 1.582 1	Odds Ratio 95% C.I. of OR 2.383 1.590-3.573 1

Class I	2.025	0.820-4.999	0.126
Class I Type I	2.511	0.973-6.480	0.057
Class I Type II	4.219	1.366-13.032	0.012
Class I Type III	0.946	0.245-3.652	0.936
Class II & Class III	1		

Malocclusion

Table 3: Logistic regression of the association between the variables studied and traumatic dental injuries in children (n=1514)

Male children were 2.383 (95% C.I. 1.590-3.573) times more probable for TDI than their counterpart (p<0.001). Children with inadequate lip coverage were 4.549 (95% C.I. 2.808-7.368) times more probable for TDI than children with adequate lip coverage (p<0.001). Active participation in sports did not show any association with TDI (p=0.145). Class I type II malocclusion children were 4.219 (95% C.I. 1.366-13.032) times more prone for TDI when compared to Class II & Class III malocclusion group (p=0.012).

Discussion

One of the main strategies of the oral health care delivery system is protection and maintenance of healthy teeth throughout life. Dental caries and periodontal disease are leading causes of tooth loss. Apart from this, tooth loss also occurs due to trauma, which may be caused by violence, accidents, falls and sport-related activities ^{20.} The increase in the levels of violence, the number of traffic accidents, the growing participation of children and adolescents in sporting activities, and the increase in the availability and access to leisure equipment with risk potentials have contributed towards transforming dental trauma into a public health problem ²¹. Traumatic dental injury (TDI) affects a large part of the younger population and may have physical, psycho logical and social impact ^{22.} and showing teeth

difficulties in 'eating and enjoying food', 'cleaning teeth', 'smiling, laughing associated without embarrass Ment', 'maintaining a normal emotional state without becoming irritable' and 'enjoying contact with people' than children with no traumatic injury²².

TDIs may occur at any point of time in an individual's life, but these are particularly common and unsolved problem among the schoolchildren throughout the world. TDI is not an end result of disease but an outcome of a number of factors that will accumulate throughout life if not appropriately treated. The trend in TDIs is not as clear and well documented as the trend in dental caries. In this current study, children were chosen between 11 to 15 years of age because in this age maximum physio logic growth and development occurred also the children are very much actively involved in outdoor sports. Especially school children can be chosen as an accessible natural group in this study. Both private and public school was chosen randomly in account to do so that represented the sample be more acceptable. Although TDIs can occur at any age, they were found to increase with age in children older than 10 years, having 3.96 times the TDI rate as children younger than 10 years. This is in concordance with other studies ^{23, 24}. As children approach maximum physical growth and development, they are increasingly involved in outdoor activities and contact sports²⁴. Moreover, the cumulative nature of TDI also supports this finding ^{23.}

In the present study 1514 school children were examined, 172 children had TDI giving the overall prevalence rate of 11.4%. This result was slight high to that found by Ajayi et al. (10.77%) and in Ibadan and Chopra et al. in Panchkula (10.2%). Lower prevalence rate than the present study was reported by Faus-Damiá et al (6%) Valencia, Spain, Chen et al. (7.1%) in Pinggu District, Beijing, China, and Azodo and Agbor (2%) in Cameroon.

The cause of TDI usually varies according to age gender, environment, and socioeconomic status of the children. In this study, though children answered "don't remember" when ask about the cause of TDI next two most common causes of traumatic injuries were "sports" followed by "fall" which was differ from the study of Ravishankar et al. Most of the incident occurred in the school (37.2%) followed by children could not tell the place of TDI (31.4%). From the current result it clearly showed that adequate lip coverage is a very important to TDI. Because graph no 10 shows that More number of study participants with inadequate lip coverage had TDI [47 (25.1%)] compared to those with adequate lip coverage [125 (9.4%)].

In our current study NO statistically significant differences (p=0.843) in proportions of TDI among subjects categorized according to overjet more than 5.5 mm but in some study they concluded that children with overjet of more than 5.5 mm were at 5.5 times more risk of getting dental trauma as compared to overjet <5.5 mm and children who had inadequate lip coverage were at 1.8 times more risk of getting dental trauma than who had adequate lip coverage ¹⁷. Majority of the TDIs were seen in children with overjet of <5.5 mm (72.4%) than those with a greater overjet of >5.5 mm (27.6%) as reported in previous studies by Ravishankar *et al* and Patel and Sujan ^{24.}

The "WHO Health Promoting Schools Program" offers a broad solution for dental trauma as a public health problem, where a "Health Promoting School" constantly strengthens its capacity as a healthy setting for living, learning, and working ²⁵.

Main limitations of the study were retrospective data collection and accuracy of patient's history.

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Summary & Conclusion

For the planning of the prevention of Traumatic Dental Injuries recognizing the risk factors and pattern will be extremely helpful. Thus, it is very important to ensure correct diagnosis, regular monitoring, and applying a preventive role in such TDIs of schoolchildren by public health dentistry and to aware the future consequence of untreated TDI cases to their parents to prevent further hamper the quality of the children's life.

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