

Traumatic Dental Injuries and Associated Risk Factors of Anterior Teeth in Eight to Thirteen Years (8-13yrs) Old School Children of Patna Bihar - A Prevalence Study

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ABSTRACT

Introduction: Anterior teeth trauma is a commonly encountered problem, which is an acute condition that requires emergency attention. Such injuries cause significant threat to dental health and significant economical consequences. Aim of this study was to assess the prevalence and risk factor associated with anterior teeth trauma in 2000 school children (8-13 years) in Patna, Bihar.

Material and methods: An epidemiological survey of 2000 school children aged eight to thirteen year (8-13 yrs) of both genders in different government/ municipal and private/ non-aided schools including both peri-urban and urban area was carried out from January 2014 to August 2014 in order to obtain the data regarding injuries to anterior teeth of permanent dentition.

Result: The over-all prevalence of traumatic dental injuries of permanent anterior teeth in Patna was observed to be 16.3% (326/2000). Boys were nearly 1.45 times more affected than girls. The most common cause of injury was fall (56.4%). Maxillary central incisors were the most commonly affected teeth (91.2%). Ellis class I (75.1%) was the predominant type of fracture and increased incisal overjet and incompetent lips are important predisposing factors

Conclusion: It was concluded that boys in the age group of 11-13 years with increased overjet and lip incompetency are the most common sufferers of such trauma.

Keywords: Traumatic dental injuries, prevalence, risk factor

INTRODUCTION

In this competitive era, children are unintentionally exposed to situations where Trauma is the unavoidable consequence. This may be due to the competitive and winning attitude of the child which may be forced or influenced by teachers, parents or peer group. Anterior teeth trauma not only causes alteration in physical appearance but also affects psychological well-being of the child as well as their parents. Various studies suggest that the dental trauma within the foreseeable future will probably exceed dental caries.¹ Review of literature suggests that it has increased significantly in the past few decades. Ellis² had given a prevalence of 4.2% in 1946 which had increased up to 58.6% in survey done by Marcenes³ in 2001 in Brazil. However, Trauma is always unpredictable but a proportion of injuries could be prevented if the risk factors are understood and public awareness is spread. Risk can be defined as probability of occurrence of the disease;⁴ hence knowledge of risk factors is essential for effective prevention. Studies have affirmed that traumatic dental injuries increases with increase in, incisal overjet and lip incompetency.⁵ Many studies have been carried out in India⁶⁻⁹ and Preva-

lence of traumatic permanent anterior teeth has been extensively documented in dental literature, but no such study has been reported of Patna, Bihar till date.

Patna is the capital and largest city of state of Bihar in India. The modern city of Patna is situated on the southern bank of river Ganges, It is the 5th fastest growing city in India. A 2012 survey found 1574 schools in Patna of these 78% were private and 21% government school.

Objectives of the research were to obtain epidemiological data concerning to prevalence of traumatic dental injury to permanent anterior teeth among school children aged eight to thirteen years(8-13 yrs) equally distributed among private / non-aided and municipal/government school in urban and peri-urban area and to record the associated predisposing factors Such as age, sex, socio-economic status, incisal overjet, lip competency.

MATERIAL AND METHODS

An epidemiological survey of school children was undertaken from January 2014 to August 2014 in order to obtain the data regarding injuries to anterior teeth of permanent dentition.

The survey was carried out on school children aged eight to thirteen year (8-13 yrs) of both genders in different government/ municipal and private/non-aided schools including both peri-urban and urban areas of Patna. Required sample size of 2000 children was determined using the following formula: $n = z^2 \{p(1-p)\} / e^2$

where n= sample size, z= critical value at a specified level of confidence, p= sample proportion, e= difference between sample proportion and population proportion

The schools were selected randomly on the basis of location, and care was taken to include government/ municipal schools as well as private / non aided schools of urban and peri-urban area. All students of that particular school aged

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Age Group	Male			Female			Grand Total
	Low	High	Total	Low	High	Total	
8-10	7	32	39	9	17	26	65
11-13	94	60	154	59	48	107	261
Total	101	92	193	68	65	133	326

Distribution of traumatic cases by sex and according to their socio-economic status does not vary significantly in different age groups however low socio economic group suffered more traumas. (Chi-square = 2.335, p=0.906, p > 0.05).

Table-1: Distribution of traumatic cases according to socio-economic status, age and sex

Cause	Sex		Total
	Male	Female	
Fall	100	84	184
Push-Play	26	32	58
Sports	21	3	24
RTA	9	4	13
Bite-Hard	00	7	7
Don't Know	37	3	40
Total	193	133	326

The most common cause of injury was fall (56.4%-184/326) and the least common cause was trauma due to bite on hard surface (2.1%-7/326)

Table-2: Distribution according to sex and cause

eight to thirteen years (8-13 yrs) of both genders were included in the study. Children studying in municipal/government schools were considered of low socio-economic status, where as those in private were taken as high socio economic status. The children were further divided into two sub-groups according to age -

- i. 8-10 years
- ii. 11-13 years

The chronological age of the patient was determined by the history taken from the children or class teacher.

The children were examined in each school by single examiner, under natural lighting, with a visual and digital examination, with the aid of a mouth mirror and probe. The dental examination for traumatic injuries included only upper and lower permanent anterior teeth.

A general screening was done by asking questions regarding history and cause of trauma. The trauma assessment form which was specifically designed for this study had questions concerning name, age, sex, name of the school, lip competency, incisal overjet, and cause of injury. A tooth was considered fractured, when a part of its surface was missing as a result of trauma and there was no evidence of caries. Types of anterior teeth injuries were classified according to Ellis Classification² (1960). Class IV injury was judge by visual examination only, that is, when tooth was discoloured it was considered class IV. Class VI injury that is fracture of root- with or without loss of crown structure was also not included- as radiographs were not taken during school survey. Class IX injury i.e., traumatic injuries to deciduous teeth were not included as children were eight to thirteen years (8 -13 years) of age and permanent incisors had erupted.

Lip competency was judged without the subject being aware of it, and when the teeth were at rest. Incisal overjet was measured with metallic scale by measuring the horizontal distance between the incisal edge of upper central incisor and labial surface of lower central incisor, when the child

closed his teeth in centric occlusion.

STATISTICAL ANALYSIS

The statistical tests that are applied to analyze the significance of parameter used in the study are -

1. Chi- Square Test- the computed value of chi-square is compared with the critical values of chi-square with corresponding degree of freedom. If p > 0.05, it was treated as not significant.
2. Z test: It is used to test the equality of two proportions. ‘Z’ value thus computed is compared with the critical value of the S.N.D (Standard Normal Deviate) to determine statistical significance.

RESULTS

A total of 2000 schoolchildren between the age group of 8-13 years were examined in this study, of which 1065 were male and 935 were female. The over-all prevalence of traumatic dental injuries of permanent anterior teeth in Patna was observed to be 16.3% (326/2000). Of these 18.1% (193/1065) were male and 14.2% (133/935) were female (Table-1). Out of 326 injuries 80% (261/326) were in the age group of eleven to thirteen years (11-13 years). (Table-2)

Of the total 2000 school children 1023 were from private school and 977 were from municipal school. Socio-economic status of the child was decided according to the school of that child. More children from low socioeconomic group 17.3% (169/977) i.e. children studying in government/ municipal school were affected as compared to high socio-economic group 15.3% (157/1023) i.e. children studying in private school, but statistically it is not found to be significant (Table 2).

515 anterior teeth were injured in 326 subjects. Maxillary central incisors were the most frequently affected teeth (91.2%), and in most of the cases it was single tooth injury (262 cases). In 326 children who had suffered traumatic anterior teeth fracture, Type I was the most common form of injuries (75.1%-245/326), followed by type II (18.1%-59/326). The least common type was type VII (0.3%-1/326) i.e. displacement injury. The most common cause of injury was fall (56.4%-184/326) and the least common cause was trauma due to bite on hard surface (2.1%-7/326). Cause of injury was significantly related to occurrence of trauma.

51.5% (168/326) of the school children who have suffered trauma were with incompetent lips in comparison to 48.5% (158/326) of competent lips. But when compared to non traumatic group 66.6% (168/252) of the children with incompetent lips have suffered trauma in contrast to 9.0 % (158/1748) of the children who have competent lips but have suffered dental trauma.

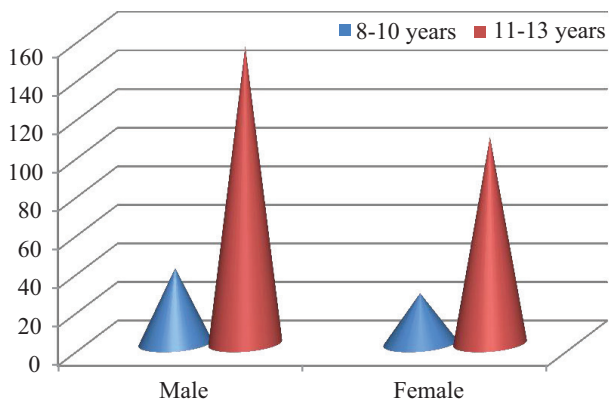


Figure-1: Distribution of Traumatic Injuries according to Age and Sex of Children

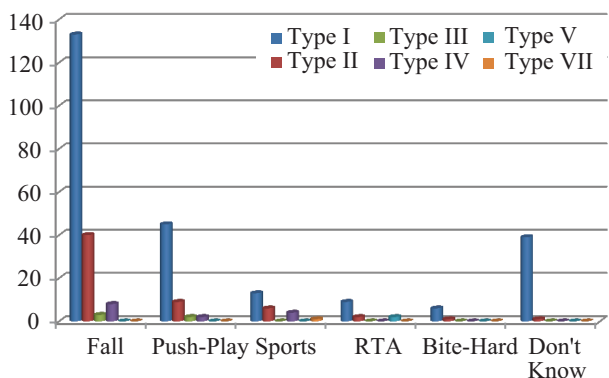


Figure-2: Distribution of Cases According to type of Fracture and Causes of Injury

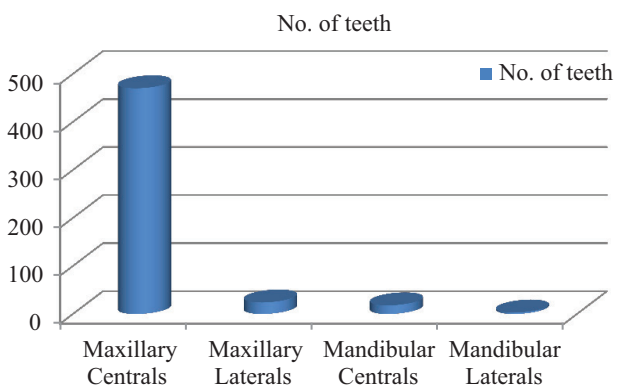


Figure-3: Frequency Distribution of Traumatic Cases According to Type of Teeth

Maximum numbers of patients who have suffered trauma were with normal overjet (72.4%-236/326). But when it was compared with non traumatic group, 30% (70/234) of increased overjet and 28% (12/43) of open bite cases have suffered traumatic dental injuries in comparison to 15% (236/1584) of the subject having normal overjet. Thus overjet was significantly related to traumatic dental injury.

DISCUSSION

A prevalence rate of 16.3% was obtained in 2000 school going children. In a prevalence study of dental injuries to the permanent incisors in Mohali, India, Dua and Sharma (2002)⁶ had observed the prevalence of 14.5%. This figure was compared with other Indian studies⁷⁻⁹ conducted by, S Chandra (1976 - 1.69%), S Rai (1998 - 5.29%), K. Gupta

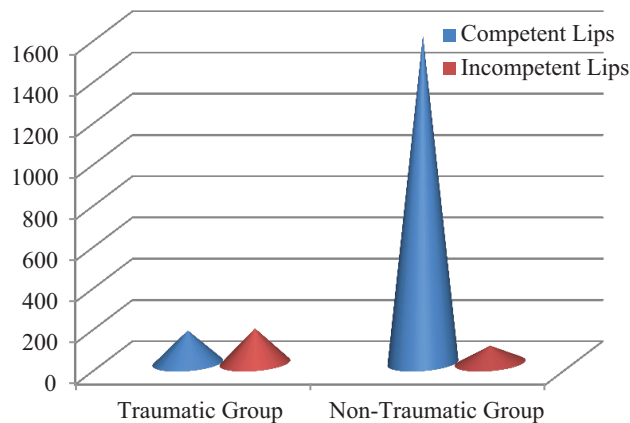


Figure-4: Overall Distribution of Cases According to Lip Competency

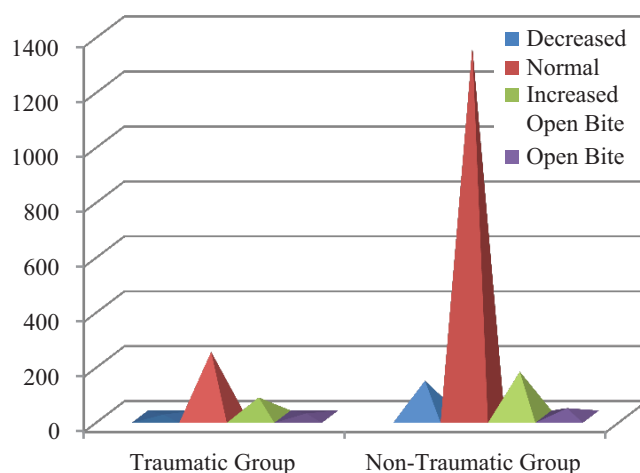


Figure-5: Overall Distribution of Cases According to Incisal Overbite

(2002- 13.80%). The present study carried out in 2014 shows still higher percentage of prevalence (16.3%) as compared to other Indian studies done in previous years; the data taken together suggest that prevalence of traumatic dental injury is increasing progressively in all parts of the world including India.

This study identified that more number of boys in the age group of eleven to thirteen years (11-13 years) suffered traumatic dental injuries than girls, boys: girl's ratio being 1.45:1. Statistical analysis further confirmed that boys are more prone to traumatic injury than girls. The fact that boys in the age group of eleven to thirteen years (11-13 years) suffer more dental injuries than girls can be explained on the basis of behaviour and cultural factor. Boys are more aggressive and more actively engaged in contact sports, thus they are more exposed to situations of traumatic injuries as compared to girls. Girls in Indian society relatively stay more at home and are not much exposed to external environment where trauma occurs more frequently. The study is consistent with the studies of, Grimm S (2004- 1.58:1)¹⁰ and Alonge (2001-1.45:1).¹¹ Of the total injuries, nearly 80% of the children were in eleven and thirteen years (11-13 years) of age group, while the younger age group of eight to ten years (8-10 years) suffer far less injuries (20%). In a study conducted by Cortes (2001)¹² the prevalence of traumatic injuries to permanent incisors was 8% at the age of nine years and

reached 16.1% at the age of fourteen years. Cortes (2001) has suggested that the fact that the prevalence of dental injury increases with age did not mean that the older children were more vulnerable, but due to characteristics of the study; the measurement of dental injuries is cumulative.

In this study school children from low socioeconomic status represented by municipal/government school suffered slightly more traumatic injuries (51.8%) as compared to those of private school (48.2%), which represents high socioeconomic status. This study concurs with the observations of Marcenes and Murray (2001)¹³ who showed that prevalence of dental trauma was higher in Newham (23.7%), the poorest socio-economic area of London, than in other areas of U.K. Among different type of tooth injuries (according to Ellis classification- 1960) it was found in the present study that type I fracture (i.e. fracture of enamel) is most prevalent (75.2%). Type I fracture is predominantly associated with all the causes of injury, namely fall, push, sports injury, RTA, and biting hard object. Nearly 97.5% of the children who responded as don't know had suffered from type I fracture only. The second most frequent type of fracture is type II (18.1%). The above findings are consistent with the findings of Al-majed (2001).¹⁴ Type III fracture (1.5%) was found to be associated with fall and push, while Type IV fracture (4%) was associated with fall, push and sports injury. Out of total sports injuries reported in the present study 54.2% (13/24) were of type I whereas 16.7% (4/24) were type IV fractures. Hayrinen-Immonen (1990)¹⁵ in a six year follow-up study of sport related traumatic injuries found that major percentage of teeth, which were initially diagnosed as uncomplicated crown fracture, had become non vital or showed sign of pathology in follow-up. In the present study, Type V fracture (0.61%) (Loss of tooth due to trauma) had occurred due to road and traffic accident, may be because road and traffic accident cases involve greater impact of energy, and causes dislodgement of teeth/tooth along with associated injuries of soft tissue and hard tissue.¹⁶

One case of Type VII fracture (0.3%) (Displacement of tooth with or without crown fracture) was found due to sports injury. No type VIII injury was observed in this survey. This result was very much similar to the study of Rai and Munshi of India (1998).⁸ One of the interesting finding of this study was that more number of girls suffer injury from push injury of which trauma from hand pump present in government school were the main cause.

In this study, 51.8% of traumatized children had incompetent lips. Compared to non-trauma group this factor was highly significant. These results are in concurrence with Marcenes (2001)³, who had found similar results with 64.8% of traumatized children having inadequate lip coverage when compared to non trauma group.

Ghose (1980)¹⁷ found that most of the traumatized children had normal overjet and adequate lip coverage. However when accident happens with inadequate lip coverage, it results in more severe form of injury and greater tooth loss. O'Mullane (1973)¹⁸ had expressed that inadequate lip coverage decreases with age and therefore its role as a predisposing factor to injuries to permanent teeth tends to become masked with age. In the present study, no significant differ-

ence between competency and incompetency of lips was found within traumatic group, which could be explained on the basis of above mentioned study.

Increased overjet denotes more anterior positioning of anterior teeth. Anterior open bite results in lips incompetency which further increases the chance of anterior teeth trauma. In this study incisal overjet was significantly associated with anterior teeth injury when compared to the non traumatic group. However, majority of the children had normal overjet of 2-3mm. It is in accordance with the study of EP Soriano (2007).¹⁶

When number of teeth injured in individual patient is considered, our present study identified that single tooth injury accounts for 80% of total teeth injury followed by 18% of two teeth injury. Maxillary central incisor involves 91%, whereas Mandibular lateral incisor accounts least number of 0.6% of total teeth injury. The obvious cause is that maxillary incisors are anatomically labial to mandibular teeth. Present result is in accordance with the result obtained by Alonge (2001)¹¹ in a prevalence study of fractured incisors among 1039 school children in Harris County, Texas.

Despite its increasing prevalence, it is not clear why more emphasis is not placed on trauma prevention. Awareness of preventive measure can avoid many serious consequences. Hence the awareness of dental trauma, its management and prevention among parents, teachers and children at critical age is very important. A general interaction with the school teachers and children suggested that knowledge of teachers about trauma prevention was very poor. This study was aimed not only to know the prevalence but attempted to create an awareness amongst the student and school teachers regarding the effects and the importance of treating and preventing anterior teeth trauma. It also included the description of importance of mouth guards and helmets and appropriate storage and transportation of avulsed tooth.

CONCLUSION

From this study, we found that boys are nearly 1.45 times more affected than girls, and that 11-14 year of age group is more susceptible to dental injury. School children from municipal school i.e. children from low socio-economic group were slightly more involved as compared to the children of private school i.e. high socio-economic status.

Children with increased overjet and with incompetent lips were found to be more prone to injuries to the anterior teeth, and when all the anterior teeth were considered, maxillary central incisors were most commonly affected. Also, single tooth trauma was the commonest of all types of anterior teeth injury, Ellis class I being the predominant type of fracture.

It is within the scope of pediatric dentistry to educate public about, how to prevent or minimize oral trauma. An educational campaign in school and institution is needed to improve the knowledge of trauma prevention and its early treatment. Knowledge of prevention against traumatic dental injury can prevent physical and psychological trauma and instill a positive attitude in child, which is the ultimate goal of pediatric dentistry.

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