ASSOCIATION BETWEEN TRAUMATIC DENTAL INJURY, SOCIO-ECONOMIC FACTORS AND CLINICAL PREDISPOSING FACTORS — A SURVEY

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ABSTRACT

An investigation was carried out to understand the association between Traumatic Dental Injuries (TDI), socio-economic factors and clinical predisposing factors such as overjet and lip coverage in 14 year old children of East London.

The cross-sectional survey used data that was previously collected by a PCT in East London. 589 fourteen year old school children were included in the sample. One dentist carried out all dental examinations and recorded TDI to upper and lower incisors, size of overjet and lip coverage. The clinical examination was followed by the completion of a questionnaire by the participants which included information regarding the cause of the TDI. Socio economic factors such as living conditions, levels of education and family income were also assessed in the questionnaire for the association with TDI.

Data analysis was done using SPSS version 12.0 and included descriptive statistics such as frequency distribution and cross-tabulation.

The results of the chi-square analysis demonstrated TDI to be strongly associated with increased overjet and lip coverage. A child with increased overjet of more than 5mm was also found more likely to have TDI (42.7%) (P<0.001) as with inadequate lip coverage (36.1%) (P=0.001). Socio-economic factors that included level of mother's education schooling / education (P=0.793) as well as the father's (P=0.858) and free school meals (P=0.809) were found to be insignificant and not related to TDI in children.

These results bring us to the conclusion that traumatic dental injuries are associated more with clinical predisposing factors such as increased overjet and lip coverage than the socio-economic factors.

Key words: *Traumatic dental injuries, Dental trauma, overjet, Socio-economic status, lip-coverage.*

INTRODUCTION

Quality of life is an important factor in children's well being and health. When certain conditions have an impact on the quality of life of children, it tends to become a public health problem.[1] The same is factual for Traumatic Dental Injuries (TDI). Anterior teeth are most commonly involved in dental trauma and this usually leads to restriction in biting, difficulty in speaking clearly, and feeling embarrassed to show the teeth.[2,3]

A deep association is present between TDI and clinical predisposing factors such as overjet and lip incompetence. It is now strongly believed that increased overjet is linked to the increased prevalence of TDI although, surveys have shown no association between the two.[4,5,6] Being an important predictor of TDI, children with inadequate lip coverage are found to be at a greater risk of TDI, regardless of their overjet size.[7,8] The reason for this could be the exposure of the incisors to any external force. Here, it is also interesting to note that increased overjet and inadequate lip coverage of the maxillary incisors do not fully predict the likelihood of TDI.[9,10,11]

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Apart from the clinical predisposing factors, it is generally believed that socio economic factors such as living conditions, levels of education and family income affect the incidence of TDI. Studies have found that living in an overcrowded household and being in a non-nuclear family having a high level of paternal punishment were associated with TDI.[12] Children from parents with higher levels of schooling/education have also exhibited higher levels of TDI.[13] However, some have found parents' education level, schooling, employment status, or family income to have a statistically non-significant association with TDI.[14] It is therefore, relevant to understand the exact association of TDI with socioeconomic factors as well as predisposing factors so that future incidences of TDI in children can be restrained.

MATERIALS AND METHODS

A cross-sectional survey design was adopted to investigate the association of TDI, socio-economic factors and clinical predisposing factors such as overjet size and lip coverage in school going 14 year old children in East London. Sample selection followed the BASCD (British Association for the Study of Community Dentistry) protocol. The minimum sample size was estimated to be 750.

Data collection was carried out by a clinical examination followed by an interview. Children were examined at school during class hours. Lip coverage, incisal overjet and presence or absence of dental trauma to all permanent incisors was recorded for each subject. Diagnostic criteria for assessing TDI, overjet and lip coverage were used. The information was entered into the dental examination forms.

The visual dental examination only included TDI to the upper and lower permanent incisors using the criteria adopted in the Children's Dental Health Survey in the UK. The presence or absence of damage to all permanent incisors was recorded as 'yes' or 'no'. The CPITN probe was used to detect damaged teeth that had been restored with composite restorations. The CPITN probe was also used for measuring the incisal overjet. The back line on CPITN probe was used to demarcate between normal and increased overjet during centric occlusion. The tip of the probe was held against the labial surface of the lower incisor parallel to the occlusal plane and the overjet was measured to the most prominent labio-incisal edge of the corresponding upper incisor. The incisor overjet was measured for each upper central and lateral permanent incisor in the same way and the greatest overjet was recorded. Reverse overjet and anterior open bites were recorded but not measured. The incisal overjet was recorded as being equal or less than 5 mm (normal) or greater than 5 mm (increased).

Lip coverage was defined as adequate or inadequate depending whether the lips covered the incisor teeth at rest or not.[15] It was assessed while the subject was not conscious of being observed.

Every tenth subject was re-examined during the clinical examination and the duplicated clinical measurements were recorded.

Following the clinical examination, participants were interviewed using a questionnaire. The questions included information about gender, age, family structure, entitlement to free school meals, family structure, parents' employment status, occupation, level of education and information regarding how, when and where the traumatic dental injuries occurred.

Data was entered into a computer and analysis was done using the SPSS package (version 12.0). Data analysis included descriptive statistics such as frequency distribution and cross-tabulation. Statistical significance for the association between the explanatory and dependent variables was assessed carrying out Chi-square statistical test. The level of significance was set at 5%.

RESULTS

The final sample size was 589 and was smaller than the estimated number (750). A reason for the decrease in the sample size was the negative consent, children absent from school on the day of the study as well as children being excluded from the study due to the exclusion criteria. The response rate was 78.5%.

Majority of the children had an overjet of up to 5mm (82.5%) and the percentage of inadequate lip coverage was 28.7%. TDI was present in 26.8% of the children (Table 1). Majority of either their fathers (2.7%) or mothers (22.8%). The percentage of children eligible for free school meals was (32.1%) (Table 2) Fathers and mothers of children were observed to have

similar education level of up to sixteen years (55%) (Table 3).

The distribution of TDI by overjet in children having an overjet of more than 5mm was 42.7% (P=0.038) while it was 23.5% in children with an overjet of up to or equal to 5mm. Lip coverage was adequate for only 23.2% children (P=0.001). Free school meals (P=0.809), level of mother's schooling/education (P=0.793) as well as the father's (P=0.858) was not significantly associated with the children's TDI (Table 4).

TABLE 1: FREQUENCY DISTRIBUTION OF TDI, OVERJET AND LIP COVERAGE IN 14 YEAR OLD CHILDREN IN NEWHAM (n=589)

Variable	Frequency (n)	Valid Frequency (%)
Overjet		
Up to 5mm	485	82.5
More than 5mm	103	17.5
Missing	1	
Lip coverage		
Adequate	419	71.3
Inadequate	169	28.7
Missing	1	
Traumatic dental injuries		
No injury	431	73.2
Injury present	158	26.8

TABLE 2: FREQUENCY DISTRIBUTION OF LIVING ARRANGEMENTS AND FREE SCHOOL MEALS IN 14 YEAR OLD CHILDREN IN NEWHAM (n=589)

Variable	Frequency (n)	Valid Frequency (%)
Living arrangements		
Both parents living together	386	65.6
Mother and her male partner	21	3.6
Father and his female partner	2	0.3
Mother only	134	22.8
Father only	16	2.7
Other	29	4.9
Missing value	1	—
Free school meals		
Free school meal	189	32.1
Paid school meal	160	27.2
Packed lunch/others	239	40.6
Missing value	1	—

TABLE 3: FREQUENCY DISTRIBUTION OF THE CHILDREN'S PARENTS SCHOOLING IN NEWHAM

Variable	Frequency (n)	Valid Frequency (%)
Father's schooling		
Up to 16 years	215	55.6
> 16 years	172	44.4
Missing value	202	
Mother's schooling		
Up to 16 years	274	55.7
> 16 years	218	44.3
Missing value	97	

TABLE 4: FREQUENCY DISTRIBUTION OF TDI TO PERMANENT TEETH IN A SAMPLE OF 589, 14 YEAR OLD SCHOOL CHILDREN BY GENDER, OVERJET, LIP COVERAGE, FREE SCHOOL MEALS, FATHER'S SCHOOLING AND MOTHER'S SCHOOLING (n=589)

	Dental Injury n (%)	No dental injury n (%)	P-value for chi-square test
Overjet size			
< 5mm			
> 5mm	114 (23.5)	371 (76.5)	
All	44 (42.7)	59 (57.3)	< 0.001
Lip coverage	158 (26.9)	430 (73.1)	
Adequate			
Inadequate	97 (23.2)	322 (76.8)	
All	61 (36.1)	108 (63.9)	0.001
Free school meals	158 (26.9)	430 (73.1)	
Provided			
Not provided	106 (26.6)	293 (73.4)	
All	52 (27.5)	137 (72.5)	0.809
Father's schooling	158 (26.9)	430 (73.1)	
Up to 16 years			
> 16 years	57 (26.5)	158 (73.5)	
All	47 (27.3)	125 (72.7)	0.858
Mother's schooling	104 (26.9)	283 (73.1)	
Up to 16 years			
> 16 years	75 (27.4)	199 (72.6)	
All	62 (28.4)	156 (71.6)	0.793
	137 (27.8)	355 (72.2)	

DISCUSSION

This survey gave the conclusion that increased size of overjet means increased occurrence of TDI. This is similar to other findings and a few other studies.[4,5] Inadequate lip coverage was found to be an important predictor of increased occurrence of TDI in children and this has been consistent for almost a decade.

Conflicting results were observed in the association between socio-economic factors and TDI. While some studies have shown socio-economic factors to be associated with a high prevalence of TDI, others have demonstrated that these factors are not related. For example, TDI has been shown to be higher in the low socio economic group as compared with the middle and upper socio-economic groups.[8,19] Conversely, Brazilian children from higher socio-economic groups have been found to have greater odds of incisor trauma than children from lower socio-economic groups.[3] The contradictory findings suggest that the interaction between individual socio-economic status and physical environment may play a role on the occurrence of TDI.[9]

Hence, confirmation is achieved with this investigation that there is a strong association of TDI with increased overjet size, not to mention inadequate lip coverage. Consequently, measures should be taken at a large scale, especially at schools for prevention of TDI in children. Provision of a protective and supportive environment for the children's well being is an important step in reducing the incidence of TDI. Protective gear for playing contact sports and other roughly played sports' along with safe play areas are very important. In the case that there may be incidences of increased overjet and inadequate lip coverage, appropriate orthodontic treatment be carried out for these children early to ensure an improved quality of life.

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