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Original Research Article

Impact of maxillary incisor trauma on child psychology in patients with Class II Div 1 malocclusion in urban population of India

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ABSTRACT

Introduction: Traumatic injuries to maxillary incisors can occur at any age, but its prevalence is high among children. Earlier studies also suggested that patients with increased overjet and lip incompetence were more prone to have trauma to maxillary incisors. The effect of Traumatic dental injuries is not only physical damage but also psychological damage as aesthetic issues are involved. Measures of oral-health-related quality of life (OHRQoL) provide essential information when assessing the treatment needs of individuals and populations.

Materials and Methods: A total of 300 patients with age group 11-14 years with Class II div 1 malocclsion were included in the study. Patients were further subdivider into three group depending upon the severity of maxillary incisal trauma and no trauma group, further to that the psychological evaluation of all the patients were done using short-form of the Child Perceptions Questionnaire to ascertain the impact of oral health conditions (incisal trauma) on their quality-of-life.

Results: Mean functional limitation score was lowest for group 1 and highest with group 3 with 0.46, 0.626 and 4.191.405 respectively. Mean emotional wellbeing score was lowest in group 1 and highest in group 3 with 1.381.14 and 6.101.46 respectively Overall statistically significant differences were found between three groups w.r.t oral symptoms, functional limitation, emotional wellbeing and social wellbeing with p=0.001.

Conclusion: Traumatic dental injury to maxillary incisors is associated with significant impairment of functionality and significant psychological implications with overall CPQ index scoring being highest in patients with more severe maxillary incisor trauma.

1. Introduction

According to studies, malocclusion affects face aesthetics may also have psychological consequences.[1] Longitudinal study conducted by Helm and colleagues found that extreme deep bite, crowding and over jet are believed to be linked with most unfavourable self-esteem among the affected individuals.[2] A study by Çokakoglu et al for assessment of the self-concept and psychosocial status in adolescent patients with different malocclusions and found that different type of malocclusions don't affect patient's self-concept and psychosocial health.[3] Traumatic injuries to maxillary incisors can occur at any age, but its prevalence is high among children. It can be affected by factors such as age, sex, socioeconomic status and behavioural problems. The etiology of traumatic injury to

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maxillary incisor includes oral predisposing factors,[4] which have been identified as increased overjet, incompetence lip coverage of the upper anterior teeth and Class II division 1 malocclusion.[5–7] Studies done in past have also proved a positive correlation between the frequency of occurrence of incisor trauma with increased proclination. Earlier studies also suggested that patients with increased overjet and lip incompetence were more prone to have trauma to maxillary incisors.[5,6,8] On the contrary, some studies have shown that overjet is a minimal risk factor for traumatic injury to maxillary incisors[9] and no association between maxillary incisal trauma and incompetence lip coverage was found.[5,10,11] The effect of Traumatic dental injuries is not only physical damage but also psychological damage as aesthetic issues are involved. Measures of oral-health-related quality of life (OHRQoL) provide essential information when assessing the treatment needs of individuals and populations, making clinical decisions and evaluating interventions, services and programs. The concept of Oral Health-Related Quality of Life (OHRQoL) corresponds to the impact which oral health or diseases have on the individual's daily functioning, well-being or overall quality of life. According Bee et alby the age of 11 or 12, which coincides with puberty, child development psychology has a clear comprehension of complex emotions such as fear, shame, and envy, as well as their self-concept.[12] Child perceptions questionnaire CPQ11-14 for children aged 11–14 years is the indices used for assessing OHRQoL among children. It was developed by Jokovic et al.[13] and has been validated in many languages in the world including in India in Hindi language.[14] Antunes et alevaluated the initial response of Brazillian version of CPQ 11-14 indices on change in quality of life after treatment for traumatic dental injury and the responsiveness of the P-CPQ (Brazilian version) in detecting change on QoL after TDI treatment which was confirmed by SRM assessment.[15]

Present study aims to determine the impact of different severities of maxillary incisal trauma on psychological wellbeing of patients with Class II div 1 malocclusion among mixed Indian population and average socioeconomic status in India. Hence the Null hypothesis of the study is there is no impact of different severities of maxillary incisal trauma on child psychological wellbeing among Indian urban population.

2. Materials and Methods

The present study was conducted on the regular patients reporting for orthodontic treatment at Govt dental centre from 2018-2019. The sample size of 300 was determined to provide an 80% statistical power at the 0.05% level of significance at 95 % confidence interval. A total no of 1670 (940 males and 730 females) patients of age group 11-14 years of mixed Indian population were screened. Out of that 300 (150 males and 150 females) patients were included in the study after applying inclusion and exclusion criteria.

The inclusion criteria considered for the study were patients with skeletal class II div 1 malocclusion, increased overjet of 4-8 mm. The exclusion criteria were patients with dental fractures other than Ellis class I & II, patients with cleft lip and palate or with syndromic or non-syndromic craniofacial anomalies, patient with history of any dental treatment, patients with altered psychological behaviour or getting behavioural or psychiatric therapy, patients with existing endodontic or periodontal pathologies.

The entire sample was divided into three groups with each group consisted of 100 subjects. Group I comprised of individuals with Class II div 1 malocclusion and not affected by any trauma to incisors (control group); Group II comprised of Individuals with Class II div 1 malocclusion and with Ellis Class I fracture; Group III comprised of individuals with Class II div 1 malocclusion and with Ellis Class II fracture.

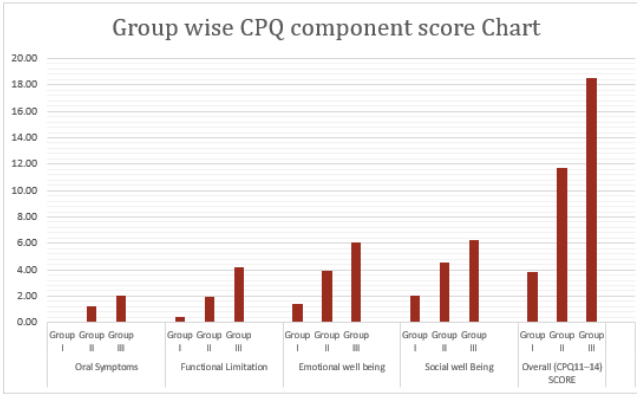
The psychological evaluation of all the patients were done using a simplified questionnaire. To assess the impact of oral health conditions (incisal trauma) on their quality-of-life the short-form of the Child Perceptions Questionnaire (CPQ11–14)[13] was used for children/adolescents aged from 11–14 years. The questionnaires printed in the language which the patients understand and can read. A total of 16 questions divided into four domains: oral symptoms (four questions), functional limitations (four questions), emotional well-being (four questions) and social well-being (four questions).[13] All the questions were answered using Likert-type score ranging from 0–4 (0 = 'never', 1 = 'once or twice', 2 = 'sometimes', 3 = 'often', 4 = 'every day or almost every day'). The scores of all questions are then summed to give a total score ranging from 0–64 points; the greater total, the greater the impact of oral health on the child's quality-of-life.

2.1. Statistical evaluation

The complete data obtained was compiled on a MS Office Excel Sheet (v 2021, Microsoft Redmond Campus, Redmond, Washington, United States). Data was subjected to statistical analysis using Statistical package for social sciences (SPSS v 26.0, IBM). Group wise descriptive analysis was done to find the mean age of the sample, mean score of various component of CPQ 11-14 index and overall score. Frequency table was used for each group to evaluate the frequency distribution of various components among different groups. One-way ANOVA & Post Hoc test was used to find the differences of means of various parameters within and among different groups. As the scorings of all the parameter were qualitative in nature, a non-parametric equivalent Kruskall-wallis test was also done.

3. Result

The results were compiled in excel sheet Ms Office 2021 with N= 100 for each group. The mean age of the samples with groups 1-3 were 12.48± 1.352 years,13.55±1.014 and 12.64±0.959 years respectively [Table 1]. Mean oral symptoms score was lowest for group 1 and highest for group 3 with mean of zero and 2.06±1.003 respectively. Mean functional limitation score was lowest for group 1 and highest with group 3 with 0.46±0.626 and 4.19±1.405 respectively. Mean emotional wellbeing score was lowest in group 1 and highest in group 3 with 1.38±1.14 and 6.10±1.46 respectively [Table 1][Graph 1]. To evaluate the difference in mean among five groups and within groups one way ANOVA and Post HOC test is done [Tables 2, 3 and 4]. Except age, statistically significant difference of means was found for all the components of CPQ index within group and between the group. Overall statistically significant differences were found between three groups w.r.t oral symptoms, functional limitation, emotional wellbeing and social wellbeing with p=0.001. Pairwise differences also showed significant differences in all pairs. However, no statistical difference was seen in age in three groups [Tables 2, 3 and 4]. The similar statistically significant differences were also found with Kruskall- wallis test between and among the three groups except the age with P value of 0.000 [Table 5].



Graph 1: Depicting group wise CPQ component score

4. Discussion

Trauma to maxillary incisors is a painful experience that can lead to impaired orofacial function, occlusion and facial aesthetics. The present study was done to evaluate the psychological impact of trauma to maxillary incisors with Class II div 1 malocclusion among mixed Indian population. Very few studies focused on any particular occlusal trait and were being done in limited geographical belt and races. All the subjects included in this study were from similar socioeconomic background. The study was done to evaluate the impact of trauma among on psychological status of the subjects especially with existing class II div 1 malocclusion. The present study intends to highlight the differences in psychological behaviour of the patients with different degree of maxillary incisor trauma. Hence a group of class II div 1 malocclusion without any incisal trauma was taken as control. According to previous studies 4-6patients with Class II div 1 malocclusion are prone for traumatic dental injuries owing to increased overjet and lip incompetence, this study was done specifically in patients with Class II div 1 malocclusion. In the present study CPQ(11-14) index was used to evaluate the responsiveness of children with traumatic dental injury and the applicability of this index is found to be reliable as quoted by earlier studies.[14]

The results of this study revealed that Class II div 1 malocclusion itself is associated with significant impairment in functionality as well as emotional and social wellbeing though the score was less compared to trauma group (Table 1), which is in agreement with earlier studies by L. Dimberg et al.[16] Results in the present study also revealed that there is significant increase in individual component score and overall score with increase in severity of trauma [Table 1]. The increased score of individual component in group II and III may be associated with sharp incisal edge, sensitivity to hot and cold, food lodgement, altered speech etc. It can be very well appreciated that incisal trauma causes significant impairment in emotional and social wellbeing of individual as both the component show higher score in group II and III, which is also in agreement with earlier study by Cortes et al. which concluded that children who had suffered a fracture in an anterior tooth reported being less satisfied from their food, maintained a negative attitude to tooth brushing, and felt less comfortable about smiling, laughing or showing their teeth, when socializing with people.[17] Among all the parameters of CPQ index in different study groups, Social wellbeing showed the highest mean score which depicts the aesthetic concern of adolescence due to peer group pressure or otherwise. In this study we considered Ellis Class I and Class II fracture as these are the two most common types of traumatic injuries to maxillary incisors as reported by earlier studies. On comparing the score of various component of CPQ index between group II and III, it was found that the score of parameters like oral symptoms, functional limitation etc increases with severity of which means functionality as well as psychological impact increases with extent of trauma. Hence early intervention in the form of treatment of Class II malocclusion will benefit the patient both functionally as well as psychologically which is confirmed by earlier studies by CA Brierley et al.[18]and in Cochrane review by Thiruvenkatachari B et al.[19]

Table 1: Descriptive analysis of different groups

Sr. No .	Parameters	Group (N= 100)	Means	SD
1	Age (years)	Group 1	12.48	1.352
		Group 2	13.55	1.014
		Group 3	12.64	0.959
		Total	12.89	1.807
2	Oral Symptoms	Group 1	0.00	0.000
		Group 2	1.23	1.014
		Group 3	2.06	1.003
		Total	1.10	1.180
3	Functional Limitation	Group 1	0.46	0.626
		Group 2	1.97	1.150
		Group 3	4.19	1.405
		Total	2.20	1.890
4	Emotional well being	Group 1	1.38	1.144
		Group 2	3.92	1.383
		Group 3	6.10	1.467
		Total	3.80	2.348
5	Social well Being	Group 1	2.01	1.480
		Group 2	4.59	1.371
		Group 3	6.25	1.486
		Total	4.28	2.266
6	Overall (CPQ11–14) SCORE	Group 1	3.82	2.866
		Group 2	11.72	3.641
		Group 3	18.55	4.036
		Total	11.39	6.986

Table 2: ANOVA : Evaluation of difference in means between all groups

Sr. No.	Variables	Comparison	Sum of Squares	Mean Square	F	Sig.
1.	Age	Between Groups	66.620	33.310	0.988	0.374
		Within Group	10014.750	33.720		
		Total	10081.370			
2.	Oral Symptoms	Between Groups	214.847	107.423	158.454	0.000
		Within Group	201.350	0.678		
		Total	416.197			
3.	Functional limitation	Between Groups	700.856	350.428	285.667	0.000
		Within Group	363.104	1.227		
		Total	1063.960			
4.	Emotional well being	Between Groups	1116.080	558.040	311.584	0.000
		Within Group	531.920	1.791		
		Total	1648.000			
5.	Social well being	Between Groups	912.987	456.493	217.996	0.000
		Within Group	621.930	2.094		
		Total	1534.917			
6.	Overall (CPQ11-14) Score	Between Groups	10813.359	5406.680	429.097	0.000
		Within Group	3729.637	12.600		
		Total	14542.997			

(The mean difference is significant at the $P < 0.05$ level)

Table 3: Comparison of mean difference of one group with other two group (Post hoc test)

Sr. No.	Variables	Groups	Comparison group	Mean Difference	Std. Error	Sig	95% Confidence Interval	
							Upper bound	Lower bound
1	Age	Group 1	Group 2	-1.070	0.821	0.194	-2.69	0.55
			Group 3	-0.160	0.821	0.846	-1.78	1.46
		Group 2	Group 1	1.070	0.821	0.194	-0.55	2.69
			Group 3	0.910	0.821	0.269	-0.71	2.53
		Group 3	Group 1	0.160	0.821	0.846	-1.46	1.78
			Group 2	-0.910	0.821	0.269	-2.53	0.71

Table 4: Comparison of mean difference of one group with other two group (Post hoc test)

Sr. No .	Variables	Groups	Comparison group	Mean Difference	Std. Error	Sig	95% Confidence Interval	
							Upper bound	Lower bound
1.	Oral symptoms	Group 1	Group 2	-1.230*	0.116	0.000	-1.46	-1.00
			Group 3	-2.060*	0.116	0.000	-2.29	-1.83
		Group 2	Group 1	1.230*	0.116	0.000	1.00	1.46
			Group 3	-.830*	0.116	0.000	-1.06	-0.60
		Group 3	Group 1	2.060*	0.116	0.000	1.83	2.29
			Group 2	.830*	0.116	0.000	0.60	1.06
2.	Functional Limitation	Group 1	Group 2	-1.510*	0.157	0.000	-1.82	-1.20
			Group 3	-3.732*	0.157	0.000	-4.04	-3.42
		Group 2	Group 1	1.510*	0.157	0.000	1.20	1.82
			Group 3	-2.222*	0.157	0.000	-2.53	-1.91
		Group 3	Group 1	3.732*	0.157	0.000	3.42	4.04
			Group 2	2.222*	0.157	0.000	1.91	2.53
3.	Emotional well being	Group 1	Group 2	-2.540*	0.189	0.000	-2.91	-2.17
			Group 3	-4.720*	0.189	0.000	-5.09	-4.35
		Group 2	Group 1	2.540*	0.189	0.000	2.17	2.91
			Group 3	-2.180*	0.189	0.000	-2.55	-1.81
		Group 3	Group 1	4.720*	0.189	0.000	4.35	5.09
			Group 2	2.180*	0.189	0.000	1.81	2.55
4.	Social well being	Group 1	Group 2	-2.580*	0.205	0.000	-2.98	-2.18
			Group 3	-4.240*	0.205	0.000	-4.64	-3.84
		Group 2	Group 1	2.580*	0.205	0.000	2.18	2.98
			Group 3	-1.660*	0.205	0.000	-2.06	-1.26
		Group 3	Group 1	4.240*	0.205	0.000	3.84	4.64
			Group 2	1.660*	0.205	0.000	1.26	2.06
5.	Overall (CPQ11–14) SCORE	Group 1	Group 2	-7.902*	0.503	0.000	-8.89	-6.91
			Group 3	-14.732*	0.503	0.000	-15.72	-13.74
		Group 2	Group 1	7.902*	0.503	0.000	6.91	8.89
			Group 3	-6.830*	0.502	0.000	-7.82	-5.84
		Group 3	Group 1	14.732*	0.503	0.000	13.74	15.72
			Group 2	6.830*	0.502	0.000	5.84	7.82

(The mean difference is significant at the $P < 0.05$ level)

Table 5: Differences in means between the three groups in respect to various parameters scores

Sr. No.	Variables	Groups (N=100)	Mean rank	Kruskal-Wallis H	df	Sig.
1	Oral Symptoms	Group 1	68.00	176.104	2	0.000*
		Group 2	164.66			
		Group 3	218.84			
		Total				
2	Functional Limitation	Group 1	64.92	204.581	2	0.000*
		Group 2	148.54			
		Group 3	237.42			
		Total				
3	Emotional well being	Group 1	59.56	208.375	2	0.000*
		Group 2	157.10			
		Group 3	234.85			
		Total				
4	Social well Being	Group 1	63.27	183.080	2	0.000*
		Group 2	161.67			
		Group 3	226.57			
		Total				
5	Overall (CPQ11–14) SCORE	Group 1	54.63	225.662	2	0.000*
		Group 2	156.19			
		Group 3	238.23			
		Total				

(The mean difference is significant at the $P < 0.05$ level)

5. Conclusion

1. Traumatic dental injury to maxillary incisors is associated with significant impairment of functionality and significant psychological implications with overall CPQ index scoring being highest in patients with more severe maxillary incisor trauma.
2. Class II div 1 malocclusion itself is associated with impairment of social and psychological wellbeing of individual. However, the CPQ index scoring were significantly lesser than other groups with maxillary incisor trauma.

Keeping in view of the high vulnerability of Class II Div 1 malocclusion with increased overjet for incisor trauma and very high impact on functionality, psychological and social wellbeing, the treatment of Class II div 1 malocclusion may be started at earliest to decrease in incidence of trauma to maxillary front teeth and improve self-esteem.

6. Source of Funding

None.

7. Conflict of Interest

None.

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