International Journal of Therapeutic Applications, Volume 33, 2016, 66-71

TRAUMA EITHER AFFECTS PULP OR PERIODONTIUM BUT NOT BOTH- A HYPOTHESIS

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ABSTRACT

Background: Traumatic dental injuries are still a great challenge as they usually injure teeth and their supporting tissues in a precocious phase and frequently with an unfavourable prognosis that can lead to tooth loss. But there was still a dilemma whether trauma affects pulp or periodontium. Thus the present retrospective study was conducted with aim to investigate that trauma can either affects pulp or periodontium but not both- a hypothesis.

Materials and methods: The total 202 individuals (508 teeth) were included with the history of any dental trauma. The individuals were examined for vitality of teeth. fracture, discolouration, exfoliation, extrusion, etc,. The probing pocket depth (PPD), gingival recession (GR) and clinical attachment level (CAL) and mobility of teeth were recorded.

Result: The mean probing pocket depth (PPD), gingival recession (GR) and mobility was found to be more in non-vital teeth as compared to vital teeth. Also the clinical attachment level is less in non-vital teeth when compared with vital teeth.

Conclusion: The result of the present study concluded that when the trauma affects pulp then the periodontium is spared and vice versa. The present study showed that teeth most commonly affected by trauma are the maxillary central incisors.

Key words: dental trauma, effects of trauma, pulp, periodontium.

INTRODUCTION

Traumatic injuries in the periodontium are the consequence of forces applied to the tooth which may or may not displace the tooth in its socket. Traumatic dental injuries are still a great challenge as they usually injure teeth and their supporting tissues in a precocious phase and frequently with an unfavourable prognosis that can lead to tooth loss. The types of clinical forces which may produce this injury can be occlusal forces, orthodontic forces or a physical blow to the tooth.[1] Statistical data indicate that 1 out of 10 individuals had sustained dental trauma during childhood or adolescence.[1]

For many years the role of occlusion and its dynamic interactive impact on the periodontium has been an issue of controversy and extensive debate. Bruxism, malocclusion, abfraction, etc. are variety of occlusal conditionshave been related to this interaction.[2]The purpose of this retrospective study was to analyse the hypothesis that trauma either affects the pulp or the periodontium but not both.

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http://dx.doi.org/10.20530/IJTA_33_66-71
ISSN 2320-138X © 2016

MATERIALS AND METHODS

The total 202 individuals were included in the study between the age group of 7 to 72 years with mean age of 33.74±11.67. Total 118 males and 84 females with history of trauma to tooth/teeth were included in the study with no history of any systemic disease. The total 508 teeth were examined in patients with history of traumatic injuries such as fracture, discolouration, exfoliation, extrusion, etc. History of trauma was taken and patients were divided into vital (332 teeth) and non-vital (176 teeth) group based on vitality test by electric pulp tester.

Patients were examined for probing pocket depth (PPD), gingival recession (GR) and clinical attachment level (CAL) with the help of UNC-15 calibrated probe in both the groups. Mobility of teeth was assessed according to the classification of Miller WD (1907).

Table 1. General profile of patients

SN	Variable	Total	Vital	Non-vital	Statistical significance
1.	Number of cases	202	99 (49.0%)	103 (51.0%)	-
2.	Gender				
	Male	118	55 (46.6%)	63 (53.4%)	(χ^2=0.654; p=0.419 (NS)
	Female	84	44 (52.4%)	40 (47.6%)	
3.	Mean Age±SD (Range) in yrs	33.74±11.67 (7-72)	34.84±11.32 (15-66)	32.69±11.96 (7-72)	t=1.311; p=0.191 (NS)
4.	Mean duration±SD (Range) in yrs	6.95±8.67 (0.02-40.0)	6.54±8.71 (0.02-37.00)	7.35±8.66 (0.08-40.00)	t=0.665; p=0.507 (NS)
5.	No. of teeth involved	508	332 (65.4%)	176 (34.6%)	-
6.	Location of teeth involved				
	11	96	32 (33.3%)	64 (66.7%)	(χ^2=119.98; p<0.001 (S)
	12	33	27 (81.8%)	6 (18.2%)	
	13	3	2 (66.7%)	1 (33.3%)	
	14	2	1 (50%)	1 (50%)	
	15	3	3 (100%)	0 (0%)	
	16	5	5 (100%)	0 (0%)	
	17	2	2 (100%)	0 (0%)	
	21	97	41 (42.3%)	56 (57.7%)	
	22	30	23 (76.7%)	7 (23.3%)	
	23	7	5 (71.4%)	2 (28.6%)	
	24	2	2 (100%)	0	
	26	5	5 (100%)	0	
	27	1	1 (100%)	0	
	28	3	3 (100%)	0	
	31	63	46 (73%)	17 (27%)	
	32	34	33 (97.1%)	1 (2.9%)	
	33	1	1 (100%)	0	
	35	1	1 (100%)	0	
	36	14	12 (85.7%)	2 (14.3%)	
	37	1	1 (100%)	0	
	38	3	3 (100%)	0	
	41	59	45 (76.3%)	14 (23.7%)	
	42	28	26 (92.9%)	2 (7.1%)	
	43	1	1 (100%)	0	
	46	10	8 (80%)	2 (20%)	
	47	4	3 (75%)	1 (25%)	

The statistical analysis of the data was done using a computer software program Statistical Package for Social Sciences (SPSS version 15). Student's paired t-tests were used to assess the significance of changes within each group between time periods. P values of significance were set at 0.05. ($p<0.05$)

RESULTS

The statistical data analysis was done. Total 508 teeth were examined in 202 cases. The general profiles of patient with the total number of teeth examined as shown in **table 1:**

Table 1 shows that total 118 males and 84 females were with history of trauma to tooth/teeth were included. The 'p' value for gender, age and range of period for history of trauma is not significant which suggest that there was no selection bias of subjects for the present study. Fifty four males, fourty four females were having vital teeth and sixty males, fourty females were having non vital teeth. The mean age group of patient were 33.74±11.67 with age range of 7 to 72 years. Out of total 508, 332 teeth were vital while 176 teeth were non vital. The result showed that traumatic injury most commonly affects maxillary left central incisors (97) followed by maxillary right central incisors (96) and least affects maxillary second molar, mandibular left canine/premolar/molar and mandibular right canine.

Table 2 shows the mean probing pocket depth (PPD) for non-vital teeth was 3.43±1.27 which was more than vital teeth (2.76±1.43). The mean

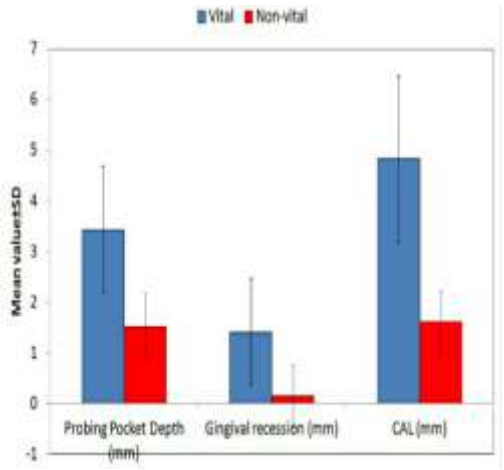

Fig. 1. Comparison PPD, GR and CAL of both vital and non-vital group.

gingival recession (GR) associated with non-vital teeth was 1.41±1.07 which was more compared to vital teeth (0.97±1.11). The PPD and GR of non-vital teeth group were statistically significant ($p=0.001$) on comparison with vital teeth group. The clinical attachment level (CAL) associated with non-vital teeth were more compared to vital and statistically significant ($p=0.001$). For all the periodontal healparameters, the mean value for vital teeth group was significantly higher than non-vital teeth group.

From table 2 and Fig. 1 it can be concluded that when trauma affects periodontium then pulp was spared. This results in increased PPD, GR and CAL in vital teeth as compared to non-vital teeth.

The table 3 and Fig. 2 shows the comparison of mobility between vital and non-vital teeth and

Table 2. Comparison of periodontal parameters in vital and non-vital teeth

SN	Parameter	Total (n=508)	Vital (n=332)	Non-vital (n=176)	Statistical significance
1.	Probing Pocket Depth (mm)	2.76±1.43	3.43±1.27	1.51±0.66	t=18.775; p<0.001
2.	Gingival recession (mm)	0.97±1.11	1.41±1.07	0.14±0.62	t=14.567; p<0.001
3.	CAL (mm)	3.71±2.10	4.83±1.65	1.61±0.62	t=23.996; p<0.001

Table 3. Comparison of mobility between vital and non-vital teeth

SN	Mobility grade	Total (n=508)	Vital (n=332)	Non-vital (n=176)
1.	No mobility	337	163 (49.1%)	174 (98.9%)
2.	I	94	93 (28.0%)	1 (0.6%)
3.	II	61	60 (18.1%)	1 (0.6%)
4.	III	16	16 (4.8%)	0

(^{2}=127.59 (df=3); p<0.001

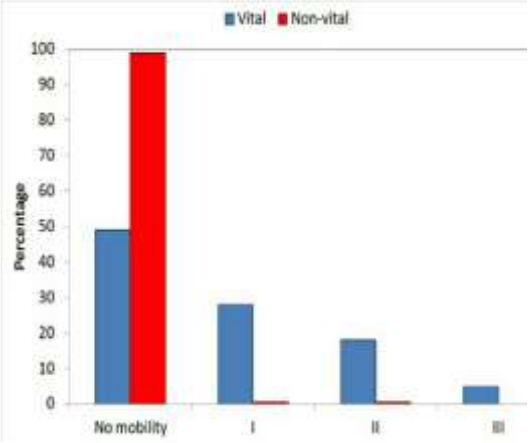

Fig. 2. Comparison of mobility in vital and non-vital teeth

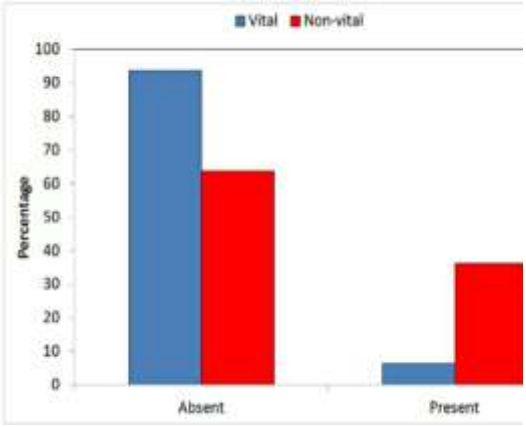

Fig. 3. Comparison of complication rate between vital and non-vital

Table 4. Comparison of complication rate of vital and non-vital teeth

SN	Complications	Total (n=508)	Vital (n=332)	Non-vital (n=176)
1.	Absent	422	311 (93.7%)	111 (63.7%)
2.	Present	86	21 (6.3%)*	65 (36.3%)**

(^{2}=76.618(df=3); p<0.001

*(11 fracture, 4 discoloration, 2 exfoliation, 2 extrusion)

**(61 discoloration, 2 extrusion, 1 fracture, 1 intrusion+discoloration)

suggests that the prevalence of mobility itself was significantly higher in vital teeth group as compared to the non-vital teeth group (p > 0.001). The Fig. 3 shows that the complication rate, especially discolouration, was significantly higher in non-vital group as compared to vital group.

DISCUSSION

The aim of present study was to analyse a hypothesis that whether trauma affects pulp or periodontium but not both.

The success or failure of the treatment of many traumatic injuries depends on the effects of trauma on the two tissues that are tooth pulp and the periodontal tissue. In teeth exhibiting increased mobility, the coronal periodontal ligament approaching the inflammatory lesion showed an increased width, increased volume of vascular structures and leukocytes and a reduction in the percentage of collagen per tissue volume. There was also a decrease in the number of collagen fibers inserting into the alveolar bone and cementum at these sites. Such changes were not observed adjacent to teeth with normal mobility.[3]

The result of the present study concluded that when the trauma affects pulp then the periodontium is spared and vice versa. The present study showed that teeth most commonly affected by trauma were the maxillary central incisors that was in accordance with study done by *Francisco SS et al* (2013).[4] Also *Pihlstrom BL* et al (1986) and *Jin LJ* et al (1992) found that teeth demonstrating signs of occlusal trauma (e.g. functional mobility, widened periodontal ligament spaces) had greater probing depths, attachment loss and less bone support [5] similar to the present study.

Andreasen JO (1970) confirmed that fracture of the tooth results in disruption of the energy of the blow and minimizes damage to the periapical region. Tooth mobility is more often associated with teeth without hard tissue damage than with teeth that are fractured.[6]

Andreasen FM (1989) reported that where the supporting tissues are concurrently damaged, the prognosis of the tooth particularly with respect to the vitality of the pulp, is poorer.[7] Dental injuries induce complications, one of these is loss of the pulp vitality.[8] Loss of the pulp vitality may be caused by strong noxious agents acting through the dentinal tubules or directly to the pulp, or it may be due to damage to the nervous fibers in a tooth root apex or to blood vessels and occurrence of ischemia.[9]

Shi Y et al (1997) showed that the damage of pulp due to trauma became more serious as time went on, but periodontium appeared adaptive changes.[10]

CONCLUSION

Thus from the present retrospective study we may conclude that the trauma can either affects pulp or periodontium but not both. Further long term studies with more sample size should be performed to confirm this hypothesis.

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