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Association of Trauma from Occlusion with Demographic Factors, Occlusal Scheme and Types of Dental Prostheses: A Clinical Study

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ABSTRACT

Objective: To determine the frequency of primary and secondary trauma from occlusion, most common signs and symptoms and their association of primary and secondary trauma with demographic factors like age, gender, occlusal scheme and type of dental prosthesis. **Methodology:** A total of 150 patients with age ranged from 20 to 70 years were recruited. A thorough clinical examination was performed to assess signs and symptoms of trauma from occlusion like tooth mobility, Temporomandibular joint pain, wearing facets and periodontal pocketing. Tooth mobility was assessed using a dental explorer or a periodontal probe. Tooth mobility was graded according to the Miller's classification. Periodontal examination i.e., probing depth, clinical attachment level and bleeding on probing were assessed. Occlusal examination was performed and occlusal contacts were evaluated for premature contacts or interferences, type of occlusal guidance i.e., canine guidance or group function noted. **Results:** Primary trauma from occlusion was found to be 70.7% and secondary trauma from occlusion was 29.3%. Frequently noted parafunctional habit was lip/pen chewing 28.7%. The association of age and gender with primary/secondary trauma from occlusion was found to be insignificant. Primary trauma from occlusion was 95.7% in canine guided occlusion whereas secondary trauma from occlusion was 70.2% in group function occlusion. Association of type of occlusal scheme with primary and secondary trauma from occlusion was statistically significant. Patients with fixed prosthesis had more of primary trauma and with removable partial dentures had secondary trauma from occlusion. The association of type of dental prosthesis with the type of trauma from occlusion was statistically significant. **Conclusion:** It was concluded that the primary trauma from occlusion was more frequent than secondary trauma, with lip and pen chewing being the most common parafunctional habit. Patients with fixed prostheses had a higher frequency of primary trauma whereas those with removable prostheses had more secondary trauma.

INTRODUCTION

Trauma from occlusion (TFO) refers to a traumatic occlusion that due to heavy occlusal loads affects the health of oral tissues.[1] Injury to the teeth supporting structures such as periodontal attachments and alveolar bone; due to increase occlusal pressure results into pathological changes.[2] There are 2 types of traumatic occlusion; Primary occlusal trauma; refers to the condition when the occlusal load is maximum that cannot be tolerated and beyond the periodontium adaptive capacity.[3] The other type of trauma from occlusion is secondary occlusal trauma where the normal occlusal load becomes heavy due to weak periodontal support of the teeth. There are however contrasting opinions about the role of periodontal disease progression.[1,3] Few researchers believe that traumatic occlusion results in to periodontal problems and is the primary etiological reason, while other claim it to be a modifier as existing inflammation result in to traumatic occlusion.[4]

Clinical signs and symptoms of traumatic occlusion had been recorded in patients worldwide. The signs and symptoms vary in different patients depending on the extent and duration of occlusal forces applied.[4] They generally include teeth mobility, periodontal tissue changes like periodontal pocket and associated attachment loss, fremitus; a visible tooth movement when put under load, premature contacts; abnormal occlusal contacts during centric and eccentric occlusal movements and pathological tooth wearing. Patients not only suffer from intraoral problems but extraoral symptoms like pain and clicking of temporomandibular joints have also been evident. [4,5]

There can be various etiological factors responsible for the development of traumatic occlusal contacts. Parafunctional habits like clenching/ bruxism that result in to grinding of teeth and resultant flat and polished wearing facets disturb the normal interdigitation of the teeth, hard object chewing, nail and pen biting and abnormal tongue positioning due to habits like tongue thrust are few reasons that can alter normal occlusal contacts and disturb the stomatognathic system.[5,6] Traumatic occlusion and the effect of age had been studied in some populations of the world. Increasing age have been observed as the key factor for patients having wearing facets, poor periodontal support, tooth and tissue loss and pathological migrations of teeth.[7,8] However, few studies stated young people with traumatic occlusion due to malocclusion and parafunctional habits. Dental restorations both fixed and removable if not adjusted properly apply heavy occlusal forces and result into serious damage.[9,10]

Timely diagnosis and assessment of occlusion, assessment of heavy occlusal contacts, premature occlusal spots in both canine guided and group function occlusal schemes should be carried out. Furthermore, timely intervention like occlusal adjustments, teeth splinting, orthodontic intervention and behavior management and counseling should be done to minimize the effects of traumatic occlusion and to prevent the bone and periodontal tissue damage.[11,12]

The findings of this study will provide valuable insights into the frequency and characteristics of trauma from occlusion in our region, which can help clinicians in early detection and management of the condition. The study's results can also contribute to the development of personalized treatment plans and improve patient outcomes. Furthermore, the study's findings can inform dental education and training programs, ensuring that dental professionals are equipped to diagnose and manage trauma from occlusion effectively. The objective of the study was to determine the frequency of primary and secondary trauma from occlusion, most common signs and symptoms and their association of primary and secondary trauma with demographic factors like age, gender, occlusal scheme and type of dental prosthesis.

METHODOLOGY

A Cross-sectional observational study conducted at Prosthodontic clinic of Lahore Medical & Dental College Lahore, from 1st September 2025 till 1st December 2025. A total of 150 patients with age ranged from 20 to 70 years were recruited for the study using non-probability purposive sampling. Patients were divided in to two age groups younger 30-50 years and older 51-70 year. The sample size was calculated from a previous study on "occlusal trauma and non-carious lesions, the role of eccentric movement and guidance".[13] Inclusion criteria were set and patients with fixed or removable prostheses were selected. Patients with a history of parafunctional habits like bruxism, tongue thrusting, pencil or nail biting and clenching were included. Those with TMJ pain, compromised periodontal and gingival health were included. Patients with dental caries and other endodontic problems, periodontal infection, periapical pathologies, myalgia, those who are unwilling to participate in the study were excluded. Informed verbal consent was obtained and ethical clearance was obtained from the Ethical Review Board of Dental College.

Patients were comfortably seated in a dental chair. A detailed history regarding parafunction habits was taken. Most common parafunctional habits like clenching, bruxism, nail biting, tongue thrusting and lip/pen chewing were noted. A thorough clinical examination was performed to assess signs and symptoms of primary and secondary trauma from occlusion. To differentiate primary and secondary trauma periodontal health examination and occlusal examination was carried out. Patients with heathy periodontium but with signs of trauma from occlusion e.g.; tooth mobility, interferences, premature contacts, TMJ pain were included in a category of primary trauma from occlusion and patients with weak periodontium showing signs of trauma from occlusion were categorized as secondary trauma.

Periodontal examination was performed using a periodontal probe. Probing depth, gingival attachment loss and bleeding on probing was noted on the teeth with premature contacts or interferences. Probing Depth: measured from the gingival margin to the base of the pocket, Clinical attachment level: measured from the cemento-enamel junction to the base of the pocket, Bleeding on probing: assessed as present or absent. Occlusal examination was performed using articulating paper. Centric Relation: assessed using bimanual manipulation or anterior jig, Occlusal contacts were evaluated for premature contacts or interferences in centric and eccentric movements by manipulating the mandible laterally and anteriorly from the centric relation position. Occlusal scheme was assessed for types of occlusal guidance i.e., canine guidance or group function. Tooth mobility was assessed using a dental explorer or a periodontal probe. Tooth mobility was graded according to the Miller's classification: Grade 0: No mobility, Grade 1: Slight mobility (0.1-0.2 mm), Grade 2: Moderate mobility (0.2-1 mm), Grade 3: Severe mobility (>1 mm).[14] Temporomandibular joint pain was assessed as present or absent. Patients if using dental prosthesis its type was recorded e.g., fixed prosthesis, removable partial dentures were noted.

Data was entered and analyzed in SPSS version 26. Descriptive statistics like frequencies and percentages were calculated for categorical variables such as gender, parafunctional habits, Signs and symptoms of primary and secondary trauma and type of dental prosthesis. Mean and SD found for age. Chi-square test was used to analyze association of primary and secondary trauma with gender, age and with type of dental prosthesis. Significance value was set as $p<0.05$.

RESULTS

A total of 150 patients of both genders were included in the study. Male patients were 70 (52.0%), female patients were 72 (48.0%). The age of the patients ranged from 30-70 years, mean age 53.27 ±SD 9.98. Primary trauma from occlusion was found to be 106(70.7%) and secondary trauma from occlusion was 44(29.3%). Frequently noted for parafunctional habit was lip/pen chewing 43(28.7%).

Frequency distribution of various parafunctional habits is shown in Table 1. Frequency distribution of signs and symptoms of primary/secondary trauma from occlusion (TMJ pain, wearing facets, pocket, premature contacts, mobility) was shown in Table 2. The association of age and gender with primary/secondary trauma from occlusion was found to be insignificant; p>0.05. Table 3.

Frequency of group function occlusal scheme was 57 (38.0%) and canine guided was 93 (62.0%). Primary trauma from occlusion was 89 (95.7%) in canine guided occlusion whereas secondary trauma from occlusion was 40 (70.2%) in group function occlusion. Association of type of occlusal scheme with primary and secondary trauma from occlusion was statistically significant; p 0.00. Table 3.

Frequency of patients with fixed processes were 64 (42.7%), removable processes were 86 (57.3%). 56(87.5%) patients with fixed prosthesis had primary trauma and 36(41.9%) patients with removable partial dentures had secondary trauma from occlusion. The association of type of dental prosthesis with the type of trauma from occlusion was statistically significant; Table 3.

Table 1

Frequency Distribution of Para Functional Habits =150

Parafunctional habits	Frequency %
Bruxism	22 (14.7)
Clenching	37(24.7)
Tongue Thrusting	10(6.7)
Nail biting	38(25.3)
Lip/Pen chewing	43(28.7)

Table 2

Frequency Distribution of Common Signs and Symptoms of Trauma from Occlusion, N=150

Variables	Present		Absent	
	n	%age	n	%age
TMJ pain	56	37.5	94	62.7
Wearing facets	38	25.3	112	74.7
Periodontal pocket	42	28.0	108	20.0
Premature contacts	22	14.6	128	85.3
Tooth mobility	43	28.7	107	71.3

Table 3

Association of Type of Dental Prosthesis, Gender, Age and Type of Occlusal Scheme with Primary/Secondary Trauma from Occlusion. N =150

Occlusal trauma types	Type of dental prosthesis		Gender		Age groups		Types of occlusal schemes	
	fixed	removable	male	Female	<50 years	>50 years	Canine guided	Group function
Primary trauma	56;87.5	50;58.1	52;66.7	54;75.0	43;70.5	63;70.8	89;95.7	17;29.8
Secondary trauma	8;12.5	36;41.9	26;33.3	18;25	18;29.5	26;29.2	4;4.3	40;70.2
P	0.00		0.26		0.96		0.00	

Significance value p<0.05.

DISCUSSION

The current study was carried to find out the most common signs and symptoms of trauma from occlusion (TFO) and the association of age, gender and dental prostheses with the types of occlusion trauma. The prevalence and frequency of trauma from occlusion had been documented at a higher rate in dental literature. High percentage of traumatic occlusion was reported by Nurul [15] and coworkers; 65% teeth of their study population were found non vital due to excessive traumatic forces. Likewise, the frequency of primary trauma from occlusion in current study was more than the secondary trauma. It was found that 70.7% our patients had primary trauma whereas, only 29.3% patient had periodontally compromised teeth that had resulted in secondary trauma. In accordance with the results of current study Nirola[16] and coworkers concluded traumatic occlusion; the main reason for periodontal tissue destruction. They further proposed that early detection and occlusal equilibration should be done immediately to save alveolar bone and tissue destruction.

Gender predilection of trauma from occlusion had been reported in various population throughout the globe. In the current study primary occlusal trauma was frequently seen in females 75.0% than secondary 25.0%, likewise it was more in males 66.7% as compared to secondary trauma 33.3%. This association of occlusal trauma with gender however was found to be insignificant. Similarly, Nurul[15] and coworkers reported that females 54.5% had more occlusal trauma as compared to males 45.5%. Likewise, Kim[17] and coworkers in their respective study investigated the effect of stress and oral parafunction and reported increase among females. In agreement with the results of current study Meynardi[18] and coworkers based on gender predilection had reported more traumatic lesion in females as compared to males. However, stated that it is not gender specific and can affect any individual if disturbing factors lead to occlusal disharmony.

Excessive occlusal pressure on one tooth or many teeth exceeds the adaptive capacity of alveolar bone and associated periodontium. Likewise, parafunctional habits result into abnormal positional relation of teeth and associated structures and exert too much occlusal force. [15]The frequently seen parafunctional habits in current study were lip / pen chewing ;28.7% followed by nail biting 25.3%. Clenching and tongue thrusting were the least frequent parafunctions in our patients 24.7% and 6.7%. Likewise, Zemowski[19] and coworkers concluded that 83.3% patient had TMDs and occlusal trauma and stated that parafunctional habits resulted in continuous muscle tension abnormal positioning of mandible and increase in the risk of development of TMDs. Similarly, most common parafunction in school children was pencil and nail biting 25.1% however clenching was reported in

8.9%. 2 In accordance with our study results, Luka[20] and coworkers found the role of oral parafunction in school children; lip / object biting 59%, clenching 45%, nail biting 36% and bruxism in 32% male. Similarly, in a study conducted in Saudia Arabia; Saudi males of young age group were 1.5 times more likely to do nail biting lip whereas object biting was 1.3 times more in males. [21]

Signs and symptoms of occlusal trauma included dental tooth wear, the gradual tooth structure loss, periodontium destruction and temporomandibular joint pains. [15] In the current study TMJ Pain was frequently seen 37.5% followed by tooth mobility 28.7% and periodontal pocketing 28.0%. However, 25.3% patients had wearing facets and 14.6% had premature contacts. Likewise, Nirola[16] and coworkers stated that the tooth mobility is the most important sign of traumatic occlusion. Type of occlusal scheme in dentate patients can affect the occlusal forces generated on occlusal table. In the current study less frequently observed occlusion scheme was group function occlusion that was only 38.0% and however maximum patients had canine guided occlusion 62.0%. Frequency of primary trauma was 95.7% in canine guided occlusion whereas secondary trauma was 70.2% in group function occlusion; significant association of type of occlusal schemes with the types of occlusal trauma was found in our patients.

In the current study primary occlusal trauma was more in both age groups as compared to secondary trauma; however, this association was found to be insignificant within age groups; P = 0.96. Nurul [15] however found more traumatic occlusion in younger age group and stated that middle age group 26-35 years were affected more e.g.; 30 % whereas it declined to 0.6% in older group of 76-85 years. In contrast Meynardi[18] and coworkers reported trauma in older age groups. Age predilection does not significantly affect occlusion but on factors causing trauma. Factors like periodontal poor health, age, and partially dentate arches are considered as important factors that can affect occlusally generated force. 42.7% patients in current study had fixed and 57.3% had partial removable prostheses. Primary trauma was frequent in patients with fixed prostheses; 87.5%, however, secondary trauma was frequent in removable processes 41.9% and we have found the significant association of occlusal trauma with type of dental processes. Removable prosthesis if retain plaque and debris can inflame the mucosa and gums underneath resulting into periodontitis. Weak periodontium perceives normal occlusal load as excessive and secondary trauma from occlusion initiates. In line with the findings of current study, a retrospective study carried out by Rios[22] and coworkers reported amalgam restorations with pathogenic occlusions that resulted in periodontitis. Strong association of occlusion trauma with periodontitis was documented. Occlusal premature contacts or disturbed occlusal contacts impact the healthy periodontium in a negative manner and periodontal destruction results.

Occlusal trauma should be early diagnosed and signs and symptoms should be detected on routine clinical examination. Excessive occlusal loads as a result of parafunctional habits and resultant habitual grinding increases the tooth wear, destroys the tooth morphology and results in to abnormal cusp fossa relationships. [23] Non adjusted fixed or removable prostheses with high spots and premature contacts damages the tissues health. Understanding these relationships can help clinicians identify high risk patients and optimize occlusal management strategies.

CONCLUSION

It was concluded that the primary trauma from occlusion was more frequent than secondary trauma, with lip and pen chewing being the most common parafunctional habit. Patients with fixed prostheses had a higher frequency of primary trauma whereas those with removable prostheses had more secondary trauma.

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