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Premature Contacts and Abfraction Lesions: A Study of Frequency Distribution and Associated Factors

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ABSTRACT

Background: Premature occlusal contacts are deflective contacts that increases the impact of occlusal forces and result into hard tissue damage. **Objective:** The purpose of the study is to find out frequency and distribution of premature contacts and developing abfraction lesions with gender, age groups, tooth type, gingival attachment loss, centric and eccentric relations and type of occlusal scheme. **Methodology:** Two hundred abfraction lesions were examined. A comprehensive odontogenic, occlusal and periodontal examination was done to check dimension and location of abfraction, to record premature contacts in centric and eccentric relation and gingival attachment loss. Occlusal premature contacts with the help of articulating paper were checked and gingival attachment loss on the teeth with premature contacts was recorded as present or absent. **Results:** Premature contacts were found in 31.5% patients. 54.4% young and 28.7% old patients had premature contacts. The association of premature contacts with gender and age groups was insignificant. 43.5% patients had group function occlusion premature contacts whereas 25.2% had in canine guided occlusion. 40.0% abfractions had premature contacts on the involved teeth**.** The association of premature contacts with centric and eccentric movement, occlusal scheme and tooth type and gingival loss was significant. **Conclusion:** Premature contacts were present in 31.5% of patients, with higher frequency in group function occlusion. They have significant association with development of abfractions, particularly with centric and eccentric movements, occlusal scheme, tooth type and gingival loss.

INTRODUCTION

Non-carious cervical lesions are a type of dental tissue damage that occurs without the presence of bacterial attack, and their occurrence is often encountered in routine dental practice, requiring professional intervention.[1] These lesions can affect individuals worldwide and typically develop in the cervical region of a tooth, near the cemento-enamel junction, which is the area where the enamel and cementum meet.[2,3]

The lesions themselves are characterized by their V-shaped appearance, with sharp, well-defined angles, and they can be attributed to various factors, including occlusal trauma, stress concentration, and lateral forces that act on the teeth.[4,5] When teeth are subjected to high masticatory loads, it can lead to stress concentration at specific regions, resulting in micro-fractures of the enamel, deformation, and ultimately, tooth enamel loss. [6] The natural occlusal scheme, which refers to the way the upper and lower teeth fit together, plays a crucial role in the distribution of forces during various mandibular movements. [7,8]

There are two main types of occlusal schemes that have been identified: canine-guided occlusion and group function occlusion. Canine-guided occlusion is characterized by the contact between the upper and lower canines during lateral movements, with the rest of the teeth being out of occlusion.[9,10] This type of occlusion helps to distribute the forces of mastication and protect the teeth from excessive wear and tear. On the other hand, group function occlusion involves the contact between the canines and at least two posterior teeth, such as premolars and molars, during lateral movements.[11]

Lateral forces, premature contacts, and occlusal interferences can all contribute to the development of non-carious cervical lesions by causing tension at the cervical junction of the teeth. This tension can lead to crystalline fractures of the enamel prisms, deformation, and ultimately, the loss of tooth structure.[12]

Non-carious cervical lesions, particularly abfractions, are a significant concern in dentistry due to their detrimental effects on tooth tissues and overall oral health. These lesions can result in poor aesthetics, increased plaque and

calculus retention, teeth sensitivity, and potentially, pulpal infection.[13]

The current study aims to investigate the role of premature contacts in the development of abfractions and inform the development of targeted prevention and treatment strategies. By clarifying the relationship between premature contacts and abfractions, dentists can make informed decisions about occlusal therapy, including the need for occlusal adjustments or splint therapy, ultimately reducing the progression of these lesions and improving oral health outcomes. The study will provide insights that how the relationship between premature contacts and abfraction lesions varies across different age groups, gender, that can help clinicians in diagnosing, preventing and managing abfraction lesions and attachment loss in dental patients. The purpose of the study is to find out frequency and distribution of premature contacts and developing abfraction lesions with gender, age groups, tooth type, gingival attachment loss, centric and eccentric relations and type of occlusal scheme.

METHODOLOGY

A cross- section observation study was conducted in the department of Prosthodontics; Lahore Medical & Dental College Lahore in three months period i.e., from 3rd August till 3rd November 2025 including hundred patients of both genders. The age of patients ranged from 30 to 70 years. Patients were divided into two age groups; 30-50 and 51-70 years. Non-probability purposive sampling was used. A total of a sample of two hundred and fifty abfraction lesions were examined from these hundred partially dental patients. Sample size was estimated from a previous study on occlusal trauma and non-carious lesions; the role of eccentric movements and guidance.[14] All patients who had teeth with abfractions were selected and abfraction lesion of maximum depth in mm per patient was evaluated. Only teeth with zero mobility and restorations but having antagonist pairs were included. Patients who had undergone occlusal and periodontal therapy, history of orthodontic treatment, abrasive and erosive lesion of teeth were excluded from the study. Patients' consent was taken and ethical approval obtained from Dental College Ethical Committee.

Patients were seated in dental chair and comprehensive odontogenic examination was done to check dimension and location of abfractions. Periodontal examination was done to check if gingival attachment loss was present or absent. Dental mouth mirror and probe was used for the examination. Occlusal examination was done to record premature contacts in centric relation, eccentric (right &left lateral excursions, protrusive movement). Mandible was retracted in centric relation position by swallowing method and tilting the patients head posteriorly. Occlusal premature contacts with the help of articulating paper were checked and gingival attachment loss on the teeth with premature contacts was recorded as present or absent. Occlusal premature contacts in eccentric movements were recorded using 40 µ thick articulating paper with double sided colored as red and blue. Patient mandible was manually moved to right (working side) and left (balancing side) premature contacts were recorded. Similarly, mandible was manipulated to the left (working side) and right (balancing side) premature contacts were noted. In protrusive movements the patient was asked to move his mandible forward till edge-to-edge position and articulating paper was placed on posterior teeth to check the premature contacts in protrusion. Occlusal scheme of every patient was recorded as (canine guidance; if canine guides the lateral movements, Group function; if lateral movements guided by both canine and premolars.)

Parameters analyzed were tooth type having abfraction, patient age, gender, type of occlusal scheme (canine guidance or group function), number of premature contact frequency in centric and eccentric movements (right, left & protrusive movements.) and presence or absence of gingival attachment loss

Data was entered and analyzed in SPSS version 26. Descriptive analysis was done. Frequency distribution of gender, tooth type, number of premature contacts, gingival attachment loss and occlusal scheme types was found. Mean and SD for age was obtained. Association of presence or absence of premature contacts with patient's age groups, gender, type of occlusal scheme (canine guided, group function), type of teeth (anterior, posterior), gingival attachment loss and centric and eccentric movements was found using Chi square. P values significance was $p<0.05$.

RESULTS

A total of 200 abfractions were checked in both genders; male were 85 (42.5%) and females were 115 (57.5%). Premature contacts were found in 63 (31.5%) patients and 137 (68.5%) had no premature contacts.

Premature contacts were found in 26(30.6%) males and 37(32.2%) females. 59(69.4%) males and 78(67.8%) females had no premature contacts. The association of premature contacts with gender was p=0.81. Table1.

The age of the patients ranged from 30 to 70 years; mean age of the patients was 56.91 ± SD 8.801. The age group 30-50 years had 15(54.5%) premature contacts whereas age group 51-70 years had 48(28.7%) premature contacts. The association found between premature contacts and age groups was p=0.06. Table1.

17 (27.0%) were having centric premature contacts and 46 (13.0%) had premature contacts in eccentric relations. The association of premature contacts with centric and eccentric movement was p = 0.00. Table 1.

The association of premature contacts with occlusal scheme and tooth type was p= 0.00. Out of 131(65.5%) group function occlusion 30(43.5%) patients had premature contacts whereas out of total 69(34.5%) canine guided occlusion 33(25.2%) had premature contacts. Table 2.

Abfractions found in anterior teeth were 110 (55.0%) out of which 44(40.0%) had premature contacts on the involved teeth. 90 (45.0%) abfractions were found on posterior teeth where 19(21.1%) had premature contacts. The association of premature contacts with the type of teeth was p= 0.00. Table 2.

Gingival loss was evident in 46(23.0%) and 154 (77.0%) had no gingival loss. Out of them 36(78.3%) teeth with premature contacts had gingival loss and 10(21.7%) teeth with gingival loss had no premature contacts. The

association of premature contacts with gingival loss was P = 0.00. Table 2.

Table 1

Association of Premature Contacts with Gender, Age Groups and Centric & Eccentric Movements; N=200

Premature contacts	Gender		Age groups		Mandibular movements	
	Male	female	30-50yrs	31-70 yrs	centric	eccentric
Present	26 (30.6)	37 (32.2)	15 (45.5)	48 (28.7)	17 (27.0)	46 (73.0)
Absent	59 (69.4)	78 (67.8)	18 (54.5)	119 (71.3)	60 (43.79)	77 (56.20)
P value	0.81		0.06		0.00	

Significance level p <0.05.

Table 2

Association of Premature Contacts with Occlusal Scheme, Tooth Type and Gingival Attachment Loss; N=200

Premature contacts	Occlusal scheme		Tooth type		Gingival attachment loss	
	Canine guided n(%)	Group function n(%)	Anterior teeth n(%)	Posterior teeth n(%)	Present n(%)	Absent n(%)
Present	33 (25.2)	30 (43.5)	44 (40.0)	19 (21.1)	36 (78.3)	27 (17.5)
Absent	98 (74.8)	39 (56.5)	66 (60.0)	71 (78.9)	10 (21.7)	127 (82.5)
P value	0.00		0.00		0.00	

Significance level p<0.0

DISCUSSION

The current study was carried out to know the frequency and percentage distribution of premature contacts and development of abfraction lesions. The association of premature contacts with factors such as gender, age groups, tooth type, gingival attachment loss, centric and eccentric relations and type of occlusal scheme was found. Premature contacts were found in our patients with abfraction lesions. Out of two hundred patients, 31.5% patients had premature contacts, (30.6% males and 32.2% females). Similar to the results of current study Ijaz[14] and coworkers reported the association of premature contacts and development of abfraction lesions. They reported maximum number of 4 abfractions i.e., 50.0% in their patients. In contrast to the results of current study Reyes[15] and coworkers reported that premature contacts do not necessarily lead to development of abfractions. Bartlelt[16] and coworkers reported 18% prevalence of lesion in their respective study due to premature contacts. Oudkerk[17] and coworkers concluded laterally directed forces as prime cause of axial stress loading. The occlusal force overloading especially as cervical end of teeth result in the development of these lesions.

The frequency of existence of premature contacts within different age groups was determined. It was found that in younger age group more premature contacts were seen as compared to older group, i.e., 54.5% young and only 28.7% older patients had premature contacts, however this association was found to be insignificant. In contrary Ijaz[14] and coworkers observed increased number of abfractions in old age group in their respective study. 35.9% abfractions were found in young population however 59.0% in old and they reported a significant association. Reves[15] and coworkers reported similar findings but with insignificant association. Saikarian[18] and coworkers also found similar results. In accordance with the results of current study another study claimed tooth loss, or tooth movement due to periodontal problem eliminated premature contacts.[19]

In the current study, 27.0% premature contacts were existed in centric occlusion and only 13.0% in eccentric occlusion. The association with existence of premature contacts with respect to occlusion was found to be significant. Likewise, Nicolae[20] and coworkers reported deflective contacts in centric relation resulted into periodontal damage way more than those than those in eccentric movements. And concluded that deflective occlusal contacts resulted in increased forces and severe periodontal damage.

In the current study more premature contacts were found in group function occlusal scheme as compared to canine guided occlusion. The frequently found occlusal scheme in our patients was group function ;65.5% and only 34.5% had canine guided occlusion. The frequency of premature contacts was more in group function occlusion; 43.5% whereas 25.2% canine guided occlusion premature contacts. Similarly, Ijaz[14] and coworkers reported maximum lesions in the group function occlusion ;52.6% and only 32.0% in canine guided occlusion but the association was insignificant. Likewise, Ispas[21] and coworkers on a sample of 100 teeth found lesions developed in group function occlusion i.e., 50% as compare to in canine guidance occlusal scheme 31.0%.

Abfraction lesions were frequently seen in anterior teeth, 55.0%, and 40.0% of these lesions developed on teeth having premature contacts. The abfraction lesion developmental frequency on posterior teeth was less 45.0% and 21.1% of the teeth having abfractions had premature contacts as well. The association was significant between the tooth type and frequency of existence of premature contacts. In contrast Reyes[15] and coworkers found maximum; 45.6% posterior teeth and only 16.8% anterior teeth with premature contacts. Badavannavar[22] and coworkers found abfraction lesions on anterior teeth followed by posterior stating the fact that smaller size of anterior teeth result in the surface damage. Zavala[23] highlighted the importance early diagnosis as preventive measure to the enlargement of abfraction.

Gingival attachment loss was only seen in 23.0% and major patient had no gingival attachment loss; 77.0%. Gingival attachment loss however was evident on teeth with premature contacts ;78.3%, and only 21.7 % teeth had premature contacts but without gingival loss. The association with existence of premature contact and gingival loss is significant. In contrast Reyes[15] and coworkers reported that the attachment loss was present in patients but the difference of attachment loss in patients with and without abfractions. In contrast Fan[24] and Coworkers commented that no credible evidence is present to support abfraction development or gingival recession due to abnormal occlusal load due to premature contacts. In accordance with the results of current study Nicolae[20] and coworkers stated high occlusal loads due to deflective contact significantly damage periodontium resulting into deeper probing depths, gingival recession, bone loss and periodontal ligament space widening. Rios[25] and coworkers stated strong association of occlusal

trauma with periodontitis. Menardi [26] and coworkers likewise recommended that if occlusal adjustment done to omit premature contacts, marked stable improvement in periodontal health can be achieved. Zavala[23] stated that abnormal occlusal force results in cervical abfractions, Similarly, few other investigators documented that the applied force time and intensity is directly proportional to the tissue damage.[27,28] We suggest that premature contacts and occlusal deflective contacts must be timely diagnosed and treated efficiently to prevent tissue damage so that abfraction lesions development could be prevented. The limitation of the study was its cross-sectional study design. Collecting information from a single point in time does not allow evaluation of disease programmed.

CONCLUSION

Premature contacts were present in 31.5% of patients, with higher frequency in group function occlusion. They have significant association with development of abfractions, particularly with centric and eccentric movements, occlusal scheme, tooth type and gingival loss.

Authors' Contribution

Noor E Sahar	Conceived Idea
M. Umair Iqbal	Literature review
Tayyab Dawood Hussain	Manuscript writing
M.Haroon	Data collection
Hina Daha	Designed research
Ramsha Emaan	Data collection
Sajid Naeem	Manuscript proof reading
Khezran Qamar	Statistical analysis

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