ORIGINAL RESEARCH

Prevalence of Palatogingival Grooves in a Libyan Population and Their Relationship with Periodontal Diseases

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ABSTRACT

Aim: The aim of the present study was to evaluate the prevalence of palatogingival grooves and its correlation to the periodontal health in maxillary incisors.

Materials and methods: The 200 individuals, aged between 18 and 60 years, were examined for the presence of the palatogingival grooves in the four maxillary incisor teeth. Plaque index (PLI), gingival index (GI) and periodontal disease index (PDI) were used to evaluate the health of the periodontal tissues on the lingual surfaces of the maxillary incisor teeth.

Results: The prevalence of palatogingival grooves in the study sample was 7.5% with no significant gender difference. The lateral incisors had the greatest prevalence of palatogingival grooves (1.68%). There were significant differences in periodontal health between teeth with and without palatogingival grooves.

Conclusion: This study shows significant association between palatogingival grooves and periodontal disease.

Keywords: Palatogingival groove, Dentogingival groove, Periodontal disease.

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INTRODUCTION

The palatogingival groove is a developmental anomaly of the maxillary incisor teeth which has been reported to be associated with localized periodontal disease.[1-7] The anomaly also has been termed radicular anomaly,[8] distolingual groove[9] and radicular lingual groove.[2]

Prichard, in 1965, was the first to state that lingual grooves on maxillary incisor teeth were a predisposing factor for localized severe periodontal destruction.[1]

Lee[10] et al reported 13 cases of localized periodontal lesions associated with these anomalies. James et al reported in their study that palatogingival grooves were associated with poorer periodontal health and more plaque accumulation.[3] Brunsvold reported that palatogingival grooves contributed to severe localized periodontitis and loss of anterior teeth because these grooves or their root extensions were covered by periodontium.

Simon et al described many unsuccessful attempts to treat periodontal defects associated with palatogingival grooves and felt that extraction of the involved tooth was the treatment of choice.[8]

Estrela et al found deep radicular grooves in maxillary lateral incisors which communicated with their pulp chambers.[7] Albaricci reported that in a few cases, palatogingival or radicular grooves reached the apices of the pulp canals of the teeth involved.[5]

Everett and Kramer (1972) reported that the prevalence of distolingual grooves was 1.9%,[9] while Albaricci[5] reported 11.1%. Withers et al[3] reported a prevalence of 8.5% for palatogingival grooves. In many instances, palatogingival grooves presented radiographically as a radiolucent parapulpal line.[9]

AIM

The aim of the study was to determine the prevalence of the palatogingival grooves in the maxillary incisor teeth and the health status of the lingual periodontal tissues adjacent to maxillary incisor teeth, both with and without palatogingival grooves.

MATERIALS AND METHODS

Two hundred individuals were randomly selected from the Outpatient Department of the Faculty of Dentistry and the Red Crescent Ibn Sina Polyclinic, Benghazi, Libya. The personal history of all the patients was recorded. They were then informed about the study and examined for the presence or absence of palatogingival grooves in the maxillary incisor teeth. Only grooves that were detected at the cementoenamel junction were counted as palatogingival grooves. The study population was divided into two groups. Group 1 included individuals with palatogingival grooves on any of the maxillary incisor teeth. Group 2 included individuals without palatogingival grooves. Ethical clearance was obtained from ethical committee of institute and informed consent was taken before the examination.

Plaque index (PLI),[11] gingival index (GI)[11] and periodontal disease index (PDI)[12] were used to assess the periodontal health. They were recorded at the lingual aspect of the four maxillary incisor teeth for all individuals.

Multiway frequency tables were used to check, if groove prevalence was consistent for sex. The relationship between the presence of palatogingival grooves and the periodontal status was analyzed using means. Chi-square (χ^2) tests were

used to test the hypothesis that there was no difference in the pattern of the variables among the groups considered. Statistical analysis was done by using SPSS Software (version 11.5).

RESULTS

The age of the study population ranged between 18 and 60 years, with a mean age of 32.995 ± 11.791 years. Ninety-three males and 107 females took part in the study. The sex distribution of the study population is presented in Table 1. There was no significant difference between the sex groups ($p > 0.05$).

Out of the 200 individuals examined, 15 individuals had palatogingival grooves, giving a prevalence of 7.5% for the study population. Of the 15 individuals with palatogingival grooves, six were males and nine were females. Seven hundred and seventy-two maxillary central and lateral incisor teeth were examined in those 200 individuals. Sixteen incisor teeth were found with palatogingival grooves, giving a prevalence of 2.07% for the maxillary incisors. Of them, 13 teeth were maxillary lateral incisors and three were maxillary central incisors. The distribution of palatogingival grooves by tooth type is presented in Table 2. It is evident that most of the palatogingival grooves were in the maxillary lateral incisor teeth with relatively few in the maxillary central incisor teeth.

The prevalence of palatogingival grooves in the study population according to the sex distribution of the individuals is presented in Table 3. The prevalence was 6.4% in males and 8.4% in females. This difference was not statistically significant.

The mean PLI, GI and PDI for incisors with palatogingival grooves (group 1) were 2.33, 2.66 and 4.46 respectively, whereas for incisors without these grooves (group 2), they were 1.0, 1.28 and 2.05 respectively. These differences were statistically significant as shown in the Table 4. Considering maxillary central incisors and lateral incisors as separate entities, the differences between the means of the variables among the two groups were found to be statistically significant (Table 5).

Table 1: Sex distribution of the study population

*Sex**	*Number*	*Percentage*
Male	93	46.5
Female	107	53.5
Total	200	100

*$\chi^2 = 0.98$, $p = 0.322$

Table 2: Distribution and prevalence of palatogingival grooves by tooth type in the study population

Tooth type	*Number of individuals*	*Percentage (n = 772)*
Maxillary lateral incisors	13	1.68
Maxillary central incisors	3	0.39
Total	16	2.07

Table 3: Prevalence of palatogingival grooves according to sex distribution of the study population

Item	*Male (n = 93)*	*Female (n = 107)*	*Total (n = 200)*
Number*	6 (40%)	9 (60%)	15 (100%)
% of total number (n)	6.4	8.4	7.5

*Number of individuals with palatogingival grooves

Table 4: Comparison among groups for each variable

Variable	*Group 1* Mean*	*Group 2** Mean*	*Probability levels: Group 1* vs Group 2**
PLI	2.33	1.01	$p < 0.0001$
GI	2.66	1.28	$p < 0.0001$
PDI	4.46	2.05	$p < 0.0001$

*Individuals with PGG; **Individuals without PGG.

DISCUSSION

The prevalence of palatogingival grooves among the maxillary central and lateral incisor teeth examined in this study was 2.07%. The prevalence reported in previous studies was 2.33%,[3] 1.9%[9] and 11.1%.[5] The result of this study is comparable to the results of Withers et al[3] who included both maxillary central and lateral incisors in their study. Everett, Kramer[9] and Albaricci[5] did not include the maxillary central incisors. The prevalence of palatogingival grooves on maxillary lateral incisors was 1.68% in our study; Everett and Kramer[9] reported similar results (1.9%). Kogon[14] found these grooves on 5.6% of maxillary lateral incisors and on 3.4% of the maxillary central incisors.

Localized periodontal destruction with loss of attachment seems to be associated with these grooves.[15] Moreover, these grooves may not be obvious clinically and may result in undiagnosed progression of the disease.[3] Our study showed more plaque accumulation and poorer periodontal health for teeth with palatogingival grooves as measured by the PI, GI and PDI. Similar findings were also reported by Withers et al[3] and Hou et al.[6]

Palatogingival groove usually starts at the cingulum of the involved tooth and runs distoapically to the cemento-enamel junction where it travels a variable distance down the root surface.[3,13] In this study, most of the palatogingival grooves ran distoapically and few mesially. These developmental grooves create accessibility problems, providing a plaque retentive area that is difficult to instrument.[15] Kogon[14] found that these grooves begin on the enamel and can extend for a significant distance on the

Table 5: Comparison among groups on each variable and tooth

Tooth	*Variable*	*Group 1 mean*	*Group 2 mean*	*Probability levels: Group 1 vs group 2*
Max. central incisors	GI	2.66	1.28	$p < 0.001$
	PDI	4.33	2.05	$p < 0.006$
	PLI	2.33	1.01	$p < 0.013$
Max. lateral incisors	GI	2.66	1.28	$p < 0.001$
	PDI	4.51	2.05	$p < 0.001$
	PLI	2.33	1.01	$p < 0.001$

root surface, where they are inaccessible to oral hygiene efforts of patient and the dentist.

Suggested treatment modalities were curettage of the affected tissues, elimination of the groove by grinding (saucerization) or by sealing with a variety of filling materials.[16] If the groove extends beyond the middle-third of the root apex, surgical procedures are required, including use of barriers and intraosseous graft to correct the defect.[17] Although the defect is of periodontal etiology, endodontic treatment is often required because of secondary pulpal involvement. If periodontal breakdown continues, the tooth should be considered for extraction.[3,8]

From our study, it can be concluded that although the prevalence of palatogingival grooves is low, it is associated with significant periodontal destruction. The low prevalence means that these grooves are not routinely seen in day to day practice and, therefore, may not get the deserved attention from dentists. However, these grooves often complicate treatment; therefore, dentists should examine the teeth for these grooves on a routine basis and familiarize themselves with the treatment options available today.

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