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Prevalence of Palatogingival Groove in Patients Visiting a Tertiary Care Centre

Dr. Pragati Acharya,[1] Dr. Radha Baral,[2] Dr. Sanjay Prasad Gupta,[3] Dr. Sujal Shrestha,[1] Dr. Sirjana Dahal,[4] Dr. Samarika Dahal[2]

[1]*Maharajgunj Medical Campus, Institute of Medicine, Maharajgunj, Kathmandu, Nepal*

[2]*Department of Oral Pathology and Forensic Dentistry, Tribhuvan University Teaching Hospital, Maharajgunj Medical Campus, Maharajgunj, Kathmandu, Nepal*

[3]*Department of Orthodontics and Dentofacial Orthopaedics, Maharajgunj Medical Campus, Maharajgunj, Kathmandu, Nepal*

[4]*Department of Community Dentistry, Tribhuvan University Teaching Hospital, Maharajgunj Medical Campus, Maharajgunj, Kathmandu, Nepal*

ABSTRACT

Introduction: Palatogingival groove (PGG) is a developmental dental anomaly present as a hollow depression in the shape of a funnel, seen mostly in maxillary lateral incisors. The PGG serves as a funnel, trapping plaque difficult to clean by instrumentation and starting a localized inflammatory response in the area around it. Localized gingivitis and periodontitis with or without pulpal pathology are diseases associated with the groove. This study aimed to determine the prevalence of palatogingival grooves in dental casts of patients visiting a tertiary care centre.

Methods: This was a descriptive cross-sectional study conducted in dental casts of patients taken for diagnostic and treatment purposes in the Department of Tribhuvan University Teaching Hospital. A total of 204 dental casts were examined for the absence/ presence, unilateral/ bilateral distribution of the PGG. The data were entered in a Microsoft Excel sheet, and for the statistical analysis, Statistical Package for Social Sciences (SPSS) version 26 was used. Descriptive statistics were presented as percentages and frequencies for categorical data.

Results: A total of 204 dental casts (408 maxillary lateral incisors) were examined in the study, among which 120 (58.82%) were of females, and 84(41.18%) were of males. Out of the 408 lateral incisors examined, the prevalence of PGG was 100 (24.50%). The groove was found to be bilateral in distribution in 20 (9.80%) patients.

Conclusion: In the present study, the prevalence of PGG among dental patients was 24.5% which was higher than shown by other studies conducted in a similar setting.

Keywords: Developmental anomaly; lateral incisors; periodontitis; prevalence

INTRODUCTION

Palatogingival groove (PGG) is a developmental anomaly found on the lingual aspect of the maxillary incisors, described with different names in the literature, such as palatal-radicular, Cingular-radicular, radicular-lingual, disto-lingual, and vertical developmental groove.[1,2] PGG was first reported as a radicular groove by Black in 1908.[3] It can be classified into different types, such as distal or mesial based on location, or mild, moderate, and severe based on the extent and complexity of the groove.[2,4]

It typically originates near the cingulum and extends apically toward the cementoenamel junction (CEJ) and the root surface.[4] It is frequently associated with localized periodontitis and pulpal necrosis.[4,5] The possible etiologic factors of PGGs include enamel epithelium infoldings, Hertwig's epithelial root sheath anomalies, variants of dens invaginatus or genetic factors, and failed attempts to form an additional root.[6]

The early diagnosis of PGG can help prevent caries, pulpal necrosis and periodontal destruction in patients.[7] Though numerous studies have been conducted to find the prevalence of PGG in several

Correspondence
Dr Radha Baral
Email: drradha@iom.edu.np

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regions of the world so far, only a few studies have been conducted in the Nepalese setting. The objective of the study was to estimate the prevalence of PGG in patients visiting the Department of Dentistry at a tertiary care centre.

METHODS

A descriptive cross-sectional study was conducted in the Department of Tribhuvan University Teaching Hospital from January 2023 to June 2023 using dental casts of patients constructed for diagnostic and treatment purposes. The ethical approval for the study was obtained from the Institutional Review Committee of the Institute of Medicine, Kathmandu [Reference number: 322(6-11) E2]. The inclusion criteria for the study were dental casts of good quality, with teeth having morphological details. The exclusion criteria were the dental casts of patients with one/ both missing lateral incisors, poor quality of the dental casts having voids or fractured teeth. Lateral incisors having restoration, root canal treatment or crown, retained deciduous lateral incisors and those with congenital malformations were also excluded from the study, which was confirmed from the patients' records.

A convenience sampling method was used. The sample size was calculated using the prevalence of PGG in maxillary lateral incisors shown in the study done by Shrestha et al.[8] in the Nepalese population using the formula:

$n = Z^2 \times p \times q / e^2$

$= (1.96)^2 \times 0.157 \times (1-0.157) / (0.05)^2$

$= 203$

Where,

n= minimum required sample size

Z= 1.96 at 95% Confidence Interval (CI)

p = 15.7% prevalence of PGG in maxillary lateral incisors[6]

q= 1-p

e= margin of error, 5%

The calculated minimum sample size was 203.38.

Hence, 204 dental casts, of which 408 lateral incisors were included in the study. For the collection of the required data, dental casts of patients were obtained after taking informed consent from the patients. The lingual surfaces of the maxillary lateral incisors were examined using a probe under natural light. A linear groove running from the cingulum area of the permanent maxillary lateral incisor was visually examined. The groove was appreciated by tactile sensation using a probe upon gently passing over the lingual surface of the tooth to diagnose it as PGG. The data obtained from the casts was filled in a pre-designed pro forma sheet. The data was entered in a Microsoft Excel sheet and was analysed using IBM SPSS Statistics 26.0. Descriptive statistics were presented as proportions (Percentages) and frequencies for categorical data.

RESULTS

A total of 408 lateral incisors in 204 casts were examined. Of the total 204 casts, 120 (58.82%) were of females, and 84(41.18%) were of males. Among 204 dental casts of patients, the prevalence of PGG on the lateral incisor was 80(39.21%). Frequency of PGG was found to be higher among females 43(21.07%) compared to males 37(18.13%). The gender wise distribution of the PGG groove is given in Table 1.

Out of the 408 lateral incisors examined, the prevalence of PGG was 100 (24.50%). Total unilateral presentation was 60 (75.00%), of which 35(44.00%) were on right lateral incisors and 25 (31.00%) on the left lateral incisors. Bilateral presentation on the PGG was 20(25.00%) (Figure 1).

Table 1: The gender-wise distribution of the palatogingival groove (n=204)

Gender	Right Only	Left Only	Bilateral
Male	14 (6.86%)	14 (6.86%)	9(4.41%)
Female	21 (10.29%)	11 (5.39%)	11(5.39%)
Total	35 (17.16%)	11 (12.25%)	20 (9.80%)

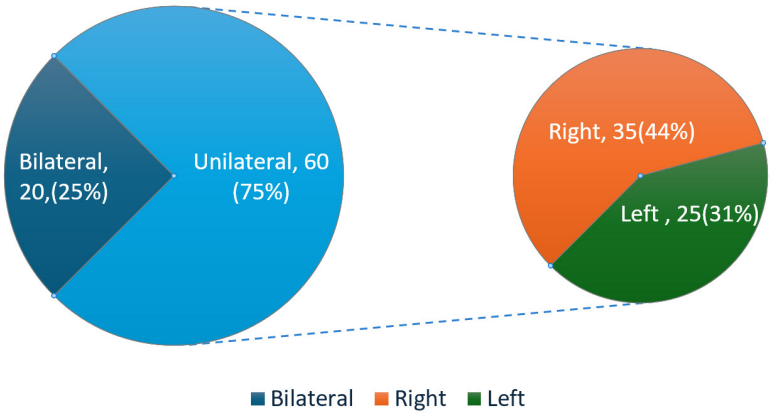

Figure 1: Unilateral and bilateral presentation of palatogingival groove

DISCUSSION

PGGs are developmental malformation that exists on the palatal aspect of the incisor teeth and runs towards the mesial, distal or midpalatal root regions.[9] These grooves function as 'funnels,' promoting the accumulation of microbial dental plaque at the base of the groove, which is inaccessible for cleaning to both patients and clinicians.[10] They have been associated with different periodontal diseases, including gingivitis and periodontitis with or without pulpal disease. In severe cases, it can lead to a primary periodontal lesion with secondary involvement of the pulp.[4,9,11]

Different studies have reported variable prevalence of PGG ranging from 0.93% to 44.6%.[12] In the present study, out of 408 lateral incisors examined, the PGG groove was present in 100(24.5%) teeth. In the extracted maxillary lateral incisors of 1786 patients, Kogon revealed a frequency of 5.6%.[13] Similarly, Pecora et al showed a prevalence of 2.6% in the lateral incisors of 421 extracted lateral incisors.[14]A substantial racial connection was found in the incidence among Chinese people, which showed a greater percentage of 30.2% for maxillary lateral incisors.[10] In a Cone Beam Computed Tomography(CBCT)-based study in the Saudi population, the incidence of the PGG in the maxillary lateral incisor was found to be 4.9%.[1] A similar radiographic study has reported the prevalence of PGG in the lateral incisor as 4.2%.[3] In a study conducted among 231 Nepalese patients, where a total of 1362 maxillary anterior teeth were examined, the prevalence of PGG was found to be 6.6% in all maxillary anterior teeth and 15.7% in lateral incisors only.[8] Another CBCT based study reported prevalence of PGG 2.77% in maxillary lateral incisors.[15] In another study conducted among dental students in Italy, a radicular groove on the lateral incisor was reported in 5.5%.[16] These figures reveal that the prevalence of PGG in our study was higher than in some previous studies. The higher prevalence of PGG in the present study may be attributed to ethnic factors in the sample population. Another reason could be better visibility of PGG in dental casts than in the examination of the patient and focused examination on the lateral incisors.

These variations in prevalence in different studies could be due to the diagnostic criteria and different techniques used for diagnosis. These studies have employed varying methodologies, including examination of the extracted teeth, clinical evaluation and CBCT-based assessments. Moreover, ethnic and geographic variation could be the key factors for different prevalence rates.[6] It is also important to note that the prevalence rates become higher when the basis of calculation is considered individual rather than the number of teeth. In our study, the PGG was present in 80 (39.21%) patients' casts and in 100 (24.50%) out of 408 teeth observed.

Among the 204 casts observed, the prevalence of unilateral PGG was 60(75.00%) in the present study. Bilateral presentations were seen in 20(25.00%). Similarly, bilateralism was found in only 26.6% cases

in the study conducted by Shrestha et al. In the study conducted by Lekshmi et al, all the cases of PGGs in maxillary lateral incisors were unilateral.[3] In another study conducted in the Saudi population, PGG was found to be unilateral in 61.5% and bilateral in 38.5%.[1] Conversely, previous literature has reported bilateralism in PGG to be more common 306(73.21%), compared to unilateral presentation 60(14.35%).[6] In another study by Demore et al, bilateral presentation was seen more often.[7] These differences could be attributed to developmental and genetic factors. Unilateral presentation indicates that at the time of tooth development, the events that took place at one side did not take place on the other side of the arch.[17]

In the present study, PGG was more prevalent in females 43(21.07%) compared to males 37(18.13%). Similar to these findings, Shrestha et al have reported PGGs in 56.6% females compared to 43.3% male Nepalese patients.[8] Demore et al. have reported a higher prevalence of PGG in females compared to males in the Brazilian population.[7] Another study conducted in the Libyan population has also reported female prediliction.[18] In contrast, other studies have reported PGG to be more prevalent in males compared to females.[6,17,19,20] Literature shows no clear gender related patterns in PGG. The female predilection in our study could be because the fact that majority of the patients, 120 (58.82%) were females in our study.

The current study helps to enhance the knowledge and understanding of PGG in the Nepalese population, which can be beneficial to both patients and dentists. Dentists should be aware of the possible presence of PGG and associated pockets while examining patients. Patients with PGG should be educated about proper oral hygiene and the need for regular dental visits to prevent periodontal pathologies. In addition, PGG should be suspected in a non-vital maxillary anterior tooth when there are no signs of caries, cracks, or a history of dental trauma.

The present study has certain limitations. As the study was based on dental casts, the radicular extent of the lesion could not be evaluated and classified. Moreover, the study is based on a single center. Future research involving a larger, multi-center population, combined with comprehensive clinical examination and advanced imaging techniques, is recommended to enable precise diagnosis and accurate assessment of the extent of PGG.

The findings of the study could have clinical and academic implications, such as screening for PGG in routine examination of patients and applying preventive measures, which could help to reduce the overall burden of periodontal and pulpal pathologies.

CONCLUSION

The PGG was common among dental patients of a tertiary care centre, and its prevalence was higher than in other studies conducted in similar settings. It was more common in females compared to males. Unilateral PGGs were more frequent compared to bilateral. The knowledge and understanding of PGG can be helpful to the dental practitioners for early diagnosis of periodontal and pulpal diseases caused by it.

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