



ORIGINAL RESEARCH PAPER

Dental Science

DENTAL CROWDING AS A PREDISPOSING FACTOR IN RAPID CALCULUS FORMATION

KEY WORDS: Dental Crowding, Calculus, Intraoral Camera

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ABSTRACT

Background: Dental crowding makes it challenging to maintain oral hygiene since there is food debris accumulation in the interdental area which cannot be removed by regular brushing. **Objective:** To determine the prevalence of calculus deposition among a population having dental crowding in the city of Hyderabad. **Materials And Methods:** This study was conducted by OroGlee Solutions Private Limited, Hyderabad. A total of 1019 subjects aged 18 to 60 years were examined and grouped based on the presence or absence of dental crowding and calculus. **Results:** Percentage of people with dental crowding having calculus deposition was 57.9% and percentage of people without dental crowding having calculus deposition was 45.2%. Chi square test was used to determine the significance of difference between the prevalence of calculus in subjects with crowding and in subjects without crowding, which showed a statistically significant correlation between dental crowding and calculus deposition. **Conclusion:** Crowding influences the oral hygiene condition. It is mandatory to remove this calculus contributing factor to achieve an optimum level of oral hygiene and decrease periodontal problems.

INTRODUCTION

Dental crowding is a condition in which there is not enough space in the jaw for the positioning of permanent teeth in proper alignment.^[1] This irregularity in dentition makes it difficult to clean teeth and maintain good oral hygiene leading to plaque and calculus build up which then causes gingivitis and periodontitis. Dental crowding ranks third after dental caries and periodontal disease as a major problem in oral health.^[2]

Crowding of teeth is a predisposing factor for calculus formation because oral hygiene maintenance becomes difficult without putting additional effort and time to access surfaces due to crowded teeth. Thus the bacterial plaque retains, accumulates and becomes indelible leading to periodontal problems.^[2]

Calculus forms when dental plaque undergoes mineralization. Pathogenic microorganisms colonize the teeth to form dental plaque. They release toxins and produce enzymatic effects, thereby inducing gingivitis.^[3] In the absence of proper hygiene due to crowding of teeth, over time the microbial dental plaque calcifies to form calculus, which further facilitates plaque accumulation. This microbial plaque is considered to be the primary causative factor for periodontal diseases.^[4]

Calculus adheres tightly to the tooth surface and becomes difficult to remove. When there is crowding of teeth, the overlapping surfaces become harder to reach while brushing, making it even more difficult to remove this calculus buildup without professional cleaning at a dental clinic.^[5]

The aim of this study was to correlate the crowding of teeth with calculus accumulation indicative of poor oral hygiene and focus on the important role of motivating people to get treatment for crowding along with practicing proper brushing technique and maintaining oral hygiene.

MATERIALS AND METHODS

A cross-sectional survey was conducted by OroGlee Solutions Private Limited, Hyderabad, among the staff (aged between 18 and 60 years) of 21 different cafes and corporate offices in the city of Hyderabad in the duration of 8 months from November 2021 to June 2022. A total of 1019 adults were examined at their respective places of work. A survey questionnaire was prepared to acquire personal details such

as age, gender, occupation, hometown, relevant dental and medical history and habits. Dental crowding was checked and recorded according to the area and teeth involved. Calculus deposits were checked and recorded according to the level of surface(s) covered.

Oral examination was done using an intraoral camera connected to a laptop to record videos of all aspects of teeth. A thorough oral examination was also done using a mouth-mirror and torch. Informed oral consent of the participants was obtained before examination.

Inclusion Criteria

Participants from the age group of 18 to 60 years were included in the study. Cases included subjects who had some level of dental crowding. Controls were the subjects who did not have any form of dental crowding.

Exclusion Criteria

Participants above the age of 60 years were excluded from the study. The data analysis was done using SPSS version 28. The chi-square test was used to test whether there were significant differences in the prevalence of calculus in people with and without dental crowding. $P \leq 0.05$ was considered statistically significant.

Table 1: Prevalence Of Calculus Among People With And Without Dental Crowding.

	People with Calculus deposition	People without Calculus deposition	Total
People with dental Crowding	260	189	449
People without dental crowding	258	312	570
Total	518	501	1019

RESULTS

A total of 1019 subjects, aged between 18 and 60 years participated in the study. They were divided into two groups: people with dental crowding (44.1%) and people without dental crowding (55.9%). Calculus percentages among the study subjects in the two groups were as follows: People with dental crowding have 57.9% prevalence of calculus deposition and people without dental crowding have 45.2% prevalence of calculus deposition. The significance of difference between the prevalence of calculus in subjects

with crowding and in subjects without crowding is determined by using Chi square test. Chi square value is 15.98 which is higher than the value (3.84) for the significance level of $P \leq 0.05$. This shows that there is a statistically significant relation between dental crowding and calculus deposition.

DISCUSSION

Dental crowding is the condition where the teeth are not aligned properly in the dental arch. Crowding mainly occurs due to the disproportion between the size of the teeth and the length of the dental arch.^[1] It is one of the most frequent dental anomalies, with the highest prevalence being in the anterior region (central incisor, lateral incisor, and canine).^[2] Crowding of teeth is mild when one or two teeth in the upper or lower jaw are slightly rotated or misaligned. Crowding of teeth is considered medium when two to three teeth overlap in the upper or lower jaw and severe when most of the teeth of the upper or lower jaw overlap.^[1]

Dental calculus is formed when the bacterial plaque is mineralized. It presents as a major oral health problem as it aids in further accumulation of plaque and bacterial toxins and hinders their adequate and effective removal due to its surface roughness.^[5]

The common periodontal diseases - gingivitis and periodontitis, have been associated with the accumulation of dental calculus. The significance of dental calculus in the initiation and progression of periodontitis has been demonstrated in several studies.^[3]

Crowding poses serious danger in terms of calculus accumulation as well as dental caries, rapid dental attrition and gum recession.^[6] Therefore it is important to correct the misalignment not just for aesthetic purpose but for better oral health in general.

Calculus accumulation occurs more rapidly in crowded teeth. The key factor for this is the inability to keep all the surfaces of the teeth from plaque deposition leading to its calcification into the calculus. Once this calculus has formed, it becomes difficult to remove with just brushing and it further gives more surface area for plaque deposition. This leads to an array of problems found to be associated with plaque and calculus deposition like dental caries, gingival and periodontal diseases. One of the reasons for performing orthodontic therapy for correction of crowding is an increase in the periodontal disease associated with it.^[6]

In the present study, a total of 1019 subjects were divided into two groups, percentage of people with dental crowding is 44.1% whereas percentage of people without dental crowding is 55.9%. The prevalence of calculus in people with dental crowding is 57.9% and in people without dental crowding the prevalence of calculus is 45.2%. The significance of difference between the prevalence of calculus in subjects with crowding and in subjects without crowding is determined by using Chi square test, which showed a statistically significant correlation between dental crowding and calculus deposition.

This finding is in accordance with a study done by Sana Farooq *et al* on 6 to 13 year old children at government school in Sakipur village of Greater Noida which states that dental calculus was significantly more among the subjects with dental crowding.^[2]

Another study by Fons-Badal *et al* at the University of Valencia dental clinic, Spain showed a greater presence of overcrowding was recorded in the rapid calculus formation group (64.7%) in comparison with the group of slow calculus formers (35.3%).^[5]

A study by Baharvand *et al* at Shahid Beheshti Dental School,

Tehran concluded that 69.2% of the study population had crowding in site of dental calculus.^[7]

CONCLUSION

There are many factors associated with the etiology of calculus deposition and the findings of this study indicate that the presence of dental crowding is an important contributor to the deposition of dental calculus. Efforts should be made by the dentists to increase the awareness about this aspect of dental crowding. By getting the crowding corrected on time, calculus deposition and subsequent development of conditions like gingivitis and periodontitis can be avoided, as maintaining the oral hygiene becomes easier and effective in the absence of crowding.

Conflict Of Interest

There are no conflicts of interest.

Source Of Funding

This study was funded by OroGlee Solutions Private Limited, Hyderabad.

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