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# EVALUATING ORAL HYGIENE IN 9-12 YEARS OLD CHILDREN WITH DENTAL CROWDING: A SCHOOL-BASED STUDY

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## ABSTRACT

**Background:** Crowded teeth refer to the condition where teeth are misaligned outside of the normal dental arrangement, resulting from a discrepancy between tooth size and dental arch dimensions. Crowded teeth occur due to a difference between the space required within the dental arch and the space available within it. This research aimed to determine the relationship between crowded teeth and oral hygiene among 9-12 years old students at SDN 92/V Gemuruh, Tanjung Jabung Barat Regency.
**Method:** This research employed an analytical survey design with a cross-sectional approach. The population in this study consisted of all fourth and fifth-grade students at SDN 92/V Gemuruh with the age range of 9-12 years old, totaling 49 students. A sample of 39 students was selected using purposive sampling. Oral hygiene was assessed using the PHP-M (Personal Hygiene Performance-Modified) index. The chi-square test was used to compare oral hygiene between groups.
**Result:** The results showed that out of 39 respondents, 84.6% students had crowded teeth, while 15.4% of students did not. Regarding oral hygiene status, 12.8% of students had good oral hygiene, 48.7% had moderate oral hygiene, and 38.5% had poor oral hygiene. The statistical test results showed a p-value of 0.201 ($p > 0.05$), indicating that there is no significant relationship between crowded teeth and oral hygiene in 9-12 years old students.
**Conclusion:** No significant relationship between crowding and oral hygiene status among 9-12 years old students at SDN 92/V Gemuruh, Tanjung Jabung Barat Regency

**Keywords:** Dental crowding; Oral hygiene; PHPM

## INTRODUCTION

Crowding is a common kind of malocclusion in which teeth are positioned too closely together, resulting in tooth rotation, displacement in different directions, and overlap (*Mosby's Medical Dictionary*, 2013). This condition developed as a result of insufficient space in the dental arch to accommodate all the teeth. It is a frequent orthodontic problem that makes it difficult for school-age children to practice good oral hygiene(Gul et al., 2023). Having crowded teeth makes it more difficult for kids to properly eliminate plaque because of the small, tough-to-clean crevices they produce. These regions are therefore more prone to plaque buildup, raising the possibility of gum disease and tooth cavities (Gopalasamy et al., 2020).

The prevalence of crowding varies between countries and continents. From 28,4% in America, 41,5% in Africa, 6,5% in Asia and 16% in worldwide(Lombardo et al., 2020). A high prevalence of crowding was also found in 12-17 years old subjects in Iraq with about 57% (Hasan, 2018).

Another study in Shanghai showed that there was an anterior crowding of more than 2 mm in 28.4% of the individuals. Remarkably, among subjects, anterior crowding was more common in the mandible (22.5%) than in the maxilla (13.3%). Girls were more likely than boys to have anterior crowding; these

dimorphisms may be explained by variations in skeletal maturity and/or the emergence of permanent teeth(Yu et al., 2019).

Children between the ages of 9 and 12 have mixed dentition and transitional growth, which often presents unique challenges for maintaining effective oral hygiene due to dental crowding, which can significantly complicate oral hygiene practices. As permanent teeth erupt, they may cause crowding and misalignment. This can result in overlapping teeth and tight spaces that are hard to reach with a toothbrush or floss. Crowded and misaligned teeth create difficult-to-clean areas, leading to increased plaque buildup and a higher risk of cavities and gum disease. Proper cleaning in these tight spaces requires more effort and specialized techniques(Kolawole & Folayan, 2019).

Dental crowding occurs when there is insufficient space in the dental arch to accommodate all the teeth, leading to overlapping and misalignment. This condition is known to exacerbate difficulties in cleaning hard-to-reach areas, increasing the risk of plaque accumulation and subsequent dental issues such as caries, gingivitis, and periodontal disease. Despite the known risks, there is limited research specifically focusing on how dental crowding impacts oral hygiene practices and outcomes in this age group(Daoud et al., 2021).

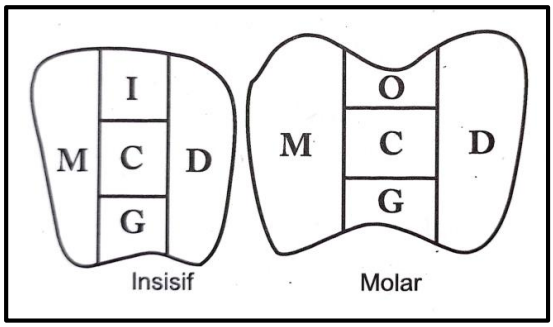
A previous study on Junior high school students in Tasikmalaya showed a relationship between crowded teeth and the Hygiene Index (HI) score. It involved 43 participants, where those with crowded teeth had 43.5% with good HI scores and 56.5% with poor HI scores. In contrast, those without crowded teeth had 75.0% with good HI scores and 25.0% with poor HI scores. The study found a significant relationship between crowded teeth and the HI, with a p-value of 0.037, which is less than the 0.05 significance level(Sari, 2023).

This school-based study focuses on evaluating how dental crowding impacts the oral hygiene of children in this age group. By understanding these dynamics, educators and dental health professionals can implement targeted interventions and education programs within schools. These efforts aim to empower children with effective oral hygiene practices, promoting better dental health outcomes and overall well-being during their school years and beyond.

## METHODS

This study employs an analytical survey design with a cross-sectional approach. A total of 39 fourth and fifth-grade students at SDN 92/V Gemuruh data collected through dental examinations to assess crowding status and dental hygiene score using the PHPM (Personal Hygiene Performance-Modified) index from Marten and Meskin (Martens & Meskin, 1972).

The index evaluates dental plaque by assessing selected teeth' buccal (cheek side) and lingual (tongue side) surfaces after employing a disclosing agent to reveal plaque. Each surface is divided into 5 sub-division areas consisting of M(mesial), D(distal), G (gingival), C(central), and I(Incisal) for anterior teeth and O(occlusal) for posterior teeth. Every area that is covered with dental plaque will give a score of 1. PHP-M scores were obtained by dividing the total sum of the scores by the number of surfaces examined.




Picture 1. Sub-division area for plaque scoring in PHP-M index (Martens & Meskin, 1972)

PHP-M scores are then categorized into Excellent (0), Good (0,7-1,7), Fair (1,8-3,4),

and Poor (3,5-5,0). Statistical analysis involves chi-square testing to compare between groups.

## RESULTS AND DISCUSSION

The research findings reveal that the frequency distribution of respondents with crowded teeth is 84.60%, while those without crowded teeth were 15.40% (table 1). This study is consistent with the research conducted by Sari et al., that a majority of respondents (53.5%) also had crowded teeth (Sari, 2023).

**Table 1.** Relationship between dental crowding status and oral hygiene status

| Dental Crowding Status | Oral Hygiene Status | | | | | | Total | | *p-value* |
|---|---|---|---|---|---|---|---|---|---|
| | Good | | Fair | | Poor | | | | |
| | n | % | n | % | n | % | N | % | |
| Non Crowded | 2 | 33,30 | 3 | 50,00 | 1 | 16,70 | 6 | 15,40 | 0,201* |
| Crowded | 3 | 9,10 | 16 | 48,50 | 14 | 42,40 | 33 | 84,60 | |
| Total | 5 | 12,80 | 19 | 48,70 | 15 | 38,50 | 39 | 100 | |

* Chi-Square test

This may be attributed to the respondents being at the mixed dentition stage, where the eruption of permanent teeth aligns with the arch curvature. Additionally, early extraction of primary teeth might contribute to this condition. Early removal of primary teeth can also result in permanent teeth lacking directional growth guidance, thus impeding their proper alignment(Bhujel et al., 2016)

The oral hygiene examination showed that most of the respondent has fair oral hygiene (48,7%), 12,8% of the students had good oral hygiene, and 38.50% had poor oral hygiene. This finding is consistent with the research on crowded teeth among students in grades IV and V at Binjai Timur which showed that most of the respondent also had 47% of students were in fair group, and 53% had poor oral hygiene(Aritonang et al., 2022).

This condition may be attributed to the fact that some respondents have not yet developed good habits in maintaining oral hygiene. Proper oral hygiene can be achieved through brushing teeth to remove plaque from the tooth surfaces. Brushing should be performed at least twice daily, in the morning after breakfast and in the evening before bedtime.

Previous studies also showed that plaque accumulates more readily in these areas because the toothbrush bristles and dental floss cannot easily reach the interproximal spaces between crowded teeth(Mustilwar et al., 2022). Some findings also indicate that one of the periodontal problems found in people with crowded teeth is the accumulation of plaque(Ma'rifatullah et al., 2021).

The statistical test results indicated no significant relationship between crowded teeth and oral hygiene (p-value 0.201). The lack of a significant difference may be due to the fact that most respondents in this study exhibited similar behaviors in maintaining oral hygiene. As a result, the oral hygiene status of respondents with crowded teeth and those without crowded teeth did not show a substantial difference.

A previous study conducted in Pakistan on respondents aged 14-25 years also showed similar results, where no significant correlation was found between anterior crowding and the plaque index (p-value = 0.690). However, a significant correlation was observed with the gingival index score (p-value = 0.036)(Hamza et al., 2019).

Different results were found in another previous study in Lahore, Pakistan on respondents above 18 years old. The results showed that crowding strongly correlates to the buildup of debris and calculus (OHI-S score), especially in young adults, and may develop further into periodontal disease(Gul et al., 2023) .

Our findings only divide the crowding groups based on is there any teeth that were positioned as misaligned present, without grading the severity of crowding. Previous study showed that, there were significant difference between severity of crowding and OHI-S with p value 0,03 (Obi et al., 2023).

Another study showed a different result, which showed that a weak correlation was found between the ALD (arch length discrepancy), a degree of severity in crowding with O'Leary plaque index value with a statistical significance of $p = 0.033$ ($p<0.05$), and a correlation coefficient value of $r = -0.352$. This study also found that there were cases that has lower degrees of ALD but showed poor plaque index, A contributing factor to the problem is the general lack of understanding and awareness of the significance of keeping good oral hygiene. However, some data—such as crowding values greater than 3 milli meters or diastema values greater than 0 milli meters have a bad ALD index; still, the O'Leary plaque index criteria reveal good or moderate values. Despite having crowded teeth, patients may make more efforts to maintain oral hygiene since they are more conscious of it (Fauzia et al., 2023).

The age seems also contributed to our finding. Our research was conducted on 9-12 years old students. A previous study in India showed that plaque distribution based on age group showed that the group of 18-21 years had lesser plaque accumulation than the group of 22-25 years old (Gopalasamy et al., 2020).

Our findings also have a similar result in a previous study conducted on 6 to 12 years respondents that showed that no significant difference (p-value 0,397) was found between crowding status and oral hygiene using OHI-S described by Greene and Vermillion (Kolawole & Folayan, 2019).

Children age 6-12 years old are in the phase of mixed dentition. Crowding can be caused by retained teeth, premature loss, supernumerary or anomaly in tooth-shaped teeth present. It can be one of the combination of those factors(Chantic et al., 2020).

## CONCLUSION

From this study, it can be concluded that there is no significant correlation between crowded teeth in children aged 9-12 years and oral hygiene.

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