

Identification of Dental Factors Associated With Crowding Malocclusion in Primary School Children in Jakarta

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Abstract

Malocclusion is the misalignment of teeth. One kind of malocclusion is crowding caused by dental factors, such as premature loss, retained teeth, supernumerary teeth, and tooth shape anomaly. The characteristics of crowding are rotation, overlapping, or displacement of teeth. We aimed to identify the prevalence of dental factors that cause crowding malocclusion in primary school students in Jakarta. We evaluated 81 students from randomly selected schools in the subdistrict of Johar Baru, Jakarta, for the presence of crowding malocclusion and the dental factor. Of the students with crowding malocclusion, 48.15% had premature loss, 58.02% had retained teeth, 9.88% had supernumerary teeth, and 9.88% had tooth shape anomalies. In some cases, crowding malocclusion was caused by more than one dental factor. Of the students with a combination of dental factors, 12% had premature loss with retained teeth, 0.67% had premature loss with tooth shape anomaly, 5% had retained teeth with supernumerary teeth, 4% had retained teeth with tooth shape anomaly, and 2% had supernumerary teeth with tooth shape anomaly. The most prevalent dental factors associated with crowding malocclusion were retained teeth and a combination of premature loss with retained teeth.

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Introduction

Malocclusion is defined as a misalignment or incorrect relation between the teeth of the two dental arches.¹ One common condition of malocclusion is crowding, in which the teeth are too close, causing alterations in position, such as overlapping, displacement in various directions, and rotation of teeth.² According to Cobourne and DiBiase, crowding represents a discrepancy between the size of the teeth and the size of the dental arch.³ The teeth can become crowded due to dental factors, such as premature loss of deciduous teeth, retained teeth, supernumerary teeth, or teeth with shape anomalies. Other causes of crowding include habits, such as thumb sucking and mouth breathing.⁴⁻⁷ This kind

of factor is the risk factor that causes dimensional changes in the dental arch. The results of such changes include drifting (shifting of teeth due to lack of space), eruption of teeth outside the dental arch, and impaction, which results in the shortening of the dental arch and reduces space for tooth eruption.^{3,8} Malocclusion affects an individual's aesthetic appearance, which can cause psychosocial problems. Moreover, it causes problems with oral functions, such as mastication and speech, and increases the risk of trauma and periodontal disease.⁸⁻¹¹

Crowding malocclusion often requires orthodontic treatment, but the treatment can be complex, expensive, and challenging. Thus, early detection of the causes of crowding malocclusion is necessary. If dental factors are detected early, the crowding can be prevented by orthodontic treatment. Early diagnosis of conditions affecting the normal development of dental occlusion significantly reduces the incidence of malocclusion. Preventive orthodontic treatment is necessary in children with mixed dentition, which occurs between the ages of 7 and 11.^{12,13}

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This study was conducted to identify the prevalence of dental factors associated with crowding malocclusion. This is the first study of dental factors that cause crowding malocclusion in Jakarta.

Materials and methods

An observational cross-sectional study was conducted over a period of 4 months (July to October 2018) among children aged 6 to 12 years, at which age the dentition is mixed. The study was conducted at one randomly selected primary school in the subdistrict of Johar Baru in central Jakarta. Participants were selected using the convenience sampling method. A total of 298 primary school children (152 boys and 146 girls) were enrolled after written informed consent was obtained from the children's parents or guardians. We included only children with both dental factors and crowding malocclusion; some children were excluded because they had received or were receiving orthodontic treatment, and 1 child was excluded because of occlusion-related habits and malnutrition. The final size of the sample was 81; the criteria for inclusion were dental factors, such as premature loss of deciduous teeth, retained teeth, supernumerary teeth, and teeth with shape anomalies.

This study was approved (Ref. number: 80/Ethical Approval/FKGUI/IX/2018) by the Ethics Committee of the Faculty of Dentistry, Universitas Indonesia (Protocol number: 010890818). Each primary school was approached through the local district office, and permission was obtained from the school's authorities. Explanatory and consent forms were sent to parents a few days before the dental examination, and only children whose parents provided written informed consent were included in the study. Verbal consent was obtained from all the participants as well.

The observers examined the participants and discussed the findings according to the diagnostic criteria. The process was repeated several times until reliability was achieved. Twenty-five children underwent examination by two observers, which yielded an intraobserver Kappa value of 0.9.

Results

Of the 81 children included in the analysis,

44 were boys and 37 were girls. Two children were 6 years old, 16 were 7 years old, 16 were 8 years old, 17 were 9 years old, 16 were 10 years old, 12 were 11 years old, and 2 were 12 years old.

Table 1 summarizes the frequencies of the dental factors that caused crowding malocclusion in the participants. The most prevalent factor was retained teeth, which affected 58.02% of the children. It was more prevalent in boys (51.1%) than in girls.

Dental factors were not limited to only one tooth per child. In this study, 55 teeth were prematurely lost in 39 children; the highest number of teeth prematurely lost in a child was 4 (mean, 0.68 teeth). In 47 children, 121 teeth were retained; the highest number of retained teeth in a child was 5 (mean, 1.49 teeth). In 8 children, 9 teeth were supernumerary, and in 8 children, 9 teeth had shape anomalies; thus, the highest numbers of supernumerary teeth and of teeth with shape anomalies in a child were 2 (mean, 0.11 teeth each).

Characteristic		Dental Factors			
		Premature Loss	Retained Teeth	Supernumerary	Shape Anomaly
Prevalence (%)	<i>n</i>	39	47	8	8
	%	48.15%	58.02%	9.88%	9.88%
Gender	Boys	<i>n</i>	24	3	2
		%	61.5%	51.1%	37.5%
	Girls	<i>n</i>	15	5	6
		%	38.5%	48.9%	62.5%

Table 1. Prevalence of dental factors that caused crowding malocclusion in 81 primary school children.

Dental Factors	<i>n</i>	Prevalence (%)
Premature loss	27	33.3%
Retained teeth	30	37%
Supernumerary teeth	2	2%
Shape Tooth shape anomaly	1	1%
Premature loss + retained teeth	10	12%
Premature loss + tooth shape anomaly	2	2%
Retained teeth + supernumerary teeth	4	5%
Retained teeth + tooth shape anomaly	3	4%
Supernumerary teeth + tooth shape anomaly	2	2%
Total	81	

Table 2. Prevalence of combinations of dental factors that caused crowding malocclusion in 81 primary school children.

Table 2 lists the number of dental factors in children with more than one factor. We found

that 60 children had only one dental factor and 21 had a combination of two dental factors. No child had three or more dental factors. Therefore, the highest prevalence for a single dental factor was 10.07% (retained teeth), and the highest for a combination of dental factors was 3.36% (retained teeth and supernumerary teeth).

Discussion

This is the first study in Jakarta of the prevalence of dental factors associated with crowding malocclusion in primary school children. We found that among children with crowding malocclusion, the prevalence of retained teeth was quite high (58.02%). Premature loss accounted for 48.15% of cases, and supernumerary teeth and shape anomalies accounted for only 9.88% each.

The overall prevalence of each dental factor is different in other geographical locations. The prevalence of premature loss was higher among primary school children in Cimahi, Indonesia,¹⁴ in Yemen,¹⁵ and in India¹⁶ than in our study. This difference might be attributable to different rates of dental caries, infection, or trauma.¹⁷ The gender analysis revealed that premature loss was more prevalent among boys than among girls. An earlier study in Cimahi also revealed that more boys than girls had crowding malocclusion.¹⁴ This finding is inconsistent with those of studies conducted in India, where gender differences were not found.¹⁸

The prevalence of retained teeth in our study was higher than that in a study in Makkah (Mecca), Saudi Arabia. Further examination is needed to determine whether retention of deciduous teeth occurs due to agenesis of permanent teeth, impaction, ankylosis, or ectopic eruption.^{19,20}

The prevalence of supernumerary teeth was higher in our study than those reported for primary school children in Turkey,²¹ Hong Kong,²² and northern Greece.²³ In all the earlier studies, the most common type of supernumerary tooth was mesiodens,²³ but it is nonetheless rare. The presence of supernumerary teeth is also influenced by hereditary factors. These excess teeth must be treated immediately once detected because they will interfere with other tooth eruptions and result in a lack of space.^{3,8,24}

The prevalence of tooth shape anomaly was higher in our study than that reported for primary school children in India.²⁵ The cause of tooth deformities is hereditary, caused by a gene mutation. This dental factor must be managed because it can result in deficiencies and excess space in the dental arch.^{3,8}

The main limitation of this study is the sampling technique. We used convenience sampling, also known as accidental sampling, a type of nonprobability or nonrandom sampling in which the members of the target population who meet certain practical criteria (such as easy accessibility, geographical proximity, availability at a given time, or willingness to participate) are included in the study. The disadvantage of this sampling technique is that the results are likely to be biased and unpredictable.²⁶ Another limitation is the small number of participants.

Conclusions

Among primary school children in Jakarta, the most prevalent dental factors that caused crowding malocclusion were retained teeth and the combination of premature tooth loss and retained teeth. The prevalence of each dental factor in this study was higher than those in other studies because we focused strictly on crowding malocclusion; thus, the number of participants was smaller than those in other studies. Further large-scale studies of participants of different ages and larger sample sizes are needed to determine the association between crowding malocclusion and the dental factors that cause it.

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Declaration of Interest

The authors report no conflict of interest.

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