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Original article

Prevalence of dental anomalies in pediatric patients at Dental and Oral Hospital of Universitas Muhammadiyah Yogyakarta

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ABSTRACT

Background: *A dental abnormality is a deviation from the normal shape and structure of the teeth due to interference during growth and development. Various kinds of abnormalities occur, such as anomalies in the size, shape, position, number, and structure of the teeth. These conditions cause problems in the arch length and occlusion of the maxilla and mandible.* ***Purpose:*** *This study aimed to describe the prevalence of developmental dental anomalies in pediatric patients at the Dental and Oral Hospital of Universitas Muhammadiyah Yogyakarta (UMY) and its networks (Qatrunnada Kindergarten, Budi Mulia Dua Taman Siswa Kindergarten, and Muhammadiyah Sapen Pusat Primary School).* ***Methods:*** *A descriptive observational study with a cross-sectional design was conducted. There were 10,714 pediatric patients included.* ***Results:*** *The prevalence of developmental dental anomalies in pediatric patients at Dental and Oral Hospital, UMY and its network was 0.30%. The prevalence of mesiodens, hypodontia, and fusion dental anomalies were 0.14%, 0.056%, and 0.028%, respectively. There was a 0.019% prevalence of microdontia, peg tooth, and amelogenesis imperfecta. The prevalence of taurodontia and gemination was 0.009%.* ***Conclusion:*** *Dental anomalies occurred more frequently in male pediatric patients, and mesiodens was the most prevalent.*

Keywords: *Developmental dental anomaly; hypodontia; mesiodens; prevalence*
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INTRODUCTION

A dental anomaly is a deviation from the normal tooth shape due to a disruption in growth and development.[1] Dental anomalies are caused by growth disorders, but not all growth disorders produce abnormalities. Dental anomalies can occur in both deciduous teeth and permanent teeth. Both types of teeth are found in childhood.[2]

Genes determine the variations in a child's dental anomalies, as well as the patient's habits, nutrition, and multivitamin intake. Genetic and environmental factors play an essential role in determining variations.[3] Anomalies in the size, shape, position, number, and structure of teeth cause problems in the length of the arch and occlusion of the maxilla and mandible. Dental abnormalities cause dysfunction, decreased activity, and lowered work productivity, affecting the quality of life.[4]

Identifying the prevalence of dental anomalies can provide important information about the anthropology and clinical management of patients. The incidence and distribution of these anomalies are also important for understanding differences in and between populations. Early diagnosis of dental anomalies is needed to foresee the possibility of complications and to minimize the risks associated with dental procedures such as orthodontic treatment for children. Epidemiological studies have been carried out in various parts of the world; the prevalence of deciduous dental anomalies was 2.27% in South India, and other studies identified a range of 0.4–8.1%.[5] However, this issue has not been reported in Indonesia.

The most common dental anomaly in children, according to the study, is hypodontia, followed by fusion and gemination (double tooth). The third most common dental anomaly is supernumerary teeth.[6] This study

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aimed to determine the prevalence of developmental dental anomalies in pediatrics, to ensure that patients with anomalies receive proper treatment. Dental and Oral Hospital, UMY was selected due to its central location and the high number of people that seek treatment there.

MATERIALS AND METHODS

This study used a descriptive observational method with a retrospective study that used the medical records of the patients at the Dental and Oral Hospital of Universitas Muhammadiyah Yogyakarta (UMY) and its networks (Qatrunnada Kindergarten, Budi Mulia Dua Kindergarten, and Muhammadiyah Sapen Pusat Primary School). This study was approved by the ethical research committee of the Medical and Health Science Faculty, Universitas Muhammadiyah Yogyakarta, Indonesia (Number: 456/EP-FKIK-UMY/X/2018).

There were 10,714 medical records reviewed. This study analyzed primary and secondary data. The primary data were obtained from pediatric patients who participated in National Dental Health Month or Bulan Kesehatan Gigi Nasional (BKGN) 2018. The secondary data was obtained from the pediatric patients' medical records at Dental and Oral Hospital, UMY from 2013–2018. All who participated in BKGN 2018 were given and signed informed consent.

The inclusion criteria were orthopantomogram (OPG) or panoramic dental roentgen, medical records, data from pediatric patients aged 0–18 years at Dental and Oral Hospital, UMY and its networks in Indonesia, and agreement with informed consent. The exclusion criteria were incomplete medical records of pediatric patients in the Dental and Oral Hospital, UMY and its network. Incomplete medical records included those that did not have OPG or panoramic dental roentgen and patients that refused to give informed consent. The disease diagnosis, age, and address data of patients were obtained from the medical records. The data were analyzed by frequency distribution. All data were analyzed by the descriptive statistical method of cross-tabulation using Statistical Analysis for Social Science (SPSS) version 21 (IBM, Chicago, US).

RESULTS

Thirty-two patients had dental anomalies with a prevalence of 0.30 %. The highest dental anomalies occurred in the number of teeth, namely mesiodens (0.14%) followed by hypodontia (0.056%). Dental shape anomalies were less common. The prevalence of fusion was 0.028%, the prevalence of microdontia and peg shape abnormalities was 0.019%, while taurodontia and gemination were only found in one patient with the prevalence of each anomaly being 0.009%. Additional dental anomalies were found as shown in Figure 1. A structural anomaly, amelogenesis imperfecta, was found in one patient with a prevalence of 0.009% (Table 1).

Figure 1. Various dental anomalies found in children, from left to right: fusion, gemination, and mesiodens.

Table 1. Distribution of dental anomalies based on gender

Dental Anomalies	Frequency	Prevalence	Gender	
			Male	Female
Mesiodens	15	0.140%	9	6
Hypodontia	6	0.056%	4	2
Fusion	3	0.028%	1	2
Microdontia	2	0.019%	2	0
Peg shaped	2	0.019%	1	1
Amelogenesis Imperfecta	2	0.019%	1	1
Taurodonsia	1	0.009%	0	1
Gemination	1	0.009%	1	0
Total			19	13

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Table 2. Distribution of dental anomalies based on age

Dental Anomalies	Age (years old)		
	0–5	6–12	13–18
Mesiodens	1	11	3
Hypodontia	4	2	0
Fusion	3	0	0
Microdontia	0	0	2
Peg Shaped	0	0	2
Amelogenesis Imperfecta	0	0	2
Taurodontia	0	1	0
Gemination	0	1	0
Total	8	15	9

Table 3. Distribution of dental anomalies based on address

Dental Anomalies	Location		
	Jogja City	Sleman	Bantul
Mesiodens	5	3	7
Hypodontia	5	1	0
Fusion	2	1	0
Microdontia	0	1	1
Peg Shape	0	1	1
Amelogenesis Imperfecta	1	1	0
Taurodontia	1	0	0
Gemination	1	0	0
Total	15	8	9

Table 2 shows the distribution of dental anomalies based on the age of the patients; the highest frequency was found in pediatric patients 6–12 years old. Table 3 shows the distribution based on address with the highest frequency in Jogja City (15), Bantul Regency (9), and Sleman Regency (8).

DISCUSSION

Our study showed that mesiodens was the most prevalent anomaly identified at Dental and Oral Hospital, UMY and its network. The prevalence of mesiodens was 0.14%. The results of this prevalence were lower than the previous studies in various countries. Gündüz et al.[7] mentions the prevalence of mesiodens dental anomalies in the Caucasian population is 0.45%, in the Finnish population it is 0.4%, in the Norwegian population it is 1.43%, and in the Hispanic population it is 2.2%. Mesiodens is a dental anomaly in the form of canine-like teeth in the middle of the arch of the jaw. Hypodontia is the absence of one or several teeth. Microdontia is a tooth that looks smaller than normal size. Peg shapes are pointed teeth while amelogenesis imperfecta is a structural dental anomaly.[8]

Hereditary patterns found in dental anomalies include autosomal dominant, recessive, and X-linked characteristics, so the number of individuals affected in one family can vary. The most common form is X-linked, and it is this gene that regulates the size and shape of human teeth.[9] Systemic conditions and syndromes associated with macrodontia are otodental syndromes, 47 XYY syndromes, facial hemihyperplasia, and insulin-resistant diabetes. These anomalies can also arise due to developmental disturbances during the morpho-differentiation stage.[10] In general, dental anomalies are caused by complex interactions between genetic, epigenetic, and environmental factors during the long process of tooth development.[11]

As shown in Table 2, mesiodens was more prevalent in male pediatric patients. Our results were in line with the research conducted on the Indian population by Peediayil et al.[12] and Khandelwal et al.[13]. Mesiodens is the most common dental anomaly in permanent teeth and is rarely found in deciduous teeth.[14] This anomaly commonly irritates the tip of the tongue and interferes with appearance.[15] Mesiodens is primarily found between 6–12 years, coinciding with the time of eruption of the maxillary central incisors. Radiographs are performed to screen for congenital hypodontia, cysts, and tumours in late tooth eruptions or malposition.[16]

The next most prevalent anomaly in the number of teeth was hypodontia with a prevalence of 0.056%. The prevalence is very low compared to research conducted by Altug-Atac and Erdem,[17] who found the prevalence to be 0.56%. Larger results were reported in India, where hypodontia had the highest prevalence at 16.3%.[5] In this study, and a study of 4,180 children in India by Shilpa et al.[18], hypodontia was predominantly found in male patients. The cause of hypodontia is strongly related to genetic factors, where there is a developmental disturbance of the teeth and disturbances in eruption.[19]

Among dental shape anomalies, fusion showed the highest prevalence at 0.028%. Fusion is an abnormality that occurs at the developmental stage and can cause two adjacent teeth to become one tooth. In general, the crown of fused teeth is larger in size.[1] The high prevalence of fusion obtained in this study is close to the results of studies conducted in Turkey, which showed a prevalence of 0.09%.[18] A higher prevalence of fusion, 4.85%, was demonstrated in a study conducted in India by Guttal et al.[20]

Fusion and gemination anomalies can be referred to as double teeth that appear larger than normal size teeth. In gemination, the number of teeth is normal due to a single tooth that enlarges or connected teeth (double) being counted as one tooth.[21] The Levita classification is a practical method for distinguishing between cases of fusion and gemination.[22] In this study, gemination was only found in one male patient with a prevalence of 0.009%. This is similar to the research conducted by Guttal et al.[20] on 20,182 patients who found only one male patient with a gemination anomaly. Other dental anomalies also showed a low prevalence; the prevalence of microdontia was 0.019%, and taurodontia was found in only one patient with a prevalence of 0.009%. These results are lower than previous studies conducted in various countries.[5,14,23] The position of the teeth is influenced by race and hereditary tendencies.[8]

In this study, anomalies in tooth size were found. Microdontia was found in two patients (0.019%).

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Macrodontia was not found. A study carried out in India showed the prevalence of microdontia was 1.0%. Studies in Pakistan found the prevalence of microdontia was higher, at 4%.[6,24] Microdontia in this study was found in male patients, in contrast to the study by Ezoddini et al.[25], where microdontia was more common in females. Race may be one of the causes of these differences. A disturbance can cause the occurrence of dental anomalies in the form, size and structure at the stage of morpho-differentiation.

This study also found structural anomalies, namely amelogenesis imperfecta. In this study, there were two patients with a prevalence of 0.019%. This is in accordance with the research conducted in India where the prevalence of amelogenesis imperfecta was 0.02%.[26] While this is the rarest dental anomaly encountered, in a Turkish study conducted by Altug-Atac and Erdem,[17] the prevalence of amelogenesis imperfecta was 0.43%. This difference in the prevalence can be caused by hereditary factors and the grouping of patients affected by this dental anomaly in certain geographical areas which increases the prevalence of disorders in the region. In addition, rigorous diagnostic criteria can affect the reported prevalence in various studies.[27]

This study also describes the results of the distribution of pediatric dental anomalies based on address. As shown in Table 3, there were no patients with dental anomalies living in Gunungkidul and Kulonprogo regencies, and the highest number was found living in Jogja City. The high frequency of patients residing in Jogja City and the absence of those who reside in Gunungkidul Regency and Kulonprogo Regency may be due to the location of the Dental and Oral Hospital, UMY. In general, rural areas are often associated with lower education levels and are related to lower levels of health literacy and the poor use of available healthcare services.[28] This could account for the absence of children who have dental anomalies in the Gunungkidul Regency and Kulonprogo Regency. Urban residents are more aware of the importance of health, the importance of maintaining and identifying abnormalities, and the importance of early detection. Awareness of dental and oral health programs needs to be improved, especially for rural regions. Since this study was limited to the Dental and Oral Hospital, UMY, further research will be improved by widening the area and population included.

In conclusion, most dental anomalies are found in pediatric patients aged 0–18 years old in the Dental and Oral Hospital, UMY. The prevalence of mesiodens, hypodontia, and fusion was 0.14%, 0.056% and 0.028%. Dental anomalies in pediatric patients were more prevalent in male children. The age range of pediatric patients who had the most dental anomalies was 6–12 years old. The greatest distribution of anomalies occurred in Jogja City, Sleman and Bantul. For further research, a larger area and population should be studied.

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