



## Prevalence of Dental Anomalies among Orthodontic Patients in South-East Sabah

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### ABSTRACT

**Aim:** This study evaluated the prevalence of dental anomalies among orthodontic patients at a referral centre in South-East Sabah. **Materials and Methods:** A total of 155 pre-treatment orthodontic records of patients who attended the orthodontic consultation clinic in September 2017 to October 2019 were included in this cross-sectional, retrospective study. Data taken were demographic data (age, gender, and ethnic groups), and types of dental anomalies. All data were analysed descriptively. The differences between females and males and ethnic groups with respect of the dental anomalies were tested using Fisher's exact test. The level of significance was set at 5% ( $p < 0.05$ ). **Results:** The mean age of the patients was  $16.17 \pm 0.23$  years. More than three-quarter of the patients were females ( $n=117$ , 75.48%). Most of the patients were Chinese ( $n=75$ , 48.39%) and Bumiputera Sabah ( $n=54$ , 34.84%). More than one-third of the patients presented with at least one dental anomaly ( $n=53$ , 34.19%). The most common dental anomalies were supernumerary ( $n=16$ , 10.32%), hypodontia ( $n=14$ , 9.03%), and impacted maxillary canine ( $n=12$ , 7.74%). The prevalence of dental anomalies in males ( $n=15$ , 39.47%) was higher than females ( $n=38$ , 32.48%). Supernumerary was more common in males ( $n=7$ , 18.42%), while hypodontia was more common in females ( $n=12$ , 10.26%). **Conclusions:** The prevalence of dental anomalies among orthodontic patients at a referral centre in South-East Sabah was 34.19%. The most common dental anomalies were supernumerary, hypodontia, and impacted maxillary canine. Supernumerary was more common in males, while hypodontia was more common in females.

Keywords: dental anomalies, supernumerary, hypodontia, impacted maxillary canine, orthodontic

## INTRODUCTION

Dental anomalies are abnormalities of form, function, or position of the teeth, bones, and tissues of the jaw and mouth. Supernumerary, hypodontia, and impacted maxillary canine are among the commonly found dental anomalies. Other less common dental anomalies are unerupted permanent incisor, transposition, macrodontia, microdontia, dilaceration, and ectopic eruption of permanent first molar.<sup>1-6</sup> Dental anomalies can cause irregularities to the teeth alignment and malocclusion, hence affecting the aesthetic and function of the teeth.<sup>6</sup>

Supernumerary is a tooth-like structure, which present in addition to the normal series of teeth. The prevalence of supernumerary is 0.1%-3.8% in the permanent dentition and 0.35%-0.6% in deciduous dentition.<sup>7</sup> It was more commonly found among males.<sup>8</sup> It is associated with cleft lip and palate, cleidocranial dysostosis, and Gardner's syndrome.<sup>9</sup> The aetiology of supernumerary is complicated, with important genetic inheritance component involved.<sup>10</sup> The clinical signs are, median diastema, delayed or failure of the adjacent teeth to erupt, malaligned teeth, crowding, root resorption of adjacent teeth, and cyst formation.<sup>7</sup> The classification of supernumerary based on morphology are conical, tuberculate, supplemental, and odontomes, while the classification of supernumerary based on location are mesiodens, paramolar, distomolar, and parapremolar.<sup>9</sup>

Hypodontia is the developmental absence of one or more teeth, excluding the third molars. It can be associated with microdontia, retained deciduous teeth, delayed eruption of permanent teeth, and reduced alveolar development.<sup>11</sup> The prevalence of hypodontia varies in different parts of the world and among different ethnic groups. The prevalence of hypodontia was highest in Africa (13.4%), followed by Europe (7%), Asia, and Australia (6.3% respectively). It was found more common in females. Most affected permanent teeth excluding the third molars, were the mandibular second premolars, maxillary lateral incisors, and maxillary second premolars.<sup>12</sup> There was familial tendency and the gene involved were the MSX1, PAX9, and AXIN2.<sup>13</sup>

Impacted maxillary canine is a canine that is prevented from erupting into its normal functional position by bone, tooth or fibrous tissue. The incidence of impacted maxillary canine was 1.7%.<sup>14</sup> The aetiology of impacted maxillary canine is multifactorial, such as long path of eruption, small or developmentally missing adjacent lateral incisor,<sup>15</sup> local obstruction or pathology, genetic inheritance, and crowding or arch length shortening.<sup>16</sup>

In Malaysia, based on an epidemiological study on school children, the prevalence of dental anomalies in the permanent dentition was 7.4%, with 0.7% presented with two different types of dental anomalies. The prevalence of hypodontia was 2.8%, followed by peg-shaped lateral incisor (2.0%), and supernumerary teeth (1.0%).<sup>2</sup>

However, a higher prevalence of dental anomalies was found among the orthodontic patients. At a referral centre in East Coast of Peninsular Malaysia, the prevalence of dental anomalies was 28.4%. Impacted teeth were the most prevalent, followed by hypodontia.<sup>6</sup> Dental anomalies can cause malocclusion and may complicate orthodontic treatment. Their presence should be examined and investigated during orthodontic diagnosis and treatment planning. Therefore, the aim of this study was to evaluate the prevalence of dental anomalies among orthodontic patients at a referral centre in South-East Sabah.

## MATERIALS AND METHODS

This is a cross-sectional, retrospective study on secondary data, with the data traced from the dental records (written case notes, relevant radiographs, and study models). Ethical approval to conduct this study was obtained from the Research Ethics Committee of Ministry of Health Malaysia (NMRR-19-1143-47950). The sample were the patients who were referred and attended the first orthodontic consultation clinic at a government orthodontic clinic in Tawau, Sabah from September 2017 to October 2019. Patients were referred from primary dental care from various areas such as Tawau, Semporna, Kunak and Lahad Datu.

All available dental records from 155 patients who fulfilled the inclusion criteria were recruited. The inclusion criteria were new patients who attended the orthodontic consultation clinic, and the consultation was done by an orthodontist, with complete dental records. The exclusion criteria were patients who presented with congenital syndromes, genetic disorders, and craniofacial deformities, patients who were previously had orthodontic treatment or dental treatment related to the dental anomalies, patients who had dental trauma, and patients who had tooth loss due to caries or periodontal disease.

The data were entered into a standardised data collection form. Data taken were the demographic data (age, gender, ethnic group), and the types of dental anomalies. Missing or impacted third molars were not included in this study. All variables were analysed descriptively using Stata 15. The

differences between females and males and ethnic groups with respect of the dental anomalies were tested using Fisher's exact test. The level of significance was set at 5% ( $p < 0.05$ ).

## RESULTS

A total of 155 dental records of the patients were taken for this study. The mean age of the patients was  $16.17 \pm 0.23$  years. More than three-quarter of the patients were female ( $n=117$ , 75.48%). The gender ratio was 3:1 (female:male). The patients were Chinese ( $n=75$ , 48.39%), Bumiputera Sabah ( $n=54$ , 34.84%), and other ethnic groups (Malay, Jawa, Banjar, Arab, Bidayuh, Indian, Bolongan, and Toraja) ( $n=26$ , 16.77%) (Table 1).

Table 1: Demographic profile of the patients

Variables		n (%)	Mean $\pm$ SE
Age		-	16.17 $\pm$ 0.23
Gender	Female	117 (75.48)	-
	Male	38 (24.52)	
Ethnic groups	Chinese	75 (48.39)	-
	Bumiputera Sabah	54 (34.84)	
	Other ethnic groups	26 (16.77)	

More than half of the patients had no dental anomaly ( $n=102$ , 65.81%). More than one-third of the patients presented with at least one dental anomaly ( $n=53$ , 34.19%). There were patients who presented with two types of dental anomalies; supernumerary and impacted incisor ( $n=4$ , 2.58%), hypodontia and peg lateral incisor ( $n=1$ , 0.65%), and hypodontia and impacted premolar ( $n=1$ , 0.65%). The most common dental anomalies were supernumerary ( $n=16$ , 10.32%), hypodontia ( $n=14$ , 9.03%), and impacted maxillary canine ( $n=12$ , 7.74%) (Figure 1).

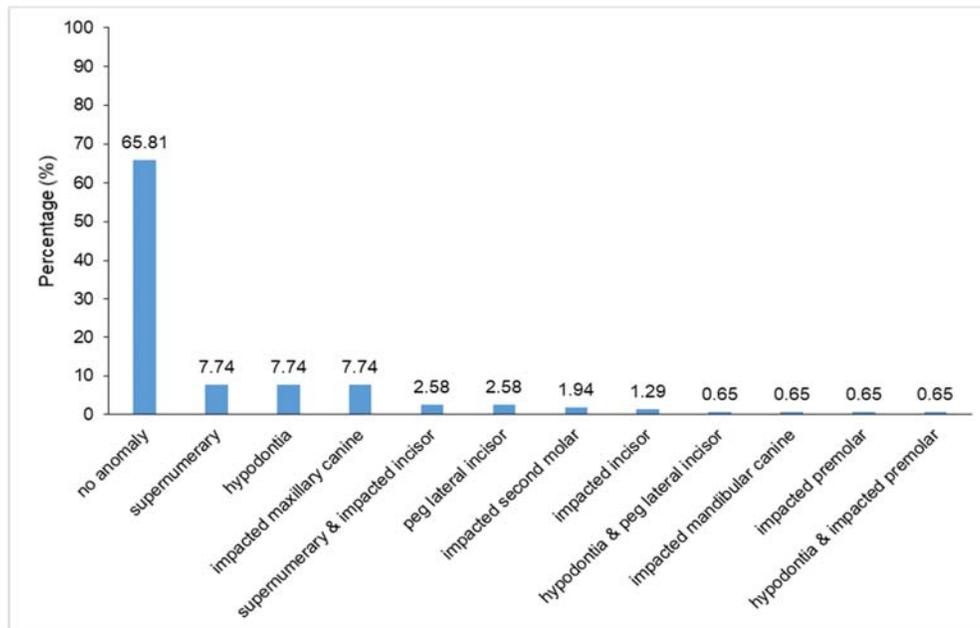


Figure 1: Prevalence and type of dental anomalies among the patients

The prevalence of dental anomalies in males (n=15, 39.47%) was higher than females (n=38, 32.48%). The prevalence of supernumerary in males (n=7, 18.42%) was two times more than in females (n=9, 7.69%), with gender ratio 1: 2.40 (female: male). In contrast, the prevalence of hypodontia in females (n=12, 10.26%) was almost twice than in males (n=2, 5.26%), with gender ratio 1.95: 1 (female: male). Prevalence of impacted maxillary canine in females (n=9, 7.69%) and males (n=3, 7.89%) was about same, with gender ratio 1: 1 (Table 2).

Table 2: Prevalence of dental anomalies between the gender

	Female n (%)	Male n (%)
No anomaly	79 (67.52)	23 (60.53)
Supernumerary	9 (7.69)	7 (18.42)
Hypodontia	12 (10.26)	2 (5.26)
Impacted maxillary canine	9 (7.69)	3 (7.89)
Other dental anomalies	8 (6.84)	3 (7.89)
Total	117 (100.00)	38 (100.00)

Fisher's exact = 0.387

The prevalence of dental anomalies in other ethnic groups was highest (n=10, 38.46%), in comparison to Chinese (n=28, 37.33%) and Bumiputera Sabah (n=15, 27.78%). Supernumerary (n=9, 12.00%) and impacted maxillary canine (n=7, 9.33%) were more common in Chinese. Meanwhile, hypodontia (n=3, 11.54%) and other dental anomalies (n=2, 7.69%) were more common in other ethnic groups (Table 3).

Table 3: Prevalence of dental anomalies among the ethnic groups

	<b>Chinese n (%)</b>	<b>Bumiputera Sabah n (%)</b>	<b>Other ethnic groups n (%)</b>
No anomaly	47 (62.67)	39 (72.22)	16 (61.54)
Supernumerary	9 (12.00)	4 (7.41)	3 (11.54)
Hypodontia	7 (9.33)	4 (7.41)	3 (11.54)
Impacted maxillary canine	7 (9.33)	3 (5.56)	2 (7.69)
Other dental anomalies	5 (6.67)	4 (7.41)	2 (7.69)
<b>Total</b>	<b>75 (100.00)</b>	<b>54 (100.00)</b>	<b>26 (100.00)</b>

Fisher's exact = 0.969

There were no significant differences between females and males and ethnic groups with respect of the dental anomalies,  $p > 0.05$ .

## DISCUSSION

Dental anomalies can cause complications to the developing occlusion and orthodontic treatment. It can be difficult to intervene or may need more complicated treatment at a later stage. Knowledge on prevalence of dental anomalies in various group of populations may assist the dental practitioners in early diagnosis, interventions, and prevent possible complications. Therefore, detailed examination and precise diagnosis are important in orthodontic treatment planning.

This study was done to evaluate the prevalence of dental anomalies among orthodontic patients at a referral centre in South-East Sabah. The government orthodontic clinic in South-East Sabah is located in Tawau, with the orthodontic referrals received from various areas such as Tawau, Semporna, Kunak, and Lahad Datu.

The number of female patients in this study were much higher than male patients, with the ratio of 3: 1. This is a common finding in most orthodontic populations as females often sought orthodontic treatment due to their higher aesthetic demand, even though their objective needs being no greater.<sup>17</sup> Therefore, in this study, evaluations were carried out separately for both gender to reduce bias.

In this study, more than one-third of the patients (34.19%) presented with at least one dental anomaly. This finding was almost similar to Egyptian orthodontic patients, 32.60%,<sup>4</sup> and Saudi orthodontic patients, 36.54%.<sup>18</sup> Meanwhile, Uslu et al. found the prevalence of dental anomalies among orthodontic patients was higher, 40.30%.<sup>19</sup> However, there were studies that found lower prevalences of dental anomalies; 30.61% in Yemeni orthodontic patients,<sup>20</sup> 28.40% at a referral centre in East Coast of Peninsular Malaysia orthodontic patients,<sup>6</sup> and 23.74% in Indian orthodontic patients.<sup>21</sup>

There were less than five percent of the patients (3.88%) in this study presented with two dental anomalies. The prevalence of dental anomalies in males was higher than females. Both of these findings were similar to the findings by Roslan et al.<sup>6</sup>

Supernumerary (10.32%) was the most common dental anomaly in this study. Other studies found that prevalence of supernumerary were low; 0.33% in Saudi orthodontic patients,<sup>22</sup> 0.95% in Pakistani orthodontic patients,<sup>3</sup> 2.00% in Spanish orthodontic patients,<sup>23</sup> 2.70%,<sup>6</sup> and 2.80%.<sup>4</sup> The prevalence of supernumerary in males was two times more than in females in this study. This is supported by others' findings of males more than females presented with supernumerary.<sup>3, 23</sup>

Prevalence of hypodontia in this study was 9.03%. Missing third molars were not included. This finding is almost similar to Indian orthodontic patients, 9.10%,<sup>21</sup> and Japanese orthodontic patients, 8.50%.<sup>24</sup> The prevalence of hypodontia among Saudi orthodontic patients were higher than this study, 19.10%,<sup>18</sup> and 22.37%.<sup>22</sup> However, some studies found the prevalence of hypodontia were lower; 7.03%,<sup>6</sup> 6.30% in Brazilian orthodontic patients,<sup>25</sup> 3.38%,<sup>3</sup> and 2.40%.<sup>4</sup> Prevalence of hypodontia in females was almost twice than in males in this study. This is in contrast with Majeed et al. as they found hypodontia was more common in males.<sup>3</sup>

The prevalence of impacted maxillary canine in this study (7.74%) was higher than other studies; 0.93% in Indian orthodontic patients,<sup>26</sup> 5.29% in Nepalese orthodontic patients,<sup>27</sup> and 5.60% in Greek orthodontic patients.<sup>28</sup> The prevalence of impacted maxillary canine was almost equal in both the gender, same as reported by Upadhyaya & Kafle.<sup>27</sup>

The prevalence of dental anomalies was evaluated separately in each ethnic group. Other ethnic groups recorded the highest prevalence of dental anomalies in this study, with more than one-third of them had dental anomalies. A study at a referral centre in East Coast of Peninsular Malaysia by Roslan et al. found about one-third of the Malay had dental anomalies, with the prevalence of dental anomalies in Malay was higher than Chinese.<sup>6</sup> Various prevalence rates were reported among different ethnic groups in different regions around the world. Ethnic and environmental backgrounds may play important aetiological factors in the prevalence and distribution of dental anomalies.

This study had a limitation, as the patients recruited were from the only government orthodontic clinic in South-East of Sabah. Therefore, the findings might not be representative of the whole population in South-East of Sabah. Therefore, future similar researches are recommended to be conducted on other orthodontic populations in other regions in Malaysia, to investigate and to compare the differences in the prevalence of dental anomalies.

### **CONCLUSIONS**

The prevalence of dental anomalies among orthodontic patients at a referral centre in South-East Sabah was 34.19%. The most common dental anomalies were supernumerary, hypodontia, and impacted maxillary canine. Supernumerary was more common in males, while hypodontia was more common in females.

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### **CONFLICT OF INTEREST**

The author declared no conflict of interests in this research.

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