


**Research Article**

## Prevalence of Selected Dental Anomalies Among Orthodontic Patients: A Retrospective Radiographic Study

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### Abstract

**Background:** Dental anomalies are developmental disturbances that may affect tooth eruption, number, size, and morphology, thereby influencing esthetics, occlusion, and orthodontic treatment planning. Early detection of these anomalies is essential for timely intervention and optimal clinical outcomes.

**Objective:** To determine the prevalence and distribution of selected dental anomalies, namely impacted teeth, hypodontia, and microdontia, among orthodontic patients using panoramic radiographs.

**Materials and Methods:** This retrospective cross-sectional radiographic study was conducted at the Department of Orthodontics and Dentofacial Orthopedics, City Dental College and Hospital, Dhaka, Bangladesh. A total of 130 orthodontic patients aged 12–30 years were included. Digital panoramic radiographs were evaluated for the presence of impacted teeth, hypodontia, and microdontia. Demographic variables including age and sex were recorded. Data were analyzed using SPSS version 26.0. Descriptive statistics were used to determine the frequency and distribution of dental anomalies, while associations with age and sex were assessed using the Chi-square test. A p-value of  $<0.05$  was considered statistically significant.

**Results:** Among the 130 patients, 49 (37.7%) presented with at least one dental anomaly. Impacted teeth were the most prevalent anomaly, affecting 22 patients (16.9%), followed by microdontia in 15 (11.5%) patients and hypodontia in 12 (9.2%) patients. Females demonstrated a slightly higher prevalence of dental anomalies than males (40.3% vs. 34.5%); however, the difference was not statistically significant ( $p = 0.497$ ). The highest frequency of anomalies was observed among patients aged 19–24 years, although no significant association was identified between age group and anomaly occurrence ( $p = 0.764$ ). The maxillary canine was the most frequently affected tooth (36.7%), followed by the maxillary lateral incisor (24.5%).

**Conclusion:** Dental anomalies were commonly observed among orthodontic patients, with impacted teeth representing the most prevalent finding. The maxillary canine was the tooth most frequently affected. Routine panoramic radiographic examination is recommended for the early diagnosis and effective management of dental anomalies during orthodontic treatment planning.

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## Introduction

Dental anomalies are developmental disturbances that affect the normal formation, eruption, number, size, shape, or position of teeth. These abnormalities arise from complex interactions between genetic, environmental, and epigenetic factors during odontogenesis and may significantly influence oral health, facial esthetics, and occlusal function [1]. Although many dental anomalies remain asymptomatic, their presence can complicate diagnosis, treatment planning, and long-term outcomes in various dental specialties, particularly orthodontics. Early identification of these conditions is therefore essential for preventing potential complications and ensuring appropriate clinical management [2]. Among the various dental anomalies, impacted teeth, hypodontia, and microdontia are among the most frequently encountered conditions in orthodontic practice. Tooth impaction, especially involving the maxillary canine, may result in delayed eruption, root resorption of adjacent teeth, and complex orthodontic interventions [3]. Hypodontia, defined as the congenital absence of one or more permanent teeth excluding third molars, can adversely affect dental arch integrity, masticatory function, and facial esthetics [4]. Similarly, microdontia, characterized by a reduction in tooth size relative to normal dimensions, may contribute to spacing problems, occlusal discrepancies, and esthetic concerns. These anomalies often require multidisciplinary management and may substantially influence the duration and complexity of orthodontic treatment [5]. The prevalence and distribution of dental anomalies vary considerably among different populations worldwide. Previous studies conducted in Europe, Asia, the Middle East, and North America have reported substantial variations in the occurrence of impacted teeth, hypodontia, and microdontia among orthodontic patients [6,7]. Such differences may be attributed to variations in ethnic background, genetic predisposition, environmental influences, diagnostic criteria, age groups studied, and methodological approaches [8]. Furthermore, orthodontic populations generally demonstrate a higher prevalence of dental anomalies compared with the general population, highlighting the importance of epidemiological investigations within this specific patient group [9]. Understanding the prevalence patterns of dental anomalies in a given population is essential for effective treatment planning, resource allocation, and the development of preventive and interceptive orthodontic strategies. However, despite the growing demand for orthodontic treatment and increasing awareness of oral health in Bangladesh, published data regarding the prevalence and distribution of dental anomalies among Bangladeshi orthodontic patients remain limited. The lack of locally generated evidence restricts the ability of clinicians to anticipate treatment challenges and formulate evidence-based management approaches tailored to the regional population [10]. Therefore, the present

retrospective radiographic study was conducted to determine the prevalence and distribution of selected dental anomalies, namely impacted teeth, hypodontia, and microdontia, among orthodontic patients using panoramic radiographs.

## Material and Methods

This retrospective cross-sectional radiographic study was conducted at the Department of Orthodontics and Dentofacial Orthopedics, City Dental College and Hospital, Dhaka, Bangladesh. Digital panoramic radiographs and patient records of orthodontic patients who attended the department between January 2023 and December 2024 were reviewed. Permission to conduct the study and access patient records was obtained from the concerned departmental authority prior to data collection. A total of 130 orthodontic patients aged 12–30 years were included in the study. Patients were selected based on the availability of high-quality digital panoramic radiographs and complete demographic records. Patients with a history of previous orthodontic treatment, craniofacial syndromes, cleft lip and/or palate, poor-quality radiographs, or incomplete records were excluded from the study. All panoramic radiographs were evaluated independently by two experienced orthodontists under standardized viewing conditions. Prior to assessment, examiner calibration was performed to ensure consistency in radiographic interpretation. Any disagreement between the examiners was resolved through discussion and consensus. Demographic information, including age and sex, was recorded for each patient. The panoramic radiographs were systematically examined for the presence of selected dental anomalies, namely impacted teeth, hypodontia, and microdontia. The affected tooth type and location were also documented. A tooth was considered impacted if it failed to erupt into its normal functional position beyond the expected eruption period and remained embedded within the alveolar bone or soft tissue. Hypodontia was defined as the congenital absence of one or more permanent teeth, excluding third molars, without a history of extraction or trauma. Microdontia was diagnosed when a tooth appeared smaller than the normal dimensions expected for that tooth type on radiographic examination. The primary outcome of the study was the prevalence of impacted teeth, hypodontia, and microdontia among orthodontic patients. Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic characteristics and the frequency of dental anomalies. Continuous variables were presented as mean  $\pm$  standard deviation (SD), whereas categorical variables were expressed as frequencies and percentages. Associations between dental anomalies and demographic variables were assessed using the Chi-square test or Fisher's exact test where appropriate. A p-value of less than 0.05 was considered statistically significant.

## Results

A total of 130 orthodontic patients were included in the study. Of these, 72 (55.4%) were female and 58 (44.6%) were male. The majority of participants belonged to the 19–24-year age group (n = 56, 43.1%), followed by the 12–18-year age group (n = 42, 32.3%) and the 25–30-year age group (n = 32, 24.6%) (Table 1).

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despite the growing demand for orthodontic treatment and increasing awareness of oral health in Bangladesh, published data regarding the prevalence and distribution of dental anomalies among Bangladeshi orthodontic patients remain limited. The lack of locally generated evidence restricts the ability of clinicians to anticipate treatment challenges and formulate evidence-based management approaches tailored to the regional population [10]. Therefore, the present retrospective radiographic study was conducted to determine the prevalence and distribution of selected dental anomalies, namely impacted teeth, hypodontia, and microdontia, among orthodontic patients using panoramic radiographs.

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## Results

A total of 130 orthodontic patients were included in the study. Of these, 72 (55.4%) were female and 58 (44.6%) were male. The majority of participants belonged to the 19–24-year age group (n = 56, 43.1%), followed by the 12–18-year age group (n = 42, 32.3%) and the 25–30-year age group (n = 32, 24.6%) (Table 1).

**Table 1:** Demographic Characteristics of the Study Population (N = 130).

| Variable                 | Frequency (n) | Percentage (%) |
|--------------------------|---------------|----------------|
| <b>Age Group (years)</b> |               |                |
| 12–18                    | 42            | 32.3           |
| 19–24                    | 56            | 43.1           |
| 25–30                    | 32            | 24.6           |
| <b>Sex</b>               |               |                |
| Male                     | 58            | 44.6           |
| Female                   | 72            | 55.4           |

The overall prevalence of dental anomalies was 37.7% (49/130). Among the selected anomalies, impacted teeth were the most prevalent finding, affecting 22 patients (16.9%), followed by microdontia in 15 patients (11.5%) and hypodontia in 12 patients (9.2%). No dental anomaly was detected in 81 patients (62.3%) (Table 2).

**Table 4:** Distribution of Dental Anomalies According to Age Group.

| AgeGroup (Years) | Impacted Teeth | Microdontia | Hypodontia | Any Anomaly | p-value |
|------------------|----------------|-------------|------------|-------------|---------|
| 12–18 (n=42)     | 8              | 4           | 3          | 15          |         |
| 19–24 (n=56)     | 10             | 7           | 5          | 22          |         |
| 25–30 (n=32)     | 4              | 4           | 4          | 12          |         |
| Total            | 22             | 15          | 12         | 49          | 0.764   |

• Chi-square test

Regarding the distribution of affected teeth, the maxillary canine was the most frequently involved tooth, accounting for 18 cases (36.7%), followed by the maxillary lateral incisor with 12 cases (24.5%). Mandibular second premolars were affected in 8 cases (16.3%), while maxillary second premolars and mandibular canines accounted for 10.2% and 6.1% of cases, respectively. Other teeth represented 6.1% of all anomalies (Table 5).

**Table 2:** Overall Prevalence of Dental Anomalies Among Orthodontic Patients (N = 130).

| Dental Anomaly    | Frequency (n) | Percentage (%) |
|-------------------|---------------|----------------|
| Impacted Teeth    | 22            | 16.9           |
| Microdontia       | 15            | 11.5           |
| Hypodontia        | 12            | 9.2            |
| AnyDental Anomaly | 49            | 37.7           |
| No Anomaly        | 81            | 62.3           |

When analyzed according to sex, females exhibited a slightly higher prevalence of impacted teeth (18.1% vs. 15.5%), microdontia (12.5% vs. 10.3%), and hypodontia (9.7% vs. 8.6%) compared with males. Overall, dental anomalies were observed in 29 of 72 females (40.3%) and 20 of 58 males (34.5%). However, these differences were not statistically significant (p = 0.497) (Table 3).

**Table 3:** Distribution of Dental Anomalies According to Sex.

| Dental Anomaly | Male (n=58) | Female (n=72) | p-value |
|----------------|-------------|---------------|---------|
| Impacted Teeth | 9 (15.5%)   | 13 (18.1%)    | 0.691   |
| Microdontia    | 6 (10.3%)   | 9 (12.5%)     | 0.703   |
| Hypodontia     | 5 (8.6%)    | 7 (9.7%)      | 0.821   |
| Any Anomaly    | 20 (34.5%)  | 29 (40.3%)    | 0.497   |

• Chi-square test

The distribution of dental anomalies across age groups showed that the highest number of anomalies was observed among patients aged 19–24 years (n = 22), followed by those aged 12–18 years (n = 15) and 25–30 years (n = 12). Impacted teeth remained the most common anomaly across all age groups. No statistically significant association was found between age group and the occurrence of dental anomalies (p = 0.764) (Table 4).

**Table 5:** Distribution of Affected Teeth Among Patients with Dental Anomalie.

| Affected Tooth             | Frequency (n) | Percentage (%) |
|----------------------------|---------------|----------------|
| Maxillary Canine           | 18            | 36.7           |
| Maxillary Lateral Incisor  | 12            | 24.5           |
| Mandibular Second Premolar | 8             | 16.3           |
| Maxillary Second Premolar  | 5             | 10.2           |
| Mandibular Canine          | 3             | 6.1            |
| Others                     | 3             | 6.1            |
| Total                      | 49            | 100            |

Analysis of the association between sex and the presence of any dental anomaly demonstrated that females had a 1.28-fold higher likelihood of presenting with a dental anomaly compared with males (OR = 1.28, 95% CI: 0.62–2.64). However, this association was not statistically significant ( $p = 0.497$ ) (Table 6).

**Table 6:** Association Between Sex and Presence of Any Dental Anomaly.

| Variable | Anomaly Present | No Anomaly | OR (95% CI)      | p-value |
|----------|-----------------|------------|------------------|---------|
| Male     | 20              | 38         | Reference        |         |
| Female   | 29              | 43         | 1.28 (0.62–2.64) | 0.497   |

• Chi-square test

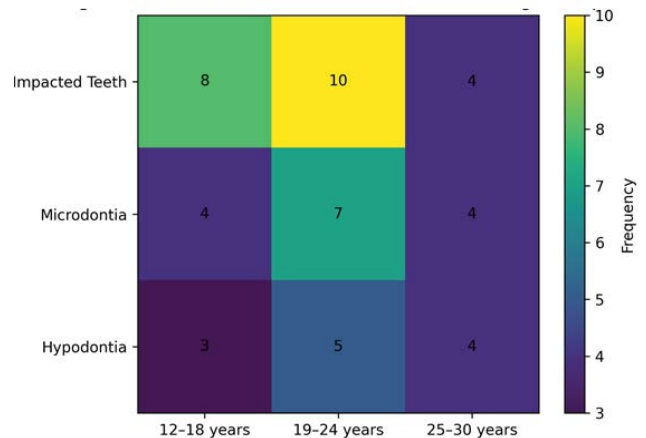
Similarly, patients aged 19–24 years and 25–30 years showed odds ratios of 1.16 (95% CI: 0.51–2.63) and 1.08 (95% CI: 0.43–2.72), respectively, when compared with the 12–18-year age group. Nevertheless, no significant association was identified between age group and the presence of dental anomalies (overall  $p = 0.764$ ) (Table 7).

**Table 7:** Association Between Age Group and Presence of Any Dental Anomaly.

| Age Group   | Anomaly Present | No Anomaly | OR (95% CI)      | p-value |
|-------------|-----------------|------------|------------------|---------|
| 12–18 years | 15              | 27         | Reference        |         |
| 19–24 years | 22              | 34         | 1.16 (0.51–2.63) | 0.718   |
| 25–30 years | 12              | 20         | 1.08 (0.43–2.72) | 0.864   |

Overall p-value = 0.764.

Figure 1 presents the distribution of dental anomalies across different age groups. The highest frequency of anomalies was observed among patients aged 19–24 years, with impacted teeth being the most frequently identified anomaly in all age categories.



**Figure 1:** Heatmap Showing Distribution of Dental Anomalies Across Age Groups.

## Discussion

The findings revealed that 37.7% of the patients exhibited at least one dental anomaly, indicating that developmental dental abnormalities are relatively common among individuals seeking orthodontic treatment. This observation supports the notion that orthodontic populations tend to demonstrate a higher prevalence of dental anomalies than the general population, likely due to the influence of these conditions on occlusion, eruption patterns, and dental esthetics. Among the anomalies evaluated, impacted teeth were the most prevalent finding, affecting 16.9% of the study population. This result is consistent with several previous orthodontic studies that identified tooth impaction as one of the most frequently encountered developmental anomalies. The relatively high prevalence of impacted teeth in the present study may be attributed to the orthodontic nature of the sample, as impacted teeth often serve as a primary reason for referral and treatment. Furthermore, delayed eruption, inadequate arch space, abnormal tooth position, and genetic factors may contribute to the occurrence of impaction [11]. Microdontia was observed in 11.5% of patients, making it the second most common anomaly identified in the study. This prevalence is comparable to findings reported in various orthodontic populations, where microdontia, particularly involving the maxillary lateral incisors, has been frequently documented. Reduced tooth size may contribute to spacing discrepancies, compromised esthetics, and difficulties in achieving optimal occlusal relationships, thereby increasing the demand for orthodontic intervention [12]. Hypodontia was identified in 9.2% of the participants. This finding falls within the range reported in previous epidemiological studies conducted among orthodontic patients. The congenital absence of permanent teeth can significantly affect dental arch development, masticatory efficiency, and treatment planning. The prevalence observed in the present study further emphasizes the importance of early radiographic assessment

to facilitate timely diagnosis and appropriate interdisciplinary management [13]. An important finding of this study was the slightly higher prevalence of dental anomalies among females compared with males. Overall, dental anomalies were observed in 40.3% of females and 34.5% of males. Similarly, females demonstrated marginally higher frequencies of impacted teeth, microdontia, and hypodontia. However, the observed sex differences were not statistically significant ( $p = 0.497$ ). This finding is in agreement with several previous studies that reported no significant sex-based differences in the occurrence of dental anomalies, although some investigators have suggested a higher prevalence among females due to differences in craniofacial growth patterns and genetic influences [14]. The age-group analysis demonstrated that the highest number of dental anomalies was observed among patients aged 19–24 years ( $n = 22$ ), followed by those aged 12–18 years ( $n = 15$ ) and 25–30 years ( $n = 12$ ). Nevertheless, no statistically significant association was found between age group and the presence of dental anomalies ( $p = 0.764$ ). Since developmental dental anomalies originate during tooth formation, their prevalence is generally expected to remain relatively stable across age groups. Therefore, the absence of a significant age-related association in the present study was not unexpected [15]. Evaluation of the affected tooth distribution revealed that the maxillary canine was the most frequently involved tooth, accounting for 36.7% of all recorded anomalies. This finding is consistent with the well-documented tendency of maxillary canines to become impacted due to their prolonged developmental pathway and complex eruption trajectory. The maxillary lateral incisor was the second most frequently affected tooth (24.5%), largely reflecting the occurrence of microdontia in this tooth type. Mandibular second premolars were also commonly affected, particularly in cases of hypodontia, which corresponds with previous reports identifying these teeth among the most frequently congenitally missing permanent teeth.

## Conclusion

Dental anomalies were commonly observed among orthodontic patients, with impacted teeth representing the most prevalent finding, followed by microdontia and hypodontia. The maxillary canine was the most frequently affected tooth. Although females exhibited a slightly higher frequency of dental anomalies than males, no significant associations were identified with age or sex. These findings emphasize the importance of routine panoramic radiographic evaluation for the early detection, accurate diagnosis, and effective management of dental anomalies during orthodontic treatment planning.

## Limitations of the study

This study has several limitations. First, it was conducted

at a single institution, which may limit the generalizability of the findings to the wider population. Second, the retrospective study design relied on existing patient records and radiographs, which may be subject to information bias. Third, the sample size was relatively small, and only selected dental anomalies were evaluated. Therefore, larger multicenter studies involving diverse populations are recommended to provide more comprehensive.

## References

1. Schonberger S, Kadry R, Shapira Y, et al. Permanent tooth agenesis and associated dental anomalies among orthodontically treated children. *Children* 10 (2023): 596.
2. Drenski Balija N, Aurer B, Meštrović S, et al. Prevalence of dental anomalies in orthodontic patients. *Acta stomatologica Croatica: International journal of oral sciences and dental medicine* 56 (2022): 61-8.
3. AlHudaithi FS, AlDuhayan NA, AlJohani LN, et al. Prevalence of dental anomalies among orthodontic patients: a retrospective study in Saudi Arabia. *Cureus* 15 (2023).
4. Roslan AA, Ab Rahman N, Alam MK. Dental anomalies and their treatment modalities/planning in orthodontic patients. *Journal of orthodontic science* 7 (2018): 16.
5. Shamrin T, Kabyo KS, Mahjabein S, et al. Comparative Microbiological Analysis of Microflora in Root Carious Lesions Across Different Age Groups: Exploring Bacterial Diversity, Biofilm Formation, and Antibiotic Resistance. *Viral Infections and Cancer Research* 2 (2025): 9285.
6. Dzemiđić V, Nakas E, Gagula I, et al. The prevalence of hypodontia and hyperdontia in orthodontic patients.
7. Aldhorae KA, Altawili ZM, Assiry A, et al. Prevalence and distribution of dental anomalies among a sample of orthodontic and non-orthodontic patients: A retrospective study. *Journal of international oral health* 11 (2019): 309-317.
8. Neville BW, Damm DD, Allen CM, et al. *Oral and maxillofacial pathology*. Elsevier Health Sciences; 2015 May 13.
9. Hoyte T, Coppin E, Kowlessar A, et al. Prevalence of dental anomalies in Trinidad and Tobago. A retrospective study. *Clinical and Investigative Orthodontics* 81 (2022): 117-125.
10. Alshammari AK, Algharbi MA, Alshammari FL, et al. Prevalence of congenitally missing permanent teeth and its association with side and gender in a Saudi subpopulation. *Plos one* 20 (2025): e0332958.

11. Alhammadi MS, Halboub E, Fayed MS, et al. Global distribution of malocclusion traits: A systematic review. *Dental press journal of orthodontics* 40 ( 2018): -e1.
12. Nazzal H, Rodd HD, Alrashed HN, et al. Prevalence of hypodontia and other developmental dental anomalies in children with or without molar incisor hypomineralisation. *Journal of dentistry* 155 (2025): 105598.
13. Jeong S, Jih MK, Ryu JW, et al. The relationship between adolescent orthodontic treatment and temporomandibular disorders: a systematic review with Meta-analysis. *Applied Sciences* 14 (2024 ): 11430.
14. Polder BJ, Van't Hof MA, Van der Linden FP, et al. A meta-analysis of the prevalence of dental agenesis of permanent teeth. *Community dentistry and oral epidemiology* 32 (2004): 217-226.
15. Meade MJ, Dreyer CW. Tooth agenesis: an overview of diagnosis, aetiology and management. *Japanese Dental Science Review* 59 ( 2023): 209-218.



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