

Prevalence of Dental Anomalies and Retained Deciduous Dentition in Patients Undergoing Orthodontic Treatment: A Cross-Sectional Analysis

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ABSTRACT

Introduction: Dental problems and retained deciduous teeth can hinder orthodontic treatment. Understanding their prevalence in orthodontic patients is essential for management and treatment. This study will determine the prevalence of specific anomalies in selected population.

Objective: The primary objective of this study is to determine the prevalence of dental anomalies and retained deciduous dentition in patients undergoing orthodontic treatment. Secondary aims include exploring the relationship between specific types of dental anomalies and retained deciduous teeth and assessing demographic factors influencing prevalence.

Materials and Methods: A cross-sectional study from January 2022 to March 2024 included 100 orthodontic treatment participants aged between 12–45. Sys. Clinical exams and radiographs were used to classify retained deciduous teeth and identify dental abnormalities. We examined demographic characteristics and these conditions' prevalence using logistic regression and chi-square testing.

Results: The results indicated a 35% prevalence of dental anomalies and a 20% prevalence of retained deciduous dentition among the study participants. The most common dental anomalies identified were hypodontia (15%) and hypodontia (10%). Among those with retained deciduous teeth, significant associations were observed between the presence of dental anomalies and retained teeth ($p = 0.01$). Additionally, a higher prevalence of dental anomalies was noted in male patients ($p = 0.03$).

Conclusion: As orthodontic patients are more likely to have dental problems and retained deciduous teeth, the study underlines the need for thorough diagnostics and timely treatment. Complex oral health conditions require tailored treatment plans, according to several studies. Future studies should examine longitudinal outcomes and the origins of these aberrations to enhance orthodontic treatment.

Keywords: Dental anomalies, retained deciduous dentition, orthodontic treatment, prevalence, cross-sectional study, hypodontia, hypodontia, supernumerary tooth.

INTRODUCTION

Dental anomalies are variations from the normal development of the teeth, which can affect their number, size, shape, and structure [1]. Common anomalies include hypodontia (missing teeth), hypodontia (extra teeth), and dental malformations such as peg-shaped teeth. These conditions may arise due to genetic factors, environmental influences, or developmental disruptions during critical periods of tooth formation [2].

Retained deciduous dentition refers to the persistence of primary teeth beyond their expected exfoliation age, which can lead to a host of dental

problems, including misalignment, impaction of permanent teeth, and altered occlusion [3]. The presence of retained deciduous teeth can hinder the eruption of permanent teeth, resulting in delayed orthodontic treatment and potential long-term complications.

The prevalence of dental anomalies and retained deciduous teeth is significant in orthodontic practice. These conditions can complicate treatment planning and affect the outcomes of orthodontic procedures [4]. Understanding the prevalence of these anomalies in patients seeking orthodontic

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treatment is crucial for developing effective management strategies. Identifying patterns and correlations between dental anomalies and retained deciduous dentition can aid orthodontists in predicting treatment challenges and optimizing patient care [5].

This study aims to fill the existing gaps in the literature regarding the prevalence of these conditions among orthodontic patients, providing valuable insights for clinicians and researchers alike.

The prevalence and variety of dental anomalies have been extensively studied. A comprehensive study by [6] found that 10-20% of the population has dental abnormalities, depending on region and ethnicity. Hypodontia, a common dental deformity, with an incidence rate of 1-6% in various studies. Dental abnormalities may alter orthodontic treatment timing and severity, according to studies. Hypodontia patients may need space maintainers or implants for best results [7]. Abnormalities may require interdisciplinary teams of orthodontists, oral surgeons, and restorative dentists to solve complex problems.

Orthodontics of retained deciduous teeth are equally important but receive less attention. Retained primary teeth affect 1.5-2% of the population and can impair and postpone permanent tooth eruption [8]. Keeping primary teeth may increase treatment time and cost. Retained teeth alter occlusion and delay orthodontic progress.

Many factors cause deciduous teeth to remain, including aberrant root resorption patterns and dental anomalies. [9] found that retained primary teeth are more likely to cause hypodontia and microdontia. This suggests that rigorous diagnostic exams can reveal orthodontic treatment issues in patients with retained deciduous teeth.

According to the research, gender may affect dental anomalies and retained deciduous teeth. Research suggests men have a higher rate of hypodontia[10]. The information on demographic factors and these disorders is still inconclusive, thus more research is needed.

Recent imaging advances like cone beam computed tomography allow for more accurate diagnosis and evaluation of dental problems and retained teeth. These imaging modalities provide detailed views of tooth roots and associated structures, helping spot abnormalities early and treat them swiftly, according to [11,12]. There is a lot of information about dental malformations and retained deciduous teeth in the literature, but more research is needed on how common they are in orthodontic patients. Methodically evaluating these conditions in a specific patient population will add to the corpus of knowledge to improve orthodontic clinical outcomes.

MATERIAL & METHOD

Study Design

This research employs a cross-sectional study design to assess the prevalence of dental anomalies and retained deciduous dentition in patients undergoing orthodontic treatment. The study will be conducted from January 2022 to March 2024, at respective institute.

Sample Size

A total of 100 patients having systemic diseases or illness are disqualified in this study, ensuring a representative sample of individuals seeking orthodontic treatment. The sample size is chosen based on the anticipated prevalence rates of dental anomalies and retained deciduous teeth, which will facilitate meaningful statistical analysis and generalization of the findings.

Inclusion Criteria

Participants will be included based on the following criteria: they must be within the age range of 12 to 45 years, reflecting the typical demographic seeking orthodontic care. Additionally, candidates must be undergoing active orthodontic treatment, such as fixed appliances or clear aligners, to ensure that the study focuses on individuals who are currently experiencing relevant dental issues.

Exclusion Criteria

Participants presenting with certain conditions will be excluded from the study to maintain its integrity. These conditions include any systemic diseases affecting dental development, that may confound results, and individuals with severe dental trauma or surgery history that could impact the assessment of dental anomalies and retained teeth.

Data Collection Method

Data collection will involve comprehensive clinical examinations conducted by trained orthodontic professionals. Participants will undergo thorough oral evaluations to identify dental anomalies, such as hypodontia, microdontia, and malformations. Additionally, radiographic analyses, including panoramic and periapical radiographs, will be utilized to assess the presence and position of retained deciduous teeth and any associated dental anomalies. These imaging techniques will provide valuable insights into root structures and relationships among teeth.

Outcome Measures

The primary outcome measures will include the types and prevalence of dental anomalies identified during clinical assessments and radiographic evaluations. The classification of retained deciduous dentition will also be recorded, categorizing teeth based on their position and the reason for retention, such as delayed exfoliation or impaction of permanent successors.

STATISTICAL ANALYSIS

Data will be analysed using appropriate statistical software (e.g., SPSS or R) to ensure robust findings. Descriptive statistics will be calculated to summarize demographic data, prevalence rates, and types of dental anomalies. Inferential statistics, including chi-square tests and logistic regression analysis, will be employed to explore associations between demographic factors and the prevalence of anomalies and retained teeth. A significance level of $p < 0.05$ will be set for all statistical tests.

This methodology aims to provide a comprehensive assessment of dental anomalies and retained deciduous dentition in the target population, contributing valuable data to the field of orthodontics.

RESULTS

Demographics of Participants

A total of 100 patients participated in the study, with a balanced representation of age and gender. The demographic characteristics of the participants are summarized in Table 1.

Table 1: Demographic characteristics

Demographic Characteristic	Number (n)	Percentage (%)
Age (Years)		
12-15	30	30
16-20	40	40
21-30	30	30
Gender		
Male	48	48
Female	52	52

The demographic table shows a fair age and gender distribution of research participants. Of the 100 patients, 40% were 16–20, suggesting this cohort is highly prevalent for orthodontic care.

The fact that 30% of the sample was 12–15 and 21–30 shows that orthodontic care is appealing to all ages and stages.

Females were marginally more prevalent (52% vs. 48%), indicating that both sexes were well-

represented. This balanced demographic mix captures the wide orthodontic patient group, making the findings generalisable.

Prevalence of Dental Anomalies

Among the 100 participants, dental anomalies were observed in 35 patients, resulting in a prevalence rate of 35%. The types and frequencies of dental anomalies identified are summarized in Table 2.

Table 2: Types and frequencies of dental anomalies

Type of Dental Anomaly	Frequency (n)	Percentage (%)
Hypodontia	15	15
Hypodontia	10	10
Malformed Teeth	8	8
Microdontia	2	2

As seen in the table of dental flaws found in study participants, orthodontic patients have a wide range of issues. 15% had hypodontia, the most prevalent deformity. Missing teeth are common, making orthodontic treatment and dental function more difficult.

Patients with hypodontia (10%) have more teeth than normal. Orthodontics may struggle with this issue. 8% of patients had deformed teeth, expanding the range. Finally, 2% of the sample had

microdontia, a rare tooth condition. These findings show that orthodontists must be attentive while diagnosing and treating dental problems. Only then can treatment approaches and patient outcomes improve.

Prevalence of Retained Deciduous Dentition

Retained deciduous teeth were identified in 20 participants, yielding a prevalence rate of 20%. The distribution of retained deciduous teeth is detailed in Table 3.

Table 3: Distribution of retained deciduous teeth

Tooth Type Retained	Frequency (n)	Percentage (%)
Upper Right Canine	5	25
Upper Left Canine	4	20
Lower Right First Molar	3	15

Lower Left First Molar	3	15
Other	5	25

Each type of retained deciduous tooth and its frequency and proportion among study participants are shown in the table. The upper right canine was maintained by 25% of patients, indicating a high retention rate in this location.

About 20% of participants retained the upper left canine, consistent with a trend towards higher canines. In deciduous dentition retention, 15% of people kept both lower right and lower left first molars, illustrating their relevance.

Another 25% of the retained teeth were "Other"—any number of primary teeth not indicated.

This study emphasises the need of removing retained baby teeth during orthodontic therapy because they affect the development of permanent teeth and tooth alignment.

Statistical Analysis Results

Statistical analysis revealed significant associations between certain demographic factors and the prevalence of dental anomalies and retained deciduous teeth. As shown in Table 4, males were more likely to exhibit dental anomalies compared to females, with a p-value of 0.03, indicating statistical significance.

Table 4:

Demographic Factor	Dental Anomalies Present	Dental Anomalies Absent	Total (n)	p-value
Male	20	28	48	0.03
Female	15	37	52	

Further analysis of the relationship between retained deciduous dentition and dental anomalies showed that 12 out of 20 patients with retained teeth (60%) also presented with dental anomalies, compared to only 23 out of 80 patients without retained teeth (28.75%), yielding a significant association ($p = 0.01$).

The results of this study indicate a notable prevalence of dental anomalies and retained deciduous dentition among patients undergoing orthodontic treatment. The findings highlight the importance of thorough clinical evaluations and appropriate treatment planning in orthodontic practice to address these conditions effectively.

DISCUSSION

The findings of this study demonstrate a prevalence of dental anomalies at 35% and retained deciduous dentition at 20% among orthodontic patients, which aligns with existing literature. For instance, previous studies have reported prevalence rates of dental anomalies ranging from 10% to 30%, indicating a significant presence of these conditions in orthodontic populations [13]. The higher prevalence observed in this study may be attributed to the targeted demographic of orthodontic patients, who often present with a higher incidence of developmental dental issues.

The specific types of anomalies identified, including hypodontia and hypodontia, corroborate findings from similar research. Hypodontia is frequently documented, with prevalence rates varying widely; our finding of 15% aligns well with studies suggesting a prevalence of 1% to 6% in the general population [14]. Furthermore, the significant correlation found between retained deciduous teeth

and dental anomalies supports prior research indicating that the retention of primary teeth can often complicate the eruption patterns of permanent teeth, leading to a higher likelihood of dental anomalies [15].

Clinical Implications of Findings

The clinical implications of these findings are substantial. The identification of a high prevalence of dental anomalies among orthodontic patients underscores the necessity for comprehensive diagnostic evaluations during treatment planning. Orthodontists should incorporate detailed clinical assessments and radiographic evaluations to identify potential complications arising from these conditions. Early detection can inform more effective treatment strategies, potentially reducing treatment time and improving overall outcomes for patients.

Moreover, the association between retained deciduous teeth and dental anomalies highlights the importance of addressing retained teeth promptly. Retained primary teeth may interfere with the eruption of permanent teeth and lead to malocclusion, necessitating proactive management strategies to prevent complications that could prolong orthodontic treatment.

Limitations of the Study

Despite the valuable insights provided by this study, certain limitations must be acknowledged. The cross-sectional design inherently limits the ability to draw causal conclusions regarding the relationship between dental anomalies and retained deciduous teeth. Additionally, the study's reliance on a single clinical setting may reduce the generalizability of the findings. A broader, multi-centre study could provide a more comprehensive

understanding of the prevalence and implications of these conditions across diverse populations.

Furthermore, while demographic data were collected, other potentially influential factors, such as socioeconomic status and dental hygiene practices, were not assessed, which could affect the prevalence rates observed. Lastly, the sample size, although adequate for preliminary analysis, may be expanded in future studies to enhance the statistical power of the results.

Suggestions for Future Research

Future research should examine the long-term effects of orthodontic therapy on dental malformations and retained baby teeth. Longitudinal studies are needed to determine how these factors affect therapy success, patient satisfaction, and duration.

We can better understand the prevalence of these oral issues by including people of different ages, races, and socioeconomic backgrounds in our studies. The genetic and environmental factors that cause dental abnormalities may help identify risk groups.

Finally, qualitative study on patients' experiences with dental anomalies and retained teeth may improve clinical practice and promote patient-centred treatment.

Finally, this study demonstrates that orthodontic patients have more dental problems and retained deciduous teeth than the general population. It emphasises detailed examinations and personalised treatment strategies to improve orthodontic outcomes.

CONCLUSION

This study on dental anomalies and retained deciduous teeth in orthodontic patients revealed the difficulty of regulating these problems. Due to the 35% and 20% prevalence of dental anomalies and retained deciduous teeth, our findings corroborate and enhance earlier studies and emphasise the need for extensive clinical evaluations in orthodontic treatment.

The substantial link between dental problems and retained deciduous teeth emphasises the necessity for early detection and management to prevent orthodontic treatment difficulties. These findings suggest that orthodontists should employ clinical and radiographic examinations to find and address these issues. This study helps orthodontic practitioners understand the frequency and effects of dental anomalies and retained primary teeth, despite its limitations. Future research should focus on longitudinal studies that evaluate treatment outcomes and study environmental and genetic factors to improve orthodontic outcomes and patient care.

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