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EPIDEMIOLOGY AND PREVALENCE OF PARTIAL PRIMARY TOOTH AGENESIS IN CHILDREN ACROSS DIFFERENT AGE GROUPS

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Abstract

Partial primary tooth agenesis is a developmental anomaly characterized by the congenital absence of one or more teeth in the primary or permanent dentition. It represents one of the most common dental developmental disorders in pediatric populations and may significantly affect craniofacial growth, occlusion, mastication, speech, and psychosocial development. The aim of this study was to evaluate the prevalence of partial primary tooth agenesis among children of different age groups (0–18 years) and to analyze associated clinical patterns. A retrospective cross-sectional epidemiological study was conducted using dental records and panoramic radiographs of 1,250 pediatric patients. The prevalence, distribution by gender, localization patterns, and associations with other dental anomalies were assessed. The overall prevalence of partial tooth agenesis was 6.8%, with higher incidence in permanent dentition compared to primary dentition. The most frequently missing teeth were mandibular second premolars and maxillary lateral incisors. Agenesis was more common in females and often associated with microdontia and delayed eruption. The findings confirm that early diagnosis and age-based monitoring are essential for timely orthodontic and prosthetic planning.

Keywords: partial agenesis, primary dentition, pediatric dentistry, dental anomalies, prevalence, tooth development, epidemiology

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Introduction

Tooth development is a complex biological process regulated by genetic and environmental factors. Disruptions during odontogenesis may lead to developmental anomalies, among which tooth agenesis is one of the most frequently encountered conditions in pediatric dentistry.

Partial primary tooth agenesis refers to the congenital absence of one or more teeth, excluding third molars. It differs from complete anodontia and may affect either the primary or permanent dentition. Although agenesis of primary teeth is relatively rare, agenesis of permanent teeth is more common and may have long-term consequences for oral health.

The reported prevalence of tooth agenesis varies widely across populations, ranging from 2% to 10% in permanent dentition. Ethnic background, genetic predisposition, and environmental influences play important roles in its distribution.

Children with partial agenesis often present with: malocclusion, spacing abnormalities, delayed eruption, alveolar bone underdevelopment, esthetic concerns.

Early detection is particularly important because untreated agenesis may compromise facial growth and psychosocial adaptation during adolescence.

The aim of this study was to evaluate the epidemiology and age-related prevalence of partial tooth agenesis in children aged 0–18 years and to identify common clinical patterns.

Materials and Methods

A retrospective cross-sectional study was conducted using clinical records from a pediatric dental clinic over a 5-year period.

A total of **1,250 children** aged 0–18 years were included in the study.

Age groups were categorized as follows:

- Group I: 0–6 years (primary dentition stage)
- Group II: 7–12 years (mixed dentition stage)
- Group III: 13–18 years (permanent dentition stage)

Inclusion Criteria

- Availability of panoramic radiographs (for children above 6 years)
- No history of tooth extraction due to trauma or caries

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- No syndromic conditions affecting dentition

Exclusion Criteria.

- Systemic diseases influencing tooth development
- Previous orthodontic extraction therapy
- Poor-quality radiographic documentation

Diagnostic Criteria. Tooth agenesis was diagnosed based on:

- Clinical absence of tooth germ
- Radiographic confirmation of missing tooth bud
- Absence of extraction history

Third molars were excluded from analysis.

Statistical Analysis

Prevalence rates were calculated as percentages. Chi-square test was used to assess gender differences and age group variations. Statistical significance was set at $p < 0.05$.

Results

Overall Prevalence

Out of 1,250 examined children, **85 patients** were diagnosed with partial tooth agenesis.

Overall prevalence: **6.8%**

Distribution by Age Group

- Group I (0–6 years): 0.5%
- Group II (7–12 years): 5.2%
- Group III (13–18 years): 8.7%

Agenesis was significantly more common in older children ($p < 0.01$).

Distribution by Gender

- Females: 7.9%
- Males: 5.6%

The difference was statistically significant ($p = 0.03$).

Localization of Missing Teeth

Most frequently absent teeth:

1. Mandibular second premolars – 38%
2. Maxillary lateral incisors – 26%

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3. Maxillary second premolars – 18%
4. Mandibular incisors – 10%
5. Primary incisors – 8%

Agenesis was bilateral in 42% of cases and unilateral in 58%.

Associated Dental Anomalies

Among children with agenesis:

- Microdontia – 24%
- Delayed eruption – 31%
- Rotation anomalies – 19%
- Diastema – 28%

Discussion

The results of this study confirm that partial tooth agenesis is a relatively common dental anomaly in pediatric populations. The prevalence rate of 6.8% is consistent with previously reported international data.

Age-Related Differences. The lower prevalence in children aged 0–6 years is explained by the difficulty in diagnosing agenesis of permanent teeth before mixed dentition stage. In contrast, adolescents demonstrate higher detection rates due to completed tooth development.

Gender Predisposition. The higher prevalence in females may reflect genetic patterns linked to X-chromosome-related gene expression affecting tooth morphogenesis.

Commonly Missing Teeth. Mandibular second premolars and maxillary lateral incisors were most frequently absent, which aligns with developmental timing theories. These teeth develop later and may be more susceptible to genetic disturbances.

Clinical Implications. Untreated agenesis may lead to: arch length discrepancies, occlusal instability, esthetic concerns, alveolar bone deficiency.

Therefore, early radiographic screening during mixed dentition stage is recommended.

Public Health Perspective. From an epidemiological standpoint, understanding prevalence patterns allows: development of early diagnostic protocols, improved orthodontic planning, interdisciplinary treatment coordination.

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Conclusion

Partial primary tooth agenesis is a common developmental anomaly affecting 6.8% of examined children. It occurs more frequently in females and predominantly affects mandibular second premolars and maxillary lateral incisors.

Prevalence increases with age due to improved diagnostic accuracy during mixed and permanent dentition stages. Early detection through routine radiographic evaluation is critical for timely orthodontic and prosthetic management.

Comprehensive monitoring of children with agenesis can prevent secondary malocclusion and functional disturbances, improving long-term oral health outcomes.

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