

RESEARCH ARTICLE

Prevalence and Characteristics of Tooth Agenesis in Permanent Dentition of Subjects from Tîrgu Mureş

Kerekes-Máthé Bernadette¹, Mártha Krisztina², Székely Melinda¹

¹ Department of Morphology of Teeth and Dental Arches, University of Medicine and Pharmacy, Tîrgu Mureş, Romania

² Department of Pediatric Dentistry and Orthodontics, University of Medicine and Pharmacy, Tîrgu Mureş, Romania

Background: Identification of the characteristics of tooth agenesis is an important component in the understanding of the etiology of this common developmental dental anomaly. The aim of the present study was to determine the prevalence and the characteristics of tooth agenesis among patients from Tîrgu Mureş.

Material and method: The present study is retrospective and descriptive, based on the evaluation of the patient's dental records from 2004 to 2012 belonging to a pediatric dental office from Tîrgu Mureş. Orthopantomograms and anamnestic data of 947 children and young adults (365 male and 582 female) were analyzed.

Results: The prevalence of tooth agenesis, excluding third molars, was 7.39%. The difference between the genders was statistically not significant ($p = 0.09$). The most frequently missing teeth were the upper second incisors, followed by the lower second premolars. The difference between the distribution of agenesis in the upper and lower jaws was statistically significant ($p < 0.0001$). The distribution of dental agenesis between the anterior region and the lateral region of the maxilla and the mandible showed significant differences ($p < 0.0001$). Symmetrical distribution of tooth agenesis was found more frequently (54.54%) than asymmetrical distribution.

Conclusions: The maxillary anterior region and the mandibular lateral region were the most affected by dental agenesis in the permanent dentition of the studied population. The maxilla was more affected than the mandible and bilateral forms of agenesis were more frequently than unilateral forms. The more extreme forms of agenesis were found amongst female.

Keywords: tooth agenesis, prevalence, permanent dentition

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Introduction

Identification of the characteristics of tooth agenesis is an important component in the understanding of the etiology of this anomaly. Tooth agenesis is the most common developmental dental anomaly and patients often require complex treatment [1,2], therefore we should pay more attention to its assessment.

The prevalence of tooth agenesis depends on many factors. The most important are: the studied population, age group of patients included in the study, and patient selection criteria. Regarding the age at which we can state dental agenesis, we have to consider the mineralization of teeth, which determines their visibility on the radiograph. Regarding the patient selection criteria, we must have in mind that almost all studies of prevalence are based on groups of patients which requested orthodontic or pedodontic treatment at various orthodontic or pediatric dental clinics. This results from the fact that in order to diagnose tooth agenesis, we must have at hand a panoramic radiograph. Taking orthopantomograms in children or subjects randomly selected for the study, without any medical indication, is not ethical. Those who come to a clinic for orthodontic treatment are required to perform panoramic radiographs, therefore such patients

are available for study of the prevalence of dental agenesis [3,4,5,6].

The congenital absence of teeth can be isolated, when only one tooth is missing, and can involve the absence of two or more teeth. Frequently third molars, second premolars and second incisors are affected, which is in concordance with Bolk's theory of terminal reduction. According to this theory the last tooth of each group would gradually disappear [7].

The aim of the present study was to determine the prevalence and the characteristics of tooth agenesis among the patients from Tîrgu Mureş.

Methods

The present study is a retrospective and descriptive one, based on the evaluation of the patient's dental records from 2004 to 2012 belonging to a pediatric dental office, located in Tîrgu Mureş. The inclusion criteria were: patients between 9 and 34 years, the presence of a high quality panoramic radiograph and without earlier orthodontical treatment. The exclusion criteria were: lack of a panoramic radiograph, children under 9 years, patients with other dental or craniofacial anomalies and patients with systemic diseases. Finally, a number of 947 dental records were selected.

Tooth agenesis was diagnosed based on the panoramic radiographs and anamnestic data, and for each case the

Table I. Demographic data of subjects (n = 947)

Subjective symptoms	Without agenesis	Agenesis
Gender		
Male	345 (94.52%)	20 (5.47%)
Female	532 (91.40%)	50 (8.59%)
Age subgroups		
9–19 years	556 (92.20%)	47 (7.79%)
20–34 years	321 (93.32%)	23 (6.68%)
Total	877 (92.61%)	70 (7.39%)

third molars were excluded. The absence of a tooth was considered congenital, if it did not showed up on the radiograph, and anamnestic data confirmed that the tooth was not extracted or lost by trauma.

The results were entered in Microsoft Excel spreadsheets, and statistical analysis was performed by Chi-square and Fisher's tests using GraphPad Prism 5 software (Graph Pad Software Inc. San Diego, USA). The confidence level was set at 95%, $p < 0.05$ being considered statistically significant.

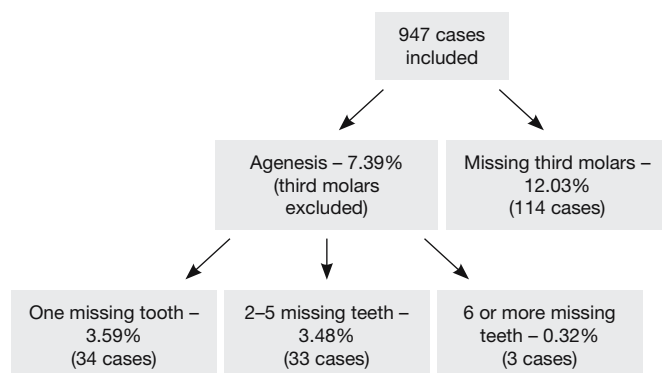
Results

From a total number of 947 subjects 61.46% were female and 38.54% were male, with a mean age of 16.51 ± 4.68 years (Table I).

The prevalence of tooth agenesis, excluding third molars, was 7.39%. The distribution of the cases is presented in Figure 1. All cases of oligodontia were found amongst females. The prevalence of agenesis amongst females was 8.59% and 5.47% amongst males. The difference between the genders was statistically not significant ($p = 0.09$).

Subjects were divided into two age subgroups, to see if there are differences between children and young adults. The difference between these groups was found statistically not significant ($p = 0.60$) (Table I).

The more frequently missing teeth were the upper second incisors, followed by the lower second premolars. One case of missing lower second incisor and lower second molar was found. Missing first molars, lower canines and upper second molars were not found in the studied population. Details of the different missing teeth are comprised in Table II.

**Fig. 1.** Prevalence of tooth agenesis in investigated subjects**Table II.** Frequency of agenesis in investigated subjects (n = 947)

Type of missing teeth	n (%)
Total number	136
Upper second incisor	60 (44.12%)
Lower second premolar	42 (30.88%)
Upper second premolar	18 (13.24%)
Upper first premolar	4 (2.94%)
Lower first premolar	3 (2.21%)
Lower first incisor	3 (2.21%)
Upper first incisor	2 (1.47%)
Upper canine	2 (1.47%)
Lower second incisor	1 (0.74%)
Lower second molar	1 (0.74%)

Different characteristics of tooth agenesis were studied, such as different localisations, gender distribution and symmetry.

The difference between the distribution of agenesis in the upper and lower jaw was statistically significant ($p < 0.0001$). 62.23% of the agenesis cases were located on the maxilla and 36.76% on the mandible.

The distribution of dental agenesis between the anterior region and the lateral region of the maxilla and the mandible showed significant differences ($p < 0.0001$). From the maxilla cases 74.41% were found in the anterior region and 25.58% in the lateral region. The mandible showed a different situation: 8% of the cases were located in the anterior region and 92% in the lateral region.

Differences between the distribution of dental agenesis on the left and right side of the arches were studied. The maxilla showed the same proportion on both sides. The mandible showed a higher number of tooth agenesis on the left side, but this difference was statistically not significant ($p > 0.05$).

Differences between the distribution of agenesis by gender were statistically not significant ($p > 0.05$).

Symmetrical distribution of tooth agenesis was found more frequently (54.54%) than asymmetrical distribution. The most frequently bilateral distribution was found at the upper second incisors (43.75%), followed by the lower second premolars (33.33%). From the bilaterally missing teeth 5 cases were found where the second premolars were missing both at the maxilla and the mandible. Unilateral agenesis was found in first incisors, upper canines and lower second molars.

Discussion

The prevalence of tooth agenesis varies according to the studied population. The permanent dentition is more affected than the primary dentition. The prevalence of tooth agenesis in the primary dentition is around 1%. Different studies showed the fact, that anomalies in the primary dentition (like hypodontia, supernumerary teeth, fusion) are followed by the apparition of anomalies in the permanent dentition. Whittington *et al.* revealed in their study that each case of primary tooth agenesis is followed by the agenesis of its successor [8].

Environmental and genetic factors may lead to agenesis. These include traumas, infections and different syndromes. A study showed, that extraction of primary teeth may lead to agenesis in the permanent dentition [9]. This anomaly implies esthetical, functional and emotional complications too, first of all among young patients. This is why early and proper diagnosis is very important [10,6].

The mineralisation of some teeth can be delayed. This is why it is not indicated to diagnose tooth agenesis before the age of 9 [11,12,13]. Some studies showed that the prevalence of hypodontia in a group of children was higher at the age of 7 than at the age of 9, in the same group [6,12].

The prevalence of tooth agenesis depends on the ethnic group the subjects belong to, depends on the geographical localisation, but also may vary in different studies performed in the same country. The results of the present study are situated between the limits found in different studies performed in Europe (between 2.6 and 14.6%) [3,14,15,16,17,18,19,20,21].

The most affected teeth were the upper second incisors and the lower second premolars. The same results can be found in many studies [3,17,4,6]. Other studies showed a higher prevalence for lower second molars [10] or reported the lower second premolars with the highest prevalence [22].

Based on the scientific literature, differences between the distribution of missing teeth in the upper and lower jaw showed various results. Some studies presented no significant differences [11], however others revealed a higher prevalence in the maxilla [23,4], and there are a few studies reporting higher differences in the mandible [10]. The present study showed a significantly higher prevalence in the upper jaw.

The distribution of missing teeth in the anterior and lateral region showed a higher frequency in the maxillary anterior region and in the mandibular lateral region. Only a few studies analyzed this feature and some of them revealed a higher prevalence in the anterior region [17], some of them revealed no significant differences [23]. The present study showed a higher prevalence of bilateral agenesis, which is in accordance with available data of the scientific literature [3,23], however a few studies showed the opposite [10].

Garn *et al.* showed an association between missing third molars and a higher incidence of other missing teeth. They concluded, that missing third molars are not isolated dental anomalies, they may increase the agenesis of other teeth 13 times. They consider important to verify the presence of all teeth when a missing third molar is discovered on an orthopantomogram [24]. The present study showed no association between missing third molars and other tooth agenesis.

Rózsa *et al.* studied canine agenesis separately and found a prevalence of 0.29%, mostly among woman and in the upper jaw. It was found in each case a persistent temporary

canine [25]. In the present study two missing canines were found (in a female and a male), with the presence of the temporary canine in both cases.

A relatively high prevalence, 11.3% was found in a Korean population, in a recent study. The authors suggested that a radiographical screening in the early childhood could be part of the public oral health policy to plan the treatment in time and to prevent the aggravation of the clinical situation [13].

Conclusions

1. The maxillary anterior region and the mandibular lateral region were the most affected by dental agenesis in the permanent dentition of the studied population.
2. The most affected teeth were: upper second incisors and lower second premolars.
3. The prevalence of tooth agenesis was higher in the upper jaw.
4. Bilateral forms of agenesis were more frequently than unilateral forms.
5. The more severe forms of agenesis were found among females.
6. Differences between the genders were not significant.

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