

Non-syndromic hypodontia of permanent dentition associated with other dental anomalies in children and adolescents

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Abstract

Anomalies of permanent dentition, by the frequency of the cases, also correspond to some unanimously recognized problems of public health. The objective of this study is to determine the prevalence of non-syndromic hypodontia and oligodontia and to identify the types of associated dental anomalies in the permanent dentition of children and adolescents in the NW of Romania. The study was conducted between 2008 and 2015 on a group of 566 children aged between 12–18 years old. Dental agenesis was diagnosed using clinical and radiological criteria. The numbers and types of teeth missing were noted. Third molars were excluded. Hypodontia had a prevalence of 2% in girls and 3.76% in boys ($p=0.007$), and oligodontia of 0.33% in girls and 0.38% in boys ($p=0.367$). Unique abnormalities were registered at 1% in girls and 1.5% in boys ($p=0.026$), those with two associations at 0.67% in girls and 1.5% in boys ($p=0.015$), and those with triple association at 0.67% in girls and 1.13% in boys ($p=0.037$). Hypodontia/oligodontia has been identified in association with other dental abnormalities, such as inclusion, microdontia, and enamel hypomineralization. The most frequent was the association of hypodontia with enamel hypomineralization.

Keywords: hypodontia, permanent dentition, other dental anomalies.

Introduction

Anomalies of permanent dentition represent an important chapter of great practical relevance in pediatric dentistry. These are pathologies with a wide range of clinical manifestations that include a major risk for the child's development through the complications they generate, both locally and generally [1]. Dental abnormalities may be syndromic or non-syndromic. The non-syndromic ones are found isolated or associated with other dental abnormalities [2, 3]. Hypodontia designates a tooth abnormality characterized by the absence of fewer than six permanent teeth, while oligodontia targets the congenital absence of six or more permanent teeth. The congenital absence of certain dental elements could be framed in the human evolution process, given the high frequency of the third molar hypodontia in the current population. Agenesis of permanent teeth is the most common abnormality of development, according to some authors [4]. The prevalence of the agenesis of one or two teeth, excluding the third molars, varies between 1.6–9.6% [5]. One case, quoted by Levin (1985), presented hypodontia associated with taurodontism and ravenous hair [5]. Other authors also point to associations between hypodontia and taurodontism [6, 7] and supernumerary teeth [8–11] between hypodontia associated with enamel hypomineralization [2, 10, 11].

Dental abnormalities undetected on time lead to a series of disorders and imbalances: dental incongruities, dento-alveolar and occlusal equilibrium disorders, affecting

masticatory, phonation and physiognomic functions, periodontal problems, and dental caries. Undiagnosed and untreated on time, they can deeply affect the quality of the individual's life [1]. When a physical abnormality is present, especially when it affects patients' facial appearance or body appearance, this may have psychological and social consequences, being in most cases a major source of stress for patients and their family [12]. Consequently, any anomaly that is manifested in the oral cavity results in a poor self-image and disrespect, diminishing socio-human interactions, or leading to chronic pain, stress and depression. These conditions can also interfere with vital functions including breathing, food selection, speaking and daily activities, such as school and socio-human interactions [1]. On the other hand, the treatment of dental anomalies has particularities related to several factors, such as the large variety of clinical forms, the severity of the abnormality, physician's performance, and children's behavioral traits [13]. Generally, treatment for oligodontia requires a multidisciplinary approach and consists of artificial dentures. Evolution of materials [13–17] and dental restoration techniques over the past decades is extremely important in the treatment of these anomalies.

Aim

The aim of this study is to determine the prevalence of non-syndromic hypodontia and oligodontia and to identify the types of dental anomalies associated with hypodontia/oligodontia in the permanent dentition of children and adolescents in the NW of Romania.

☐ Participants, Materials and Methods

The study was conducted between 2008–2015 on 566 children and adolescents aged between 12–18 years in the NW of Romania, in accordance with the *World Medical Association (WMA) Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects* approved by the Ethics Committee of the University of Oradea, Romania.

All children were taken in the study with their parents' consent, and in the case of adolescents, possibly with the agreement of the latter too.

From the study were excluded children who refused to be examined, those whose parents did not give their consent for examination, those who had previously received orthodontic treatments or were under orthodontic treatment when the batch was constituted, and children with severe systemic illness that may influence, in a context of high clinical complexity, the integrity of the oral cavity: hematological diseases, severe immune or autoimmune diseases, disseminated infections [human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), tuberculosis, sepsis], etc.

The third molars were not subjected to clinical observation. Diagnostic criteria included both clinical and radiographic criteria. Past dental histories were checked to ensure that extraction of permanent teeth was not diagnosed as agenesis.

Clinical methods

We examined the cephalic extremity after the anamnesis. Intraoral examination was performed with the help of the instrumentation specific to the dental medical office. All teeth present in the oral cavity as well as those included in the jaw or mandible were taken into account.

Hypodontia/oligodontia

Dental agenesis was diagnosed using clinical and radiological criteria. The numbers and types of teeth missing were noted. Third molars were excluded. In the case of children and adolescents with abnormalities of number, represented by hypodontia/oligodontia, clinical evaluation was made, consisting of medical and familial histories, extraoral and intraoral examination. In the intraoral examination, examining the teeth of the two arcades, the persistence of some temporary teeth on the dental arcades, the absence of some teeth from the permanent series whose eruption term was far exceeded, as well as a thin, concave crest, suggested the tooth agenesis. For a hypodontia/oligodontia diagnostic certainty, patients underwent paraclinical researches consisting of retroalveolar dental radiographs or panoramic radiographs.

Impacted and transmigrated teeth

In the intraoral examination, it was noticed the absence of some teeth with exceeded eruption time. The inspection was completed by paraclinical examinations for a diagnostic certainty. It could be the case of impacted teeth or transmigrated teeth – situation in which an unerupted

tooth (usually the canine) is migrating crossing the jaw midline [17].

Microdontia

The diagnosis of microdontia was made following the intraoral examination, comparing the tooth with its counterpart.

Enamel hypomineralization

There were subjected to examination the teeth present in the oral cavity that have not been subjected to trauma or caries. The teeth present in the oral cavity were considered to be those with all visible coronary surfaces. This was ascertained mainly from clinical records and confirmed with radiographs whenever possible.

☐ Results

The girls prevailed in the study group, in number of 300 (53%), the girls/boys ratio being 1.1:1. Of the total of 566 investigated children, 18 (3.18%) were diagnosed with dental abnormalities, hypodontia and oligodontia. The prevalence of dental abnormalities was significantly lower in girls than in boys ($p=0.012$). Hypodontia had a prevalence of 2% in girls and 3.76% in boys ($p=0.007$), and oligodontia of 0.33% in girls and 0.38% in boys ($p=0.367$) (Table 1).

Table 1 – The prevalence of dental abnormalities of number

Abnormalities of number	No.	%	p^\dagger	
Hypodontia	Girls	6	2	0.007
	Boys	10	3.76	
Oligodontia	Girls	1	0.33	0.367
	Boys	1	0.38	
Total	Girls	7	2.33	0.012
	Boys	11	4.44	

$^\dagger p < 0.05$ shows a statistically significant difference between the studied groups.

In the case of the patients with hypodontia, in number of 16 and a prevalence of almost 3%, congenital absence of at least one permanent tooth to six permanent teeth was found.

For patients with oligodontia, in number of two and a prevalence of 0.35%, one shows the congenital absence of 16 permanent teeth and the other one of eight permanent teeth.

The highest incidence of congenital absence of some teeth was recorded in the premolars level, followed by maxillary lateral incisors, canines, mandibular central incisors and molars (in decreasing order).

In premolars, secondary premolars agenesis was most frequently encountered, followed by secondary mandibular premolars and first maxillary premolars.

The distribution of the premolar agenesis on the two arcades was unequal: there were nine ageneses of first and secondary premolars at the maxillary arcade level and four ageneses of secondary premolars at the mandibular arcade level.

For the first maxillary premolars, agenesis was recorded, while for the first mandibular premolars agenesis was not registered.

For the maxillary secondary premolars, five ageneses were recorded, while for the secondary mandibular premolars there were four ageneses (Figure 1).

There were also differences regarding the premolar ageneses of the right maxillary and of the left maxillary hemiarcade: for the first maxillary premolars of the right hemiarcade there were recorded three ageneses, and for their homologues on the right hemiarcade only one agenesis; for the secondary premolars of the right maxillary hemiarcade, there were recorded two ageneses, while for their counterparts on the left hemiarcade there were three ageneses; for the first premolars of the right mandibular hemiarcade there were recorded two ageneses and for their counterparts from the left hemiarcade the same.



Figure 1 – 18-year-old boy: occlusal view of maxillary arch reveals agenesis of teeth 12, 15, 25.

Regarding recorded lateral incisor ageneses, all interested the maxillary lateral incisor. The distribution on the two hemiarcades, right and left, was uneven: five right lateral incisor ageneses and three of the lateral left incisor (Figure 2).



Figure 2 – 17-year-old boy with agenesis of 12, 22.

In case of canine ageneses, we identified three patients with congenital absence of one to all four permanent canines. On the mandibular arcade, the frequency of congenital absence of the permanent canine was higher than at the maxillary level.

We have found a higher frequency of permanent canine agenesis at the level of the right hemiarcade. One single patient was diagnosed with agenesis of the first maxillary and mandibular molars.

Unique abnormalities of number were in all the seven (1.24%) cases of hypodontia. Eleven (61.11%) patients of those with ageneses have other associated dental abnormalities.

Six cases with the presence of two (0.35%) dental abnormalities were identified, four (0.71%) with number and structure anomalies (Figure 3) and two (0.35%) with number and size anomalies. Five of the cases presented three associated abnormalities, three (0.53%) with abnormalities of number + size structure and two (0.35%) with abnormalities of number + size + eruption.

Unique abnormalities were registered at 1% in girls and 1.5% in boys ($p=0.026$), those with two associations at 0.67% in girls and 1.5% in boys ($p=0.015$), and those with triple association at 0.67% in girls and 1.13% in boys ($p=0.037$).

In girls, associated abnormalities with hypodontia were: hypodontia + enamel hypomineralization – one case (0.33%) (Figure 3), hypodontia + localized microdontia – one case (0.33%), hypodontia + generalized microdontia + enamel hypomineralization – one case (0.33%), oligodontia + localized microdontia + dental inclusion – one case (0.33%).

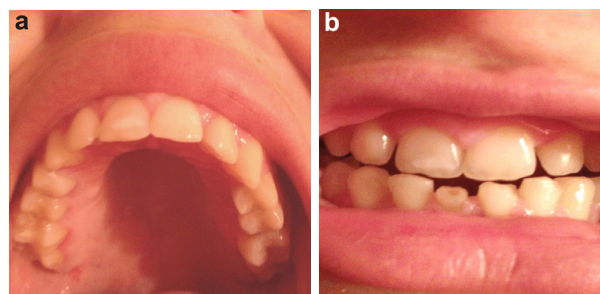


Figure 3 – 18-year-old girl with hypodontia of 41, with the presence of 81 and hypomineralization of 11.

In boys, the abnormalities associated with hypodontia were: hypodontia + enamel hypomineralization – three (1.13%) cases, hypodontia + generalized microdontia + enamel hypomineralization – two (0.75%) cases, oligodontia + localized microdontia + dental inclusion – one case (0.38%) (Table 2).

Table 2 – Associated abnormalities with hypodontia

Abnormalities of number	No.	%	$p^†$
Unique	Girls 3	1	0.026
	Boys 4	1.5	
Two associated dental abnormalities	Girls 2	0.67	0.015
	Boys 4	1.5	
number + size oligodontia/hypodontia + localized microdontia	Girls 1	0.33	0.037
	Boys 1	0.38	
number + structure hypodontia + enamel hypomineralization	Girls 1	0.33	0.037
	Boys 3	1.13	
Three associated dental abnormalities	Girls 2	0.67	0.037
	Boys 3	1.13	
number + size + structure hypodontia + generalized microdontia + enamel hypomineralization	Girls 1	0.33	0.037
	Boys 2	0.75	
number + size + eruption oligodontia + localized microdontia + dental inclusion	Girls 1	0.33	0.037
	Boys 1	0.38	

$†p<0.05$ shows a statistically significant difference between the studied groups.

✉ Discussions

Dental agenesis, represented by hypodontia and oligodontia, present in 18 of the 566 investigated children, record a total prevalence of 3.18%. Hypodontia records a prevalence of 2.83%. Many authors report hypodontia prevalence values between 1.6–16.3% [2, 5, 10, 18–25] the value obtained in this study being consistent with some previous ones.

Oligodontia falls within the parameters indicated by other studies [5] and has a prevalence of 0.35%.

The most frequently absent teeth in the dental arches were secondary mandibular premolars, consistent with other studies [18–21] and in disagreement with other authors that indicate the maxillary lateral incisor as the most common congenitally absent tooth in permanent dentition [23].

Unique number abnormalities are represented by seven cases with hypodontia, with a prevalence of 1.24%. In literature, unique number abnormalities are less reported [26–28].

It has usually been about hypodontia associated with enamel hypomineralization. Other studies also indicate this association as being superior to others [2, 11, 29].

With a lower prevalence and equal, in our casuistry of 0.35%, the association of abnormalities of number and of size is placed. There are authors who signal the existence of such associations [2, 11, 18, 30, 31].

These associations, especially hypodontia/oligodontia with localized microdontia, are relatively frequently encountered and reported [12, 29–31], also existing rare reported cases of associations of abnormalities of position with abnormalities of number [32].

✉ Conclusions

The prevalence of non-syndromic hypodontia/oligodontia among children in the NW of Romania was of 3.18%. Hypodontia has a prevalence of 2.83%. Hypodontia/oligodontia has been identified in association with other dental abnormalities such as inclusion, microdontia, and enamel hypomineralization. The most frequent was the association of hypodontia with enamel hypomineralization. In boys, associated dental abnormalities were more common.

✉ Conflict of interests

The authors declare that they have no conflict of interests.

✉ Authors' contribution

Adriana Tenț and Luminița Ligia Vaida equally contributed to the manuscript.

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