STUDY REGARDING THE SEQUENCE OF ERUPTION OF PERMANENT TEETH AT A GROUP OF CHILDREN FROM BUZĂU

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Abstract: Tooth eruption is a physiological process in which the tooth migrates from the maxillary bone towards the oral cavity, at the end of which teeth find their place on the arch creating vicinity relations according to a genetic code characteristic to each individual. Dental eruption begins with the eruption of the first primary teeth around 6 months and finishes at 2 years and a half for primary teeth, and around 18 – 25 years for permanent teeth, when the third molar erupts. The teeth's eruption and development is, usually, related to the child's chronological age, but there can also be some discordances as we refer to a precocious eruption or, on the contrary, to a delayed one. The chronology of dental eruption is submitted to a genetic model that is valid for the entire human population. Nevertheless, the values for the initial and ending moments of each stage present important variations that require the study of the average values and mostly of the variability limits for different characteristic human samples thus to create reliable norms for comparing individual values.

INTRODUCTION

Teeth eruption represents the final stage in teeth formation, being seen as a physiological process in which the tooth migrates from the maxillary bone towards the oral cavity.

At the end of this process, teeth find their place on the arch creating vicinity relations according to a genetic code characteristic to each individual.

Normally, dental eruption starts around the age of 6 months with the eruption of the first primary teeth and finishes at 2 years and a half for primary teeth, and around 18 – 25 years for permanent teeth, when the third molar erupts.

The teeth's eruption and development is, usually, related to the child's chronological age, but there can also be some discordances as we refer to a precocious eruption or, on the contrary, to a delayed one.

Generally, each dental unit covers certain sequences that repeat in a given order starting with the development and the mineralization of the crowns and ending with the root's development and the formation of the apical area. At the same time, the development of each dental group can be related to a certain age period, so that for every moment of the growth period there is a particular representation characterized by the sum of the stages reached by each stage of the dental arch.

The criterion of dental age is very much used by dentists as it has the advantage of a relatively limited individual variability and of some relatively simple possibility of making appreciations.

PURPOSE OF THE STUDY

The study's goal is to evaluate the eruption age of permanent teeth at a group of children, in a longitudinal study and to compare the resulting data with the existent one in literature.

MATERIAL AND METHOD

The study is based on a group of 348 children from Buzău and the coterminous area, aged between 6 and 13 that were evaluated either on request or at the dental offices that exist in schools.

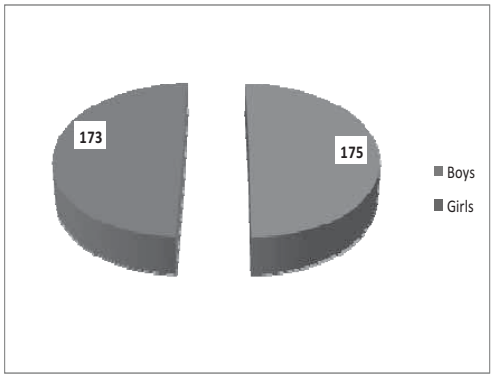
The data were got from the patients' observation charts, after the clinical and paraclinical exams (X-rays, photographies, study models, etc).

The resulting information was statistically interpreted using Excel. The average value and the standard deviation were calculated.

RESULTS AND DISCUSSIONS

Distribution by sex

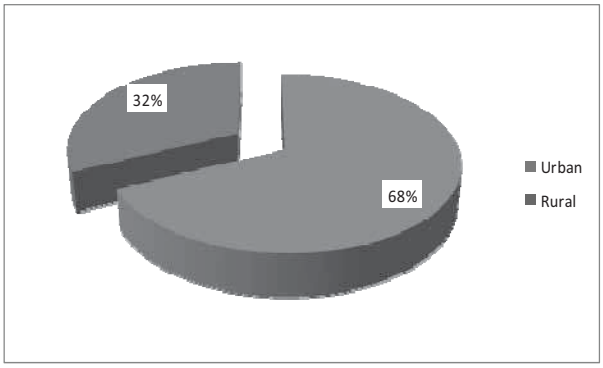
The separation of the initial group members according to their gender reveals a relatively equal number of members in each group (Picture 1).



Picture 1 Distribution by sex of the resulting groups

Distribution by origin

The distribution by origin (Picture 2) shows that most children come from the urban area.



Picture 2 Distribution by origin of the resulting groups

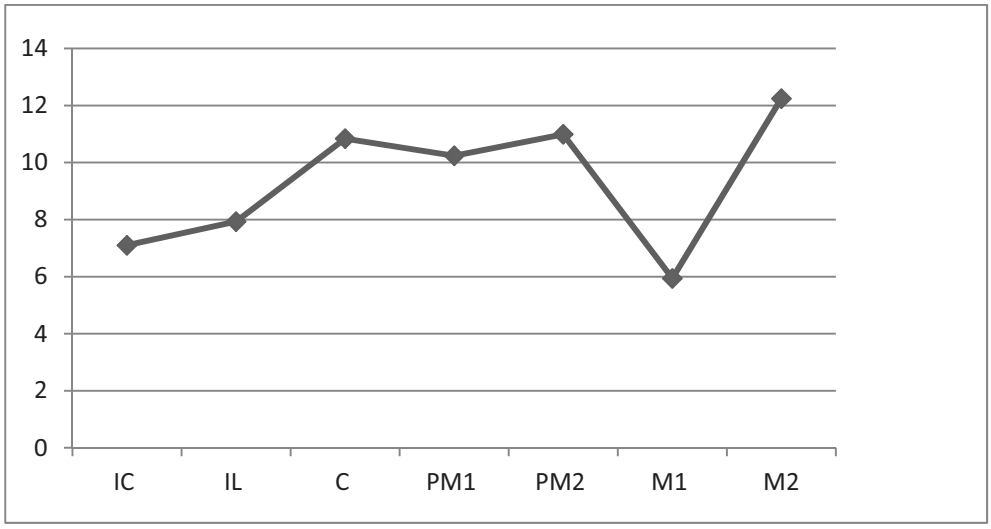
The group of boys

Evaluating the age when teeth appeared at the boys included in the study it resulted the following (charts I, II, pictures 3, 4):

Chart I Evaluation of the age when teeth appeared on boys – Maxillary

Tooth	Average age	SD	2SD (inter arch standard deviation)
CI 11,21	7,10	0,73	1,46
LI 12,22	7,93	0,77	1,54
C 13,23	10,84	1,07	2,14
PM_1 14,24	10,24	1,45	2,90
PM_2 15,25	10,99	1,14	2,28
M1 16,27	6,04	0,85	1,70
M2 17,27	12,24	1,55	3,10

Referring to the group of boys, the first tooth that erupted on the maxillary was the first molar, at the average age of 6.04 age, followed, in order, by central incisor, lateral incisor, first premolar, canine, second premolar, first permanent molar and second permanent molar.



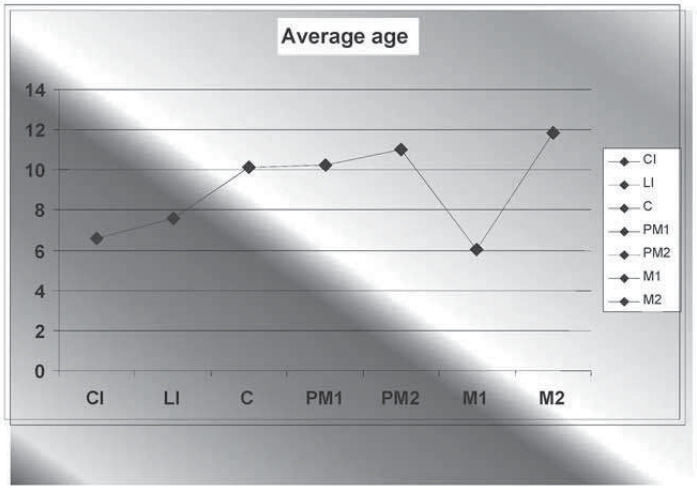
Picture 3 The apparition age of maxillary teeth on boys

Chart II Evaluation of the age when teeth appeared on boys – Mandible

Tooth	Average age	SD	2SD (inter arch standard deviation)
CI 31,41	6,56	0,92	1,84
LI 32,42	7,60	0,87	1,74
C 33,43	10,15	0,65	1,30
PM1 34,44	10,24	1,43	2,86

PM2 35,45	11,01	1,05	2,10
M1 36,46	6,03	0,85	1,70
M2 37,47	11,85	1,40	2,80

At the boys, the first tooth that erupted on the mandible was also the first permanent molar, followed by the central incisor, lateral incisor, canine, first premolar, second premolar and the second permanent molar.



Picture 4 The apparition age of mandibullary teeth on boys

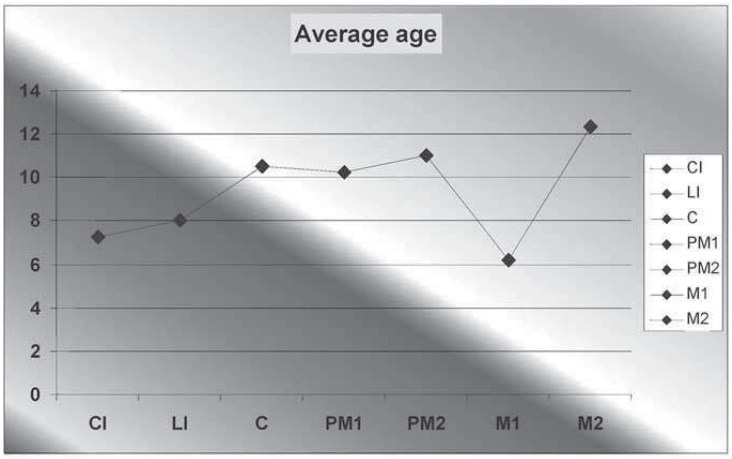
The group of girls

As far as the girls are concerned, the eruption age was as follows:

Chart III Evaluation of the age when teeth appeared on girls –Maxillary

Tooth	Average age	SD	2SD (inter arch standard deviation)
CI 1121	7,26	0,56	1,12
LI 12,22	8,01	0,72	1,44
C13,23	10,49	0,95	1,90
PM114,24	10,26	1,32	2,64
PM2 15,25	11,01	1,06	2,12
M1 16,27	6,17	1,02	2,04
M2 17,27	12,33	1,24	2,48

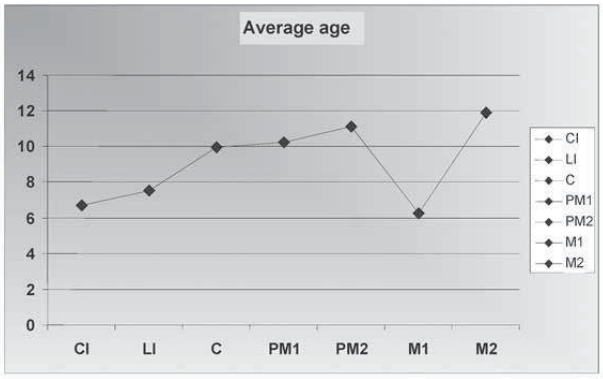
The same eruption sequence is noticed on girls as well, both on the maxillary and the mandible.



Picture 5 The apparition age of maxillary teeth on girls

Chart IV Evaluation of the age when teeth appeared on girls – Mandible

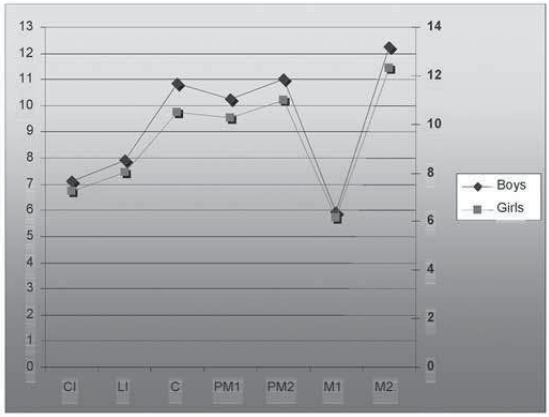
Tooth	Average age	SD	2SD (inter arch standard deviation)
CI 31,41	6,71	0,83	1,66
LI 32,42	7,55	0,70	1,40
C 33,43	9,96	0,93	1,86
PM1 34,44	10,21	1,35	2,70
PM2 35,45	11,12	1,11	2,22
M1 36,46	6,23	1,03	2,06
M2 37,47	11,90	1,08	2,16



Picture 6 The apparition age of mandibullary teeth on girls

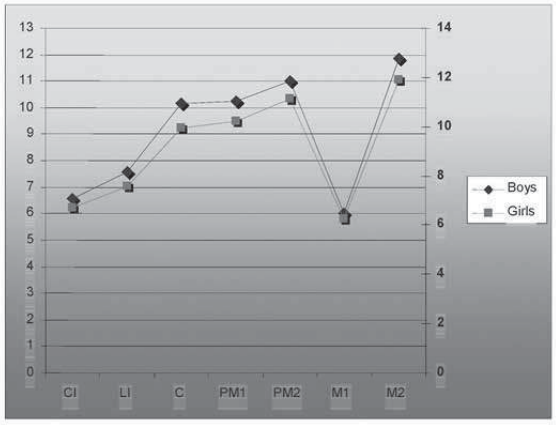
From the data presented above results that there are no significant statistic differences related to the arch (left / right).

Comparing the eruption age of permanent maxillary teeth results that there are some differences between the sexes, dental eruption being precocious on girls than on boys (Picture 7).



Picture 7 Comparison between the eruption age of maxillary teeth on girls and boys

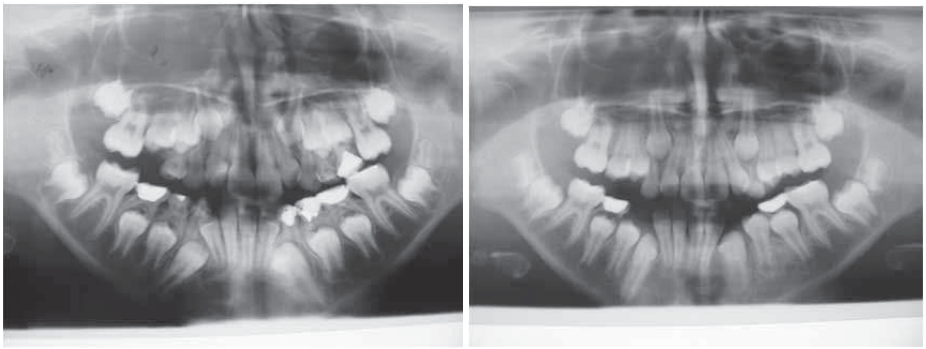
The same tendency is noticed for the mandible too, with differences between the sexes, mandibullary teeth erupting sooner on girls than on boys. Relatively equal values of eruption age resulted only in the case of the first permanent molars (Picture 8).



Picture 8 Comparison between the eruption age of mandibullary teeth on girls and boys

Complementary exams

Complementary exams (radiographic exam) also showed the sequence of eruption:



Picture 9 Sequence of eruption of permanent teeth

The analyzes performed on groups of children from northern countries underlined the existence of some modifications during the last decades, more precisely, the first tooth that erupted was the mandibullary central incisive and not the six years inferior molar.

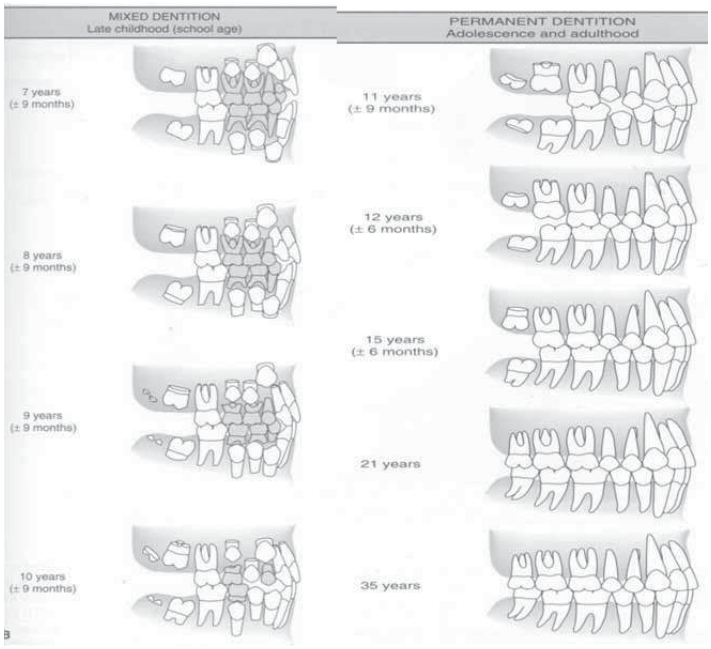
According to Lyselle, Magnusson and Thilender, the eruption of permanent teeth on the populations situated in the N of Europe takes place in the following sequence expressed in years and months (Chart V):

Chart V The eruption of permanent teeth on the populations situated in the N of Europe

Maxillary			**Mandible**		
Tooth	**Boys**	**Girls**	**Tooth**	**Boys**	**Girls**
11;21	7.3	7.1	***41;31***	6.4	6.2
12;22	8.4	8	***41;32***	7.6	7.1
13;23	11.7	11.0	***43;33***	10.8	9.9
14;24	10.4	10.0	***44;34***	10.8	10.2
15;25	11.2	10.9	***45;35***	11.5	10.9
16;26	6.7	6.7	***46;36***	6.6	6.4
17;27	12.7	12.3	***47;37***	12.1	11.7
According to Lyselle, Magnusson and Thilender					

Comparing the data we achieved and the one present in the study mentioned above, we realize that the values are quite close.

Bath-Balogh and Fehrenbach (2010), present the following values for the eruption age of teeth during mixed and permanent dentition (Picture 10).



Picture 10 Sequence of dental eruption – eruption age of permanent teeth (according to Bath-Balogh and Fehrenbach, 2010)

The eruption of permanent teeth expands on a longer period of time, between 6 and 13 years, being submitted to individual variations that are more often and more complex than in the case of temporary teeth.

The different way in which tissues react during the developing process represents an essential factor to differentiate a large number of clinical problems.

The chronology of dental eruption is submitted to a genetic model valid for the entire human population. Nevertheless, the values for the initial and ending moments of each stage present important variations that require the study of the average values and mostly of the variability limits for different characteristic human samples thus to create reliable norms for comparing individual values.

Generally, mandibullary teeth erupt sooner than maxillary teeth, except for the premolars. Apart from some modifications in the order of appearance, in the last decades it was noticed that permanent teeth tend to appear at a younger age. This process is related to the accelerated process of general development and the beginning of puberty at a younger age which are determined by the growth of the life standards and the sudden decrease of rachitism, at least in the European countries. This tendency was noticed for the second molars from both maxillaries and for the canines and the first mandibullary premolars.

It is also true that, in the case of permanent teeth the difference between sexes is obvious; teeth erupt sooner on girls than on boys. Nevertheless, these differences are extremely limited for the first erupted teeth, centrals and first molars, but they are more visible, 8 -12 months, for the teeth that appear later as canine do. The difference in

behaviour between the sexes especially towards the end of the development stage is due to the moment when puberty starts. It is well known that girls enter puberty before boys.

Some deviations from normal refer to the teeth's place and position in relation to the bony substrate.

The sequence of teeth eruption follows a certain pattern but variations on the erupting age can also appear due to general and local factors.

Referring to the sequence of eruption in the case of permanent teeth, a dental group appears in a period of 1 year, unlike the case of temporary teeth, where a dental group erupts at a 6 months interval. The teeth on the inferior arch appear before those on the superior arch, and if we refer to the two sexes, teeth appear sooner on girls than on boys.

Except for the molars, the eruption of permanent teeth takes place in the same time with the resorption of the root of temporary teeth and their exfoliation from the arch. Subsequently, there is a period of time in which, on the arch, coexist both the permanent teeth and the temporary ones – the period of mixed dentition that ends with the exfoliation of the last temporary teeth.

The normal variations of the eruption age are within the limit of one year (6 months sooner or later) in relation to the average age of eruption.

This variability is determined by a series of general factors as the patients sex (on girls dental eruption can take place sooner than on boys with 6 months up to 1 year); race (eruption takes place sooner at black people than on Caucasians); climate (it was noticed that eruption appears sooner in the areas with worm climate than in those with cold climate); social – economic factors (a higher life level and the urban environment favour the precocious eruption of teeth).

Apart from these factors, there are also a series of local and systemic conditions that can influence the sequence of dental eruption.

Local conditions as traumatisms during temporary dentition or cavity complications at temporary teeth can lead to the early loss of the temporary tooth and to the precocious eruption of the permanent tooth that are in this case immature and insufficiently mineralized.

Some systemic conditions can also lead to the variability of the eruption pattern of permanent teeth.

Genetic factors as Down syndrome, osteopetrosis, cleidocraneal dysostosis as well as a series of endocrine diseases can cause delays for the entire permanent dentition: sequence turnarounds, the presence on the arch of some temporary teeth or the presence of over-number teeth.

CONCLUSIONS

The studies on dental eruption that were realized with the help of illustrative groups of people allow in the end to estimate the speed with which dental maturation takes place and more than this can illustrate the levels reached by the general maturation of the children's' organism.

Dental age represents a valuable element in interpreting temporary or permanent differences that may appear during the development of dental occlusion. It allows the

identification of the best moments for initiating orthodontic treatments or selecting the most suitable treatment methods.

Apart from some modification in the order of eruption, in the last decades was noticed that permanent teeth tend to appear sooner, at younger ages, fact that is correlated to the accelerated general development and to the fact that puberty starts earlier; a possible explanation could be the growth of life standards and the sudden decrease of rachitism, at least in the European countries.

In the case of permanent teeth the difference between sexes becomes obvious, permanent teeth erupting sooner on girls than on boys.

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