

Dental Surgery Department, Medical University of Lublin

JOANNA KOPER, ANNA SKOWROŃSKA, ANNA M. SZYSZKOWSKA,
PAWEŁ ZAŁĘSKI

Study of the presence of third molar germs in children at school age

Examination of the developmental stage of the wisdom tooth is based on radiograph analysis. According to Demirjian, a tooth-forming process starts from a bone crypt, which is observed on a radiograph as a round radiolucent area in the place of the future germ. There are no signs of mineralization on this stage yet. Then in the crypt the beginning of cuspid mineralization is observed. The cuspid connects to each other and afterwards the crown keeps being formed, which is visible as an increase of hard tissue towards the future apex of the root. Researches tell about particular stages, classified according to a degree of forming a tooth germ: after the bone crypt there is the beginning of mineralization of the cuspid, then the joined cuspid stage, the crown formed in 50%, 75% and crown fully formed. In the following stages the gradual development of the root is observed (1).

Forming a wisdom tooth from the stage of the bone crypt to the moment of closure of the root apex takes approximately 66 months. It was also noticed that the mineralization process lasts 48–50 months (8).

According to various evolutionary theories third molars are atavistic teeth and in the future they will probably be lost. Nowadays it is often said that third molar germs are observed in children more rarely than in the past, however some researches (ref.) deny that and show that the number of wisdom teeth maintains. Osteological studies on human remains from the past centuries (11th, 12th, 13th cent.) proved the presence of wisdom teeth of various shapes and sizes in each of these periods. The analysis of the osteological material showed that typical dental arches were longer than these observed now, which means more space for wisdom teeth to erupt. Due to that impaction of third molars or their inappropriate position in the dental arch was very rarely noticed. Studies on people in the 20th century show absence of third molars in 22–25% of cases, which may be interpreted as a sign of evolutionary changes.

During the last years a tendency to earlier teeth erupting is observed, which is interpreted as an influence of earlier maturing, increase of healthcare and optimized nutrition. With regard to these factors it is expected that decreasing of the average age of particular developmental stages of third molar germs will be observed (6).

Data from the literature relating to the time of eighth teeth germs appearance differ. According to some researches bone crypt may be observed at the age of 4–5 years, and according to the others the age is barely 7–9 years. It is contended that the beginning of mineralization takes place between 7 and 11 years. According to Weise and Bruch the existence of third molar germs can be stated at the age of 11, and full mineralization of the crown at the age of 10–17 years. Research by Magnusson, carried between 1976 and 1980, shows that the average age, at which formation of the third molar germ begins, is 8.8 years in the maxilla and 8.9 years in the mandible in boys and 9.1 years in the maxilla and 9.3 years in the mandible in girls. In this time period bone crypts are observed (stage O).

The beginning of cuspids mineralization (stage named *C_i*) was noticed in males at the age of 9.0 years in the maxilla and 9.8 years in the mandible. In females cuspids mineralization started at the age of 9.4 years in the maxilla and two months later in the mandible. The average age, at which the stage of joined cuspids (*C_{co}*) was observed was for boys in the maxilla and the mandible 9.6 and 10.5 years as well as for girls 9.7 and 9.9 years. Crown formed in 50% (stage named *C_{1/2}*) was noticed in children aged over 10. In boys this stage was observed at the age of 10.5 years in the maxilla and 11.5 years in the mandible, and in girls 10.4 years in the maxilla and 11.7 years in the mandible. Crown formed in 75% (stage *C_{3/4}*) was noticed in males at the age of 12.7 years in the maxilla and 13.0 years in the mandible, and in females at the age of 12.0 years in the maxilla and 12.3 years in the mandible. Fully formed crowns (stage *C_c*) were observed in boys at the age of 13.2 years and 13.7 years in the maxilla and the mandible, and in girls the average age was 12.8 years and 13.3 years for the maxilla and the mandible. According to these data it was possible to ascertain earlier forming of wisdom teeth germs in males and faster development of these germs' in females (2).

The aim of the study was examination of presence and developmental trends of third molar germs in children from Lublin area. The group contained 136 children: 69 girls and 67 boys, aged between 6 and 12 years.

MATERIAL AND METHODS

The study was based on panoramic radiographs, by means of which the presence of third molar germs was examined. The germs development stage was also evaluated relatively to the metrical age of each child. In addition there was a comparison between the stages for wisdom teeth germs in the upper and lower jaw.

The results were analyzed according to statistical rules. In statistic elaboration basic frequency measures (per cent), as well as average measures (arithmetic average) and variability measures (standard deviation *S_d*) were enumerated. The results were collated in multi-way tables and the relationship between the number of wisdom teeth germs in the maxilla and the mandible and the gender was analyzed using *Chi*-square distribution test. For the features capable of data regularization the analysis was based on Spearman rank correlation.

The statistical significance was affirmed at *p*-level < 0.05. The calculation was carried by means of the program Statistica 7.1.

RESULTS

In the examination absence of all four wisdom teeth germs was observed in 46.4% of girls and 56.7% of boys. In panoramic radiographs of these children there were no signs of any differences in the bone structure in the upper or lower jaw, which could give evidence of the beginning of a germ development process. In some part of the examined group (19% of girls and 10.5% of boys) only two wisdom teeth germs were observed. In these cases usually upper third molar germs were missing. The results are shown in Table 1.

The results of carried out examination concerning the age of children at which third molar teeth germs forming was observed, shows Table 2. It was noticed that these germs forming processes began in boys at the age of 7.4 years in the maxilla and 8.2 years in the mandible, and in girls at the age of 9.4 years in the maxilla and 9.0 years in the mandible. Then in places of future germs there were bone crypts visible in panoramic radiographs. The age at which cuspids mineralization started was in males 7.8

years in the maxilla and 8.2 in the mandible, whereas in females it was 9.8 years in both the upper and lower jaw. The stage of joined cuspids was observed in boys at the age of 9.4 years in the maxilla and 9.9 years in the mandible, and in girls the same stage was visible at the age of 9.4 in the maxilla and 9.7 in the mandible. Fifty per cent of the tooth crown formed was noticed in males at the age of 10.0 years in the maxilla and 9.6 years in the mandible. In females this stage appeared at the age of 10.0 and 10.7 years in the maxilla and the mandible. The average age, at which the crown was formed in 75% was in boys 10.1 years in the maxilla and 11.1 years in the mandible. In girls the same stage was observed at the age of 9.6 years in the upper and 10.1 years in the lower jaw. Fully formed crowns of wisdom teeth were noticed in males at the age of 9.7 years in the maxilla and 9.8 years in the mandible. In females the age was 10.0 years in the maxilla and 9.8 years in the mandible. First stage of roots mineralization took place in boys at the age of 11.2 in both jaws, and in girls this age was 10.4 years in the maxilla and 10.8 in the mandible.

The results of the study, concerning the average age at which the particular stages of wisdom teeth germs development were observed in children of both genders, were compared to data from the literature. In the literature the results of Magnusson's research, carried in the late 70's in European citizens, are considered basic (ref.). Own studies show decreasing of the average age for particular developmental stages while comparing to Magnusson's data (Table 2). What is more, it was also observed that it takes less time for a germ to develop now than in the past. It is probably a result of general development processes acceleration, which has been observed during the last years. The differences between Magnusson's data and own study show (Figures 1–4). Statistical significance was affirmed at $p < 0.05$.

Another issue raised in the study was a tendency to a decrease in the frequency of appearing wisdom teeth germs in the population. In the examined group the absence of all four germs of the third molars was noticed in 56.7% of boys and 46.4% of girls. In 10.5% of males and 18.8% of females there were only two germs present (Table 1). However, the young age of part of the children from the group has to be taken into consideration because of its influence on the results. Lack of wisdom teeth germs in children at the age of 8 years and older was noticed in 22.8% of cases. According to the literature lack of third molar germs at the age of four suggests their absence and lack of wisdom teeth in the future (6).

Similar studies carried out by other authors prove statistical significance of decreasing frequency of appearing wisdom teeth germs during the last years. Haavikko noticed absence of at least one third molar germs in over 20% examined patients (ref.). Studies carried out the beginning of the 80's in the Lublin area showed absence of all wisdom teeth in 13.4% of males aged over 19 years. The germs were observed more often in the maxilla than in the mandible. Germs in the same development stage were noticed in 37.5% of cases, which is similar to data received from other authors' studies (8).

Table 1. Absence of third molar germs in children of both genders depending on age

Metrical age (years)	Number of missing third molar germs										
	girls				boys						
	number of examined children	1	2	3	4	number of examined children	1	2	3	4	
6	8				6	7					6
7	12		2		6	15		3			9
8	25		5		14	22					10
9	15		1		5	9		2			8
10	12		3		1	11					4
11	8		2		1	6		2			1
All	69		13		32	67		7			38

Table 2. Average age of forming wisdom tooth germs in children of both genders compared with Magnusson's research

Developmental stage	Maxilla				Mandible			
	boys	boys according to Magnusson	girls	girls according to Magnusson	boys	boys according to Magnusson	girls	girls according to Magnusson
O	7.4	8.8	9.4	9.1	8.2	8.9	9.0	9.3
Ci	7.8	9.0	9.8	9.4	8.2	9.8	9.8	9.6
Cco	9.4	9.6	9.4	9.7	9.9	10.5	9.7	9.9
C1/2	10.0	10.5	10.0	10.4	9.6	11.5	10.7	11.7
C3/4	10.1	12.7	9.6	12.0	11.1	13.0	10.1	12.3
Crc	9.7	13.2	10.0	12.8	9.8	13.7	10.6	13.3
Ri	11.2	15.9	10.4	14.9	(b.d.)	16.0	10.8	15.5

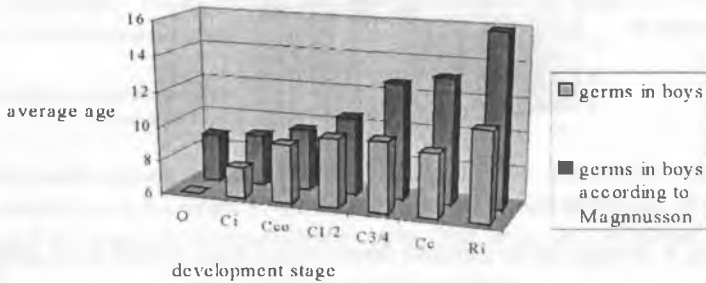


Fig. 1. Average age for particular developmental stages of third molar germs in the maxilla in the boys' group

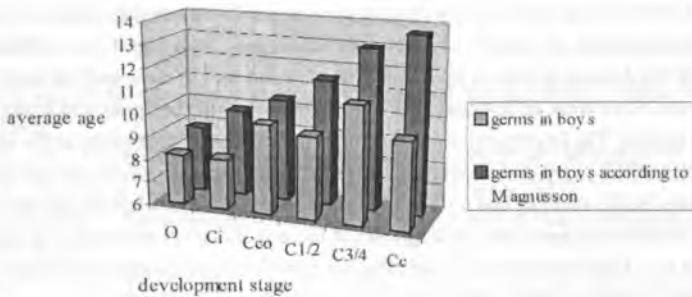


Fig. 2. Average age for particular developmental stages of third molar germs in the mandible in the boys' group

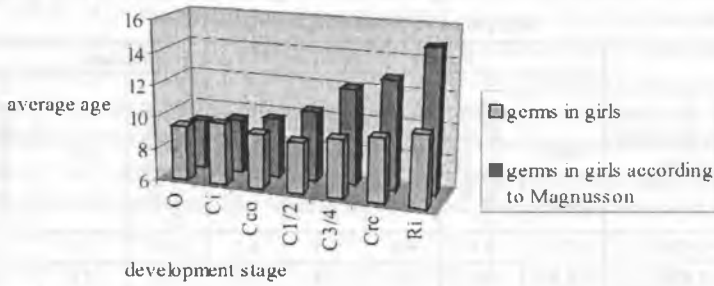


Fig. 3. Average age for particular developmental stages of third molar germs in the maxilla in the girls' group

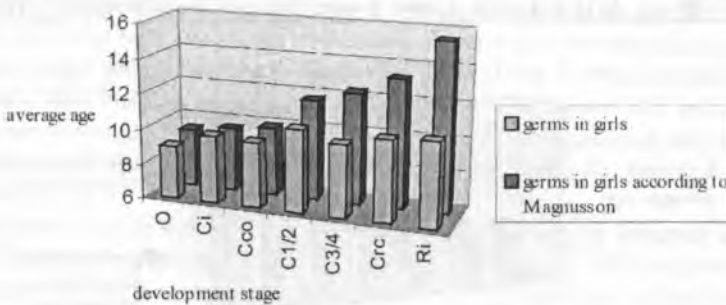


Fig. 4. Average age for particular developmental stages of third molar germs in the mandible in the girls' group

DISCUSSION

Results of own studies were compared to results of similar researches made in other countries. Analogical examinations in Israeli children did not show any significant differences in the development of third molar germs in males and females and on the right and left side of oral cavity as well. However, there were differences between development in the upper and lower jaw, which is similar to own results. The beginning of forming a third molar germ took place at the age of 8.7 years in the mandible and 9.3 years in the maxilla. The final stage of crown formation was observed at the age of 11.7 years in the maxilla and 11.8 years in the mandible. The elaboration also says, that the absence of the third molar germ can be diagnosed if there is still no bone crypt in a radiograph at the age of 14 years (4). These results vary from data obtained from the European literature, in which the latest age at which wisdom teeth germs can appear in children is 8–9 years.

Turkish researchers examined the minimum age, at which wisdom teeth germs start to progress. The age is approximately 8 years in the maxilla and 7 years in the mandible (7). The results of this study are similar to the majority of the data received from researches from other countries (1, 2, 4, 7).

Japanese researchers claim that third molar germs start to mineralize in children of both genders at the age of 7.6 years in the maxilla and 7.0 years in the mandible. The crown is fully formed at the age of 11.8 years in boys and 11.5 years in girls. In children aged 13 or more wisdom teeth germs

were observed in males in 70% in the maxilla and 75% in the mandible, as well as in females it was 65% and 80% of cases. All four third molar germs were noticed in 52.3% of boys and 45.5% of girls. Absence of all four wisdom teeth germs was observed in 9.5% of males and 12.0% of females. However, data from 2001 show lack of all wisdom teeth germs in 23% of Japanese children. This proves a tendency to decrease the number of children with third molar germs, which is analogical to the one described in own study. In the research in cases, where only two germs were present, they were usually observed in the mandible. What is more, wisdom teeth germs in the lower jaw were often highly developed comparing to germs in the upper jaw (5). Similar trends were observed in own research.

Studies carried out on every continent show a tendency to decrease a number of wisdom teeth in populations, which can be explained as an evolutionary change leading to elimination of wisdom teeth. In the examined group of children aged from 6 to 12 years third molars were not observed in 46.6% of girls and 56.7% of boys. 22.8% of children at the age of 8 and older had no wisdom teeth germs, which suggests the absence of wisdom teeth in the future in this part of the population.

The study also shows that the average age, at which particular stages of germs development were observed has decreased, which strictly corresponds with a general acceleration of progress in contemporary populations. The results of the examination prove the compatibility of wisdom teeth development tendencies with the data received from other authors' studies.

CONCLUSIONS

1. Wisdom teeth germs in children from Lublin area are observed at the age of 7.4 years in the maxilla and 8.2 years in the mandible in boys, and at the age of 9.4 years in the maxilla and 9.0 years in the mandible in girls. That suggests a tendency to progress acceleration.

2. Absence of third molar germs in the examined group – 62.3% in the maxilla and 67.2% in the mandible in boys, and 47.8% in the maxilla and 56.7 in the mandible in girls proves evolutionary changes. Statistical significance was affirmed at p-level < 0.05.

REFERENCES

1. Demirjian A.: Dental development: an index of physiological maturity. *Union Med. Can.*, 109 (6), 832, 1980.
2. Magnusson B., Persliden B.: *Development and its Aberrations*. Munksgaard, 1981.
3. Proffit W., Fields H.: *Ortodoncja współczesna*. Wyd. Czelej, 2001.
4. Sarnat H., Kaffe I.: Developmental stages of the third molar in Israeli children, *Pediatr. Dent.*, 25 (4), 373, 2003.
5. Steinhardt J., Mertins J., Mertins H.: Clinical observations on the development of third molars, *J. Osaka Dent. Univ.*, 26 (2), 91, 1992.
6. Szpringer-Nodzak M.: *Stomatologia wieku rozwojowego*. PZWL, 1999.
7. Uzamis M. et al.: Radiographic evaluation of third-molar development in a group of Turkish children. *ASDC J. Dent. Child*, 67 (2), 136, 83, 2000.
8. Widawska-Stachurska J.: *Badanie kliniczne i chemiczne trzecich zębów trzonowych*. Praca doktorska, AM Lublin, 1982.

SUMMARY

The aim of the study was to examine the presence of third molar germs in children at school age. The investigation was carried out with reference to panoramic radiographs. There was also a comparison between results of the study and data obtained in similar studies carried out during the last years in Poland and some other countries (Great Britain, Israel, Japan). It was noticed that during the last few years the number of children having third molar germs has decreased. All four germs were more often present in the male group and, what is more, the total absence of the germs was observed in that group not as often as in the females.

Ocena obecności zawiązków zębów ósmych u dzieci w wieku szkolnym

Celem pracy była ocena obecności zawiązków zębów ósmych u 136 dzieci obu płci w wieku szkolnym. Badania wykonano w oparciu o zdjęcia pantomograficzne. Dokonano również porównania wyników z danymi uzyskanymi w podobnych badaniach wykonanych w ubiegłych latach w Polsce i w wybranych krajach (Wielka Brytania, Izrael, Japonia). Stwierdzono, że w ciągu ostatnich kilkunastu lat zmniejszyła się liczba dzieci posiadających zawiązki trzecich zębów trzonowych stałych. Wszystkie cztery zawiązki były częściej obecne u chłopców, ponadto rzadziej u płci męskiej stwierdzano całkowity ich brak.