

Age and Sequence of Permanent Canine and Premolar Teeth Eruption in 102-174 Months Old Children in Kerman Province

Farokhgissor Elham and Shahrzad Adhamy
Department of Peadiatric Dentistry,
Kerman University of Medical Science, Iran

Abstract: Problem statement: The aim of this study was to investigate the eruption time of permanent canine and premolar teeth in 8.5-14.5 years (102-174 months) old boys and girls of Kerman province. **Approach:** The sample for this cross-sectional study consisted of 2602, 102-174 months old (8.5-14.5 years old) children from 56 primary and guidance schools in Kerman which were scattered over in 2 districts of the city. There were 1556 of girls and 1046 of boys were chosen by simple randomization and the emergence stage of each tooth was recorded. **Results:** The analysis indicated significantly earlier emergence ages in girls than in boys. The eruption pattern turned out to be symmetric in both sexes and no statically significant difference was detected between the right and left side. The most common observed emergence pattern in girls was mandibular canine and maxillary first premolar followed by mandibular first premolar, maxillary second premolar, then mandibular second premolar and canine and in boys it was maxillary and mandibular first premolar, mandibular canine, maxillary second premolar, mandibular second premolar and maxillary canine **Conclusion:** Significantly earlier emergence ages in girls seen than in boys. The sequence of eruption differs between girls and boys for mandibular canine and first premolar. It may be concluded that the eruption timing and sequence seen in large sample of children from Kerman revealed that emergence of teeth appeared later than other ethnic group these finding are relevant for dental treatment planning, forensic evaluation and should be reconfirmed at certain interval.

Key words: Mandibular Canine, premolar teeth, tooth eruption, maxillary counterpart, canine emerged, Standard Devotion (SD), Confidence Interval (CI), ethnic group

INTRODUCTION

Adequate knowledge of timing and pattern of permanent teeth emergence is essential for diagnosis of developmental disturbance (Mugonzibwa *et al.*, 2002) and treatment planning in (pediatric) dentistry (Leroy *et al.*, 2003a; 2003b), anthropological use (Savara and Steen, 1978) and caries prevention programs (Garn *et al.*, 1973). Several factors have been found to be related to the timing of the emergence of permanent teeth, for example: weight and height of children (Billewicz and McGregor, 1975; Triratana *et al.*, 1990) economic and social status (Stewart, 1982), gender, ethnicity, environmental and secular factors (Virtanen *et al.*, 1994).

Emergence of permanent teeth has been studied among different population and among different ethnic groups (Eskeli *et al.*, 1999; Pahkala *et al.*, 1991; Johannessen *et al.*, 1989; Manji and Mwaniki, 1985; Richardson *et al.*, 1975; Atai *et al.*, 2007). In the

literature it has been suggested that standards for tooth emergence should be derived from the population in which they are to be applied because factors related to tooth emergence of both deciduous and permanent dentition may vary.

There is little or no information about the time and sequence of the eruption of permanent teeth in Kerman. Accordingly, there is a need for the construction of reliable reference table on permanent teeth emergence in this population. The aim of this study was to investigate the eruption time of permanent canine and premolar teeth in 8.5-14.5 years (102-174 months) old children of Kerman.

MATERIALS AND METHODS

Population and sample: The sample for this cross-sectional study consisted of 2602 102-174 months old (8.5-14.5 years old) children from 56 primary and guidance schools in Kerman which were scattered over in 2 districts of the city. There were 1556 of girls and 1046 of boys were chosen by simple randomization.

Corresponding Author: Farokhgissor Elham, Department of Peadiatric Dentistry, Kerman University of Medical Science, Kerman, Iran

Clinical examination: Before starting, sessions were arranged for children and their parents to describe and discuss the study and obtain consent. Dental examinations were carried out by trained dentist-examiners. Each of the canine and premolar teeth was scored according to its clinical eruption stage. The scoring was as below:

No visible tooth:

Any visible tooth structure: Sex and age (in month) of the children were also recorded.

If any of these conditions existed, it would be excluded from the study:

- Tilting of first molar more than 2 mm
- Early loss of first and second deciduas molar
- Sever crowding

For statistical analysis, SPSS and Mann-Whitney test were used and P-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 and 2 shows) mean, Standard Devotion (SD), Minimum (Min), Maximum (Max) and the Confidence Interval (CI): Eruption time in boys and girls.

Table 3 shows the mean time of the eruption. The results showed that the average age at the eruption of permanent teeth in girls is significantly younger than the boys.

The average time of permanent teeth eruption between girls and boys ranged from 4-7 month. With the largest difference being seen in mandibular canine (7 months).

The eruption pattern turned out to be symmetric in both sexes and no statically significant difference was detected between the right and left side. The result of this study also showed that the mandibular teeth have an earlier eruption time than maxillary counterpart in both girls and boys with the exception of the first and second premolar. There was no significant difference in mean age of permanent teeth eruption in left and right side of jaws in both groups. Our result revealed that the average age at eruption time of mandibular canine in girls was younger than boys and also revealed earlier eruption of comparable teeth in females as against males. In both groups the maxillary canine appeared after the second premolar. Emergence of mandibular canine in female was about 11, 9 years and first premolar appeared at the same time as the mandibular canine.

The emergence of the first premolar of both jaws was of the same time in 12.6 year that is later than girls.

Table 1: Mean, Standard Devotion (SD), Minimum (Min), Maximum (Max) and the Confidence Interval (CI): Eruption time in boys

The sequence of tooth eruption	number	mean	SD	min	Max	CI
Max. right second premolar	616	151/8	14	38	204	155/5-157/6
Max. left second premolar	626	151/7	16/7	95	201	150/3-153
Mand. right second premolar	520	153/4	16/5	95	201	152-154/8
Mand. left second premolar	516	153/1	17	95	201	151/6-154/6
Max. right first premolar	720	149/1	17/7	95	201	147/8-150/4
Max. left first premolar	723	149/2	17/5	95	201	147/9-150/5
Mand. right first premolar	678	150/3	17	95	201	149-151/6
Mand. left first premolar	679	150/2	17/2	95	201	148/8-151/5
ax. right canine	471	154/7	16/7	95	201	153/2-156//2
Max. left canine	471	154/7	16/7	95	190	153/2-156//2
Mand. right canine	793	148/8	17/5	95	201	147-149/3
Mand. left canine	793	148/8	17/5	95	201	147-149/3

Table 2: Mean, Standard Devotion (SD), Minimum (Min), Maximum (Max) and the Confidence Interval (CI): Eruption time in girls

The sequence of tooth eruption	number	mean	SD	min	Max	CI
Max. right second premolar	610	156/5	14	38	204	155/5-157/6
Max. left second premolar	610	667	14/2	38	204	155/4-157/7
Mand. right second premolar	558	157/8	13/7	38	204	156/6-159
Mand. left second premolar	561	157/6	13/8	38	204	156/5-158/8
Max. right first premolar	667	154/7	15/1	38	204	153/5-155/8
Max. left first premolar	667	154/7	15/2	38	204	153/4-155/7
Mand. right first premolar	637	155/6	17	38	204	154/5-156/8
Mand. left first premolar	632	155/9	17/2	38	204	154/8-157
ax. right canine	500	159/6	16/7	38	204	158-160/7
Max. left canine	509	159/7	16/7	38	204	158/6-160/7
Mand. right canine	661	154/5	17/5	38	204	153/4-155/7
Mand. left canine	672	154/2	17/5	38	204	153/2-155/2

Table3: The mean (\pm SD) time of tooth eruption

Tooth	Girls	Boys	p-value
	Eruption time	Eruption time	
Max. right second premolar	148.6 \pm 18.0	152.8 \pm 16.3	
Max. left second premolar	148.8 \pm 17.7	152.7 \pm 16.4	
Mand. right second premolar	149.5 \pm 17.4	154.4 \pm 15.6	
Mand. left second premolar	149.1 \pm 17.6	154 \pm 16.00	
Max. right first premolar	143 \pm 20.00	149.5 \pm 17.6	
Max. left first premolar	142.7 \pm 20.0	149.1 \pm 18.0	<0.0001
Mand. right first premolar	144.7 \pm 19.0	149.5 \pm 17.7	
Mand. left first premolar	143.9 \pm 19.5	149.5 \pm 18.0	
Max. right canine	149.2 \pm 17.2	154.8 \pm 15.1	
Max. left canine	149.2 \pm 17.2	155.2 \pm 14.7	
Mand. right canine	143.3 \pm 19.7	150.3 \pm 17.1	
Mand. left canine	143.2 \pm 19.7	150.3 \pm 17.1	

In females eruption time for mandibular first premolar was at 12 years and for maxillary second premolars was at 12.9 years. The mandibular first premolar erupted at 12 years the mandibular and maxillary canine emerged at 12.5 years in males the emergence of mandibular canine was at 12.6 years. That is earlier in female by about 1 year. At least the emergence of the maxillary second premolar in males was at 12.11 years and also the maxillary canine emerged at approximately at the same time. Both the maxillary and mandibular canine and premolar in female appeared earlier than in males.

The emergence of the permanent teeth in Kerman children is a little delayed compared to most of the other populations. The most common observed emergence pattern in girls was mandibular canine and maxillary first premolar followed by mandibular first premolar, maxillary second premolar, then maxillary mandibular second premolar and canine and in boys it was maxillary and mandibular first premolar, mandibular canine, maxillary second premolar, mandibular second premolar and maxillary canine.

The range of variation in eruption time differed for differing permanent teeth and between girls and boys. In girls the minimum range of variation in eruption (17.2 months) was seen in maxillary canine. The maximum range of variation in girls (20 months) was seen for the maxillary first premolar. In boys the minimum range of variation of eruption (14.7 months) was seen in the maxillary canine and the maximum range of variation in boys was seen in mandibular first premolar (18 months).

DISCUSSION

Cross sectional data on permanent teeth eruption (canine and premolar) were collected from 2602 subject of primary and junior school in Kerman Province of Iran.

Since the Kerman is the largest province in Iran country and survey the timing and sequence of teeth eruption provide an important foundation to understanding the biology and culture of past and present population this information is also of clinical significance in child health planning, diagnosis and treatment planning (Hussin *et al.*, 2007).

The results showed that the average age at the eruption of permanent teeth in girls is significantly younger than in boys.

The average time of permanent teeth eruption between girls and boys ranged from 4-7 month. With the largest difference being seen in mandibular canine (7 months).

These results are in parallel with those described elsewhere in the literature.

Stewart (1982) reported difference in the eruption time between genders to be a maximum of 2-10 months and Hagg and Taranger (1985); Hurme (1949) and Kim *et al.* (2003) reported that average age at eruption among girl was distinctively earlier than in boys. This survey clearly confirm to previous findings.

The result of this study also showed that the mandibular teeth have an earlier eruption time than maxillary teeth in both girls and boys with the exception of the first and second premolar. That is in parallel with the other studies in literature Blankenstein and Cleaton (1990); Kochhar and Richardson (1998) and Mugonzibwa *et al.* (2002).

It is postulated that there are numerous factors which influence the development and eruption of teeth including: endocrine, genetic, nutrition and ethnics. The emergence of permanent maxillary first and second premolar in Kerman population was earlier than the mandibular counterpart. Similar sequence of eruption seen in other studies. Nizam *et al.* (2003) reported that all mandibular teeth with the exception of first and second premolar in both males and females, tended to erupt earlier than the maxillary counterpart, Kochhar and Richardson (1998) and Friedrich *et al.* (2007) also showed similar results.

Our result revealed that the average age at eruption time of mandibular canine in girls was younger than boys.

This study confirms earlier eruption of comparable teeth in females as against males.

Early eruption is generally a conflict of earlier maturation in the females (Nizam *et al.*, 2003). But Earlier eruption in boys reported by Wedi *et al.* (2005).

There are no substantial differences in the sequence and timing of permanent teeth eruption compared with other studies such as Japan (Hoffding *et al.*, 1984) America (Pahkala *et al.*, 1991) Finland (Moslemi, 2004) Denmark (Hughes *et al.*, 2007), Tehran

(Mahmoodian, 1998) knowledge about eruption time for canine and premolar is critical for dental treatment planning specially in orthodontic in cases of a space deficit in the canine region.

There was no significant difference in mean age of permanent teeth eruption in left and right side of jaws in both groups.

That is agree with Kochhar and Richardson (1998) and Hughes *et al.* (2007).

In both groups the maxillary canine appeared after the second premolar. Emergence of mandibular canine in female was about 11, 9 years and first premolar appeared at the same time as the mandibular canine.

The emergence of the first premolar of both jaws was of the same time in 12.6 year that is later than girls.

In females eruption time for mandibular first premolar was at 12 years and for maxillary second premolars was at 12.9 years. The mandibular first premolar erupted at 12 years the mandibular and maxillary canine emerged at 12.5 years in males the emergence of mandibular canine was at 12.6 years. That is earlier in female by about 1 year.

At least the emergence of the maxillary second premolar in males was at 12.11 years and also the maxillary canine emerged at approximately at the same time. Both the maxillary and mandibular canine and premolar in female appeared earlier than in males.

The emergence of the permanent teeth in Kerman children is a little delayed compared to most of the other populations.

Our study revealed that the mean age of emergence of teeth is earlier than maxillary counterpart in both girls and boys. But maxillary first and second premolar erupted earlier than mandibular counterpart. The sequence of eruption in this study is in accordance with previous study (Hurme, 1949; Kim *et al.*, 2003; Blankenstein and Cleaton, 1990; Kochhar and Richardson, 1998; Mahmoodian, 1998) also found the same pattern for premolar teeth eruption with exception mandibular first premolar, which erupted earlier than mandibular canine. But our result is in contrast with (Moslemi, 2004; Mahmoodian, 1998).

Similar sequence in eruption seen, at least comparison of our result with other states in America (Wedi *et al.*, 2005) Finland (Hoffding *et al.*, 1984) Tanzania (Mugonzibwa *et al.*, 2002) revealed that eruption time in Kermanian children is later.

Factors affecting the time and sequence of eruption such as genetic over weight (Billewicz and McGregor, 1975; Triratana *et al.*, 1990; Stewart, 1982) fluorides and caries environmental ethnicity socio economic and secular factor (Virtanen *et al.*, 1994).

Ethnic origin has been proven by many investigators to have influence on the timing of teeth eruption.

It is said to exert more influence than other variable such as the socio economic status or nutrition. Socio economic conditions may play a major role in general stomatic growth but their effect on dental development is considered to be insignificant (Hussin *et al.*, 2007)

CONCLUSION

It may be concluded that the eruption timing and sequence seen in large sample of children from Kerman revealed that emergence of teeth appeared later than other ethnic group these findings are relevant for dental treatment planning, forensic evaluation.

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