

**AGE AND SEQUENCE OF ERUPTION OF
PERMANENT TEETH IN CHILDREN AND
ADOLESCENTS IN NORTH-EASTERN MALAYSIA**



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**Final Report
USM Short Term
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1869 ✓

BAHAGIAN PENYELIDIKAN & PEMBANGUNAN CANSELORI

UNIVERSITI SAINS MALAYSIA

Laporan Akhir Projek Penyelidikan Jangka Pendek

1) Nama Penyelidik: Dr. Nizam Abdullah

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2) Pusat Pengajian/Pusat/Unit : Pusat Pengajian Sains Pergigian

3) Tajuk Projek : 'Age and sequence of eruption of permanent teeth in children and adolescents in North-eastern Malaysia.'

4) (a) Penemuan Projek/Abstrak:

The aim of this study is to determine the age and sequence of eruption of permanent teeth as well as gender differences in children and adolescents in the state of Kelantan, north-eastern Malaysia. Cross-sectional data on permanent tooth eruption were collected by examining pre-school, primary and secondary school children of 5-17 years of age . The subjects were drawn by multistage random sampling from the school register. There were 2382 subjects in the sample, 1062 boys and 1320 girls. A tooth was considered erupted if any part of its crown was visible in the mouth. The data were subjected to probit analysis to compute the eruption time of each individual tooth in terms of median, 95th percentile and 99th percentile. The mean age of eruption of lower first molar is 6.0 years (5.8yr,6.2yr) at 95%CI and for lower canine is 10.2 years (10.0yr,10.3yr) at 95%CI. The median age of eruption of each tooth was earlier in girls than in boys. Although the range of years during which the teeth erupted was similar in both sexes, the sequence of the individual teeth differed. All mandibular teeth, with the exception of first and second premolars in both males and females, tended to erupt earlier than their maxillary counterparts. The findings seem to correspond to earlier studies done in the other parts of the world, however the eruption time seems to be earlier compared to studies done in Thailand and Madras.

Bahasa Malaysia:

Penyelidikan ini bertujuan untuk menentukan umur, turutan dan perbezaan antara jantina bagi pertumbuhan gigi kekal dikalangan kakak-kakak dan remaja di Negeri Kelantan. Data cross-sectional diperolehi dengan cara menjalani pemeriksaan pergigian keatas kanak-kanak pra-sekolah, murid sekolah rendah dan menengah berumur antara 5 hingga 17 tahun. Sampel diperolehi dengan cara pengumpulan secara rawak dari buku rekod sekolah. Seramai 2382 murid telah diperiksa, 1062 lelaki dan 1320 perempuan. Gigi kekal dicatatkan sebagai sudah tumbuh sekiranya mana-mana bahagian koronanya sudah kelihatan didalam mulut. Data di analisa secara 'Probit' untuk menentukan peringkat umur pertumbuhan bagi setiap gigi kekal pada tahap Median (50th percentile), 95th dan 99th percentile. Mean umur bagi pertumbuhan gigi kekal pertama iaitu gigi geraham bawah pertama ialah 6.0 tahun (5.8th, 6.2th) pada 95% CI. Mean umur bagi pertumbuhan gigi taring bawah pula ialah 10.2 tahun (10.0th, 10.3th) pada 95% CI. Mean umur setiap gigi kekal didapati lebih awal bagi kanak-kanak perempuan berbanding dengan lelaki. Walaupun jarak waktu pertumbuhan gigi kekal bagi lelaki dan perempuan sama iaitu dari 6 tahun hingga 12 tahun, turutan gigi diperhatikan berlainan. Gigi bawah pada amnya tumbuh lebih awal berbanding dengan gigi atas yang sama dalam kedua-dua jantina kecuali gigi geraham kecil pertama dan kedua. Penemuan ini bersamaan dengan penemuan yang dihasilkan oleh penyelidik-penyelidik lain di dunia, walau bagaimana pun umur bagi pertumbuhan gigi kekal bagi kanak-kanak di Kelantan didapati lebih awal berbanding dengan kajian yang dijalankan di Thailand dan Madras.

(b) Senarai Kata Kunci yang digunakan di dalam abstrak:

Bahasa Malaysia

Melayu

Gigi Kekal

Pertumbuhan Gigi

Bahasa Inggeris

Malays

Permanent Teeth

Eruption

5) Output Dan Faedah Projek

(a) Penerbitan (termasuk laporan/kertas seminar)

Pembentang Kertas (Oral)

1. N. Abdullah, N. Mokhtar and L. Naing
Eruption of permanent teeth in Children and Adolescents in North eastern Malaysia. 'The 2nd. Scientific meeting in Dentistry – Surabaya 2-3 September 2001
2. N. Abdullah, N. Mokhtar and L. Naing
Eruption of permanent teeth in Children and Adolescents in North eastern Malaysia. 'Scientific Meeting of The International Association for Dental Research – IADR – The Legend Hotel, Kuala Lumpur, 25-27 September 2001

Pembentang Kertas (Poster)

1. N. Abdullah, N. Mokhtar and L. Naing
Eruption of permanent teeth in Children and Adolescents in North eastern Malaysia. The FDI-World Dental Congress- PWTC Kuala Lumpur 28th. September – 1st. October 2001

Penerbitan:

Manuskrip telah dihantar untuk penerbitan.

Jidalam Journal " Clinical Oral Investigations "

(b) Faedah-faedah lain seperti perkembangan produk, prospek komersialan dan pendaftaran paten.

.....Tiada.....

(c) Latihan Gunatenaga manusia


- i) Pelajar siswazah
Tiada.....
- ii) Pelajar Prasiswazah
Tiada.....
- iii) Lain-lain:
Tiada.....

6. Peralatan yang telah dibeli:

1. Note book Computer
2. Scanner

UNTUK KEGUNAAN JAWATANKUASA PENYELIDIK UNIVERSITI

Ditulisakan seterusnya kepada peribensangan yang memastikan di P.P.S.


T/Tangan Pengerusi
J/K Penyelidikan
Pusat Pengajian

PROF. DR. RUSLI BIN NORDIN
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TITLE PAGE

MANUSCRIPT TITLE:

Age and Sequence of eruption of Permanent teeth in North-Eastern Malaysia

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ABSTRACT

The aim of this study is to determine the age and sequence of eruption of permanent teeth as well as gender differences in children and adolescents in the north-eastern Malaysia. Cross-sectional data on permanent tooth eruption were collected by examining pre-school, primary and secondary school children of 5-17 years of age . The subjects were drawn by multistage random sampling from the school registers. There were 2382 subjects in the sample, 1062 boys and 1320 girls. The data were subjected to probit regression analysis. The mean age of eruption of lower first molar is 6.0 (95%CI: 5.8, 6.2) years. The median age of eruption of each tooth was earlier in girls than in boys. Although the range of years during which the teeth erupted was similar in both sexes, ie 6-12 years, the sequence of the tooth eruption differed. All mandibular teeth, with the exception of first and second premolars in both males and females, tended to erupt earlier than their maxillary counterparts. The findings seem to correspond to earlier studies done in the other parts of the world. However the eruption time seems to be earlier compared to studies done in Thailand and Madras.

Key Words: Tooth eruption, permanent teeth, sequence, probit regression.

INTRODUCTION

The eruption of teeth is defined as the appearance of teeth in the oral cavity. Eruption time for permanent teeth vary widely from one person to the next. The development process, in which the primary teeth are exchanged for permanent teeth, is a physiological phenomena having characteristics not seen in any other body organ.

The exfoliation of primary teeth and subsequent eruption of permanent teeth is a developmental phenomenon that forms part of the body's continual process of growth. The time and sequence of eruption of permanent teeth has been studied by several researchers in many parts of the world. J. Sushma (1983) reported earlier eruption among Khasis compared to other population in India. R. Pahkala et al (1990) reported earlier eruption in rural children in northeastern Finland than in other parts of the community.

Both local and systemic factors play a major role in determining the time and sequence of tooth eruption. Because of variety of factors influencing eruption of teeth, standards for tooth eruption of permanent teeth are most useful when they are derived from the population to which they are applied.

The eruption order of permanent teeth is a major factor in the formation and the occlusion of the permanent dental arch. The permanent dental arch is formed as a product of the eruption of a total of 32 permanent teeth from the maxillary and mandibular jaws. The order and

positions of in which the teeth erupt comprise the body's physiological mechanism for the growth and development of occlusion and mastication.

Adequate knowledge of the timing and pattern of tooth eruption are important for diagnosis and treatment planning when working with children in pediatric dentistry and orthodontics. It is also useful in the field of surgery and for determination of age in forensic science. Several authors have reported differences in permanent tooth eruption between ethnic groups [2,3] and genders, [4]. Socioeconomic and nutritional factors, caries conditions and the circular trends have also been found to have some effect on the eruption of permanent teeth. Differences have been reported within a population of the ethnic group. Although the most accurate method for studying eruption time and sequence of eruption of permanent teeth is to trace the dental history of the same individual, many researchers, in consideration of the many years and the various difficulties involved in this method, have opted to study this time and sequence in terms of average eruption times, ie. Average age at time of eruption.

The objective of this present study is to determine the age and sequence of eruption of permanent teeth as well as gender differences in children and adolescents in north-eastern Malaysia.

MATERIALS AND METHODS

This cross-sectional study was undertaken in Kelantan, a state situated in the north-eastern part of peninsular Malaysia, comprising 14,920 sq km land with 1.3 million population. The state is divided into ten districts with majority of the habitants are Malay origin (92.9%) and 90% of them living in rural areas as farmers and fishermen. In Malaysia all children start their preschool education from 5 to 6 years of age, primary school education from 7 to 12 years of age and secondary education from 13 to 17 years old. A multistage cluster sampling was done to select children ages from 5 to 17 years of age for this study. Three out of ten districts were drawn out by simple random sampling. In each district, one pre-school, one primary school and one secondary school were selected by stratified random sampling. Children in each school were selected from the school register by simple random sampling. Only the Malays and those without any congenital anomalies were included the study. Children with a history of systemic diseases and those undergoing orthodontic treatment were excluded from the study. The total number of children examined was 2,340. Birth-date and sex were taken from the school register. The age in months was calculated by their birth-date to the date of the examination. Oral examination was carried out by 4 trained dentists with the help of 4 trained recorders. The examination was done in the

school classrooms with the child sitting on a normal classroom chair by using 2 plain mouth mirrors under normal daylight. The tooth was recorded as 'present' or 'absent'. 'Present' was recorded when any part of its crown had penetrated the mucous membrane. Only permanent teeth were recorded. The data was subjected to probit regression analysis to determine the 5th, 50th (median), and 95th percentile of age of eruption for each individual tooth and their 95% confidence intervals. Assuming the age of tooth eruption is normally distributed, the median age is equal to the mean age, and the sequence of tooth eruption was determined by referring to the mean age of eruption of individual tooth.

RESULTS

A total of 2,340 children, (45%) males and (55%) females were examined. The mean age of female was 12.0 (SD 3.17) years and the mean age for male was 11.7 (SD 3.2) years, (Fig.1). The 5th, 50th(median) and 95th percentiles of eruption of each individual tooth in male and female is shown in tables 1 & 2 respectively and the sequence of eruption for both sexes are shown in table 3. The first tooth to erupt was lower first permanent molar, while the last tooth to erupt was the upper second molar in both sexes (table 1 & 2). All mandibular teeth erupted earlier than their maxillary counterparts in both males and females excepts for the first and second premolars (fig.2). The range of years during which the teeth erupted was similar in both sexes, i.e. 6-12 years, but the sequence of the individual teeth differed (table 3).

Figure 1

Table 1

Table 2

Table 3

Figure 2

DISCUSSIONS

Our results show no significant difference in eruption time of the teeth on the contra-lateral permanent teeth, therefore we only consider eruption time and sequence on the right side of the maxilla and mandible. The similarities in eruption ages on contralateral permanent teeth was similar to other studies [5,8]. The eruption of permanent teeth in female malay children was found to be more advance compare to male and this seem to conform to other studies done in Japan (Hoffding et al 1984), Findland (R. Pahkala et al 1991) and (R. Eskali 1999). All mandibular teeth appeared to erupt earlier comparing to their maxillary counterparts in both sexes except for the first and second premolar and this finding is similar to study done in India [7]. In both sexes the first tooth to erupt is the lower first molar. The mean eruption time of lower first molar is 6.0 (95%CI: 5.8, 6.2) years and it coincided in both male and female children.

Maxillary first molar appeared after the mandibular first molar in female followed by eruption of mandibular first incisor. Similar pattern is observed in male. Maxillary first incisor erupted after the mandibular first incisor in both sexes, followed by eruption of mandibular second incisor, maxillary second incisor and maxillary first premolar. Similar sequence of eruption is also observed in India [7]. Mean age of eruption of maxillary first premolar is 9.5 (95%CI: 9.4, 9.7) years in male and 9.2 (95%CI: 9.1, 9.4) years in female. After this age, the sequence of tooth eruption is different in male and in female. However, the last tooth to erupt is similar again in both sexes that is the upper second molar. The mean range of age of eruption for permanent teeth in these children was noted to be the same in both sex, that is from 6 – 12 years old .

CONCLUSION

In the present cross-sectional study the eruption status of the dentition was registered during clinical examination. We did not consider the possible effects of premature eruption of the permanent successor owing to early extraction or delayed eruption owing to delayed exfoliation on the eruption age of the permanent teeth. Our results of equal eruption of contralateral teeth, earlier eruption of mandibular teeth compared with maxillary counterparts, and the differences between males and females all agree with earlier studies done in other parts of the world.

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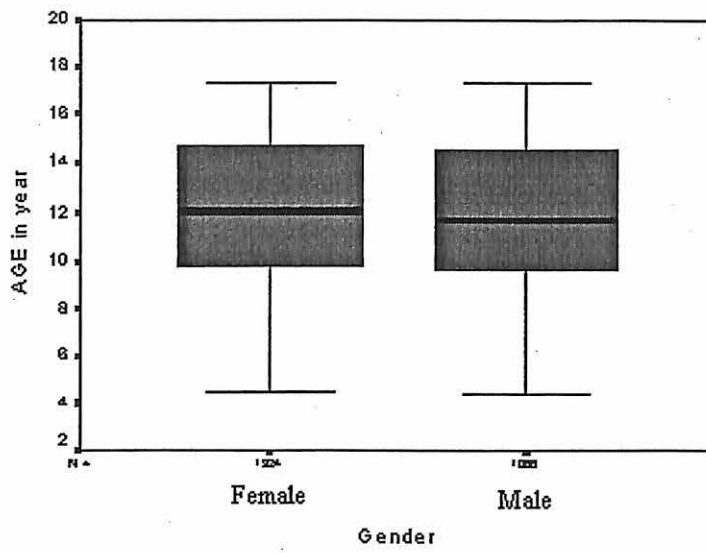
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Figure 1: Age distribution of male and female



Female mean age 12.0 (SD 3.17)

Male mean age 11.7 (SD 3.20)

Table 1: The 5th, 50th and 95th percentiles of age (in years) of tooth eruption for male

Mandible

Tooth	5 th (95% CI)	50 th (95% CI)	95 th (95% CI)
I1	5.1 (4.7, 5.4)	6.4 (6.2, 6.6)	7.7 (7.5, 8.0)
I2	6.1 (5.8, 6.4)	7.5 (7.3, 7.7)	8.8 (8.6, 9.1)
C	8.3 (8.0, 8.5)	10.2 (10.0, 10.3)	12.0 (11.8, 12.3)
P1	7.7 (7.4, 8.0)	9.9 (9.7, 10.0)	12.0 (11.8, 12.3)
P2	8.3 (8.0, 8.6)	10.9 (10.7, 11.1)	13.5 (13.2, 13.7)
M1	4.9 (4.5, 5.2)	6.0 (5.8, 6.2)	7.2 (7.0, 7.5)
M2	9.5 (9.3, 9.7)	11.4 (11.3, 11.6)	13.3 (13.1, 13.5)

I- Incisor, C-Canine, P-Premolar, M-Molar

Maxilla

Tooth	5 th (95% CI)	50 th (95% CI)	95 th (95% CI)
I1	5.8 (5.5, 6.0)	7.2 (7.0, 7.4)	8.6 (8.4, 8.9)
I2	7.0 (6.7, 7.2)	8.6 (8.4, 8.8)	10.3 (10.1, 10.5)
C	8.9 (8.6, 9.1)	11.0 (10.8, 11.1)	13.1 (12.9, 13.3)
P1	7.6 (7.3, 7.9)	9.5 (9.4, 9.7)	11.4 (11.2, 11.7)
M1	5.4 (5.1, 5.7)	6.4 (6.3, 6.6)	7.4 (7.2, 7.7)
M2	10.3 (10.1, 10.5)	12.2 (12.0, 12.3)	14.0 (13.8, 14.2)

I- Incisor, C-Canine, P-Premolar, M-Molar

Table 2: The 5th, 50th and 95th percentiles of age (in years) of tooth eruption for female

Mandible

Tooth	5 th (95% CI)	50 th (95% CI)	95 th (95% CI)
I1	5.0 (4.6, 5.3)	6.3 (6.1, 6.5)	7.6 (7.3, 7.8)
I2	5.9 (5.6, 6.2)	7.3 (7.1, 7.5)	8.7 (8.4, 8.9)
C	7.6 (7.4, 7.9)	9.5 (9.4, 9.7)	11.4 (11.2, 11.6)
P1	7.5 (7.2, 7.8)	9.7 (9.7, 9.8)	11.9 (11.6, 12.1)
P2	8.0 (7.7, 8.3)	10.6 (10.5, 10.8)	13.2 (13.0, 13.5)
M1	4.9 (4.5, 5.2)	6.0 (5.8, 6.2)	7.2 (7.0, 7.4)
M2	9.1 (8.9, 9.3)	11.0 (10.9, 11.1)	12.9 (12.7, 13.1)

I- Incisor, C-Canine, P-Premolar, M-Molar

Maxilla

Tooth	5 th (95% CI)	50 th (95% CI)	95 th (95% CI)
I1	5.7 (5.3, 5.9)	7.1 (6.9, 7.2)	8.5 (8.3, 8.7)
I2	6.8 (6.6, 7.1)	8.5 (8.3, 8.6)	10.1 (10.0, 10.4)
C	8.4 (8.2, 8.7)	10.5 (10.4, 10.7)	12.6 (12.4, 12.9)
P1	7.3 (7.0, 7.6)	9.2 (9.1, 9.4)	11.1 (10.9, 11.4)
M1	5.2 (4.9, 5.5)	6.2 (6.0, 6.4)	7.2 (7.0, 7.5)
M2	10.1 (9.9, 10.3)	12.0 (11.8, 12.1)	13.8 (13.6, 14.0)

I- Incisor, C-Canine, P-Premolar, M-Molar

**Table 3: Sequence of tooth eruption for male and female
(at mean age of eruption in years)**

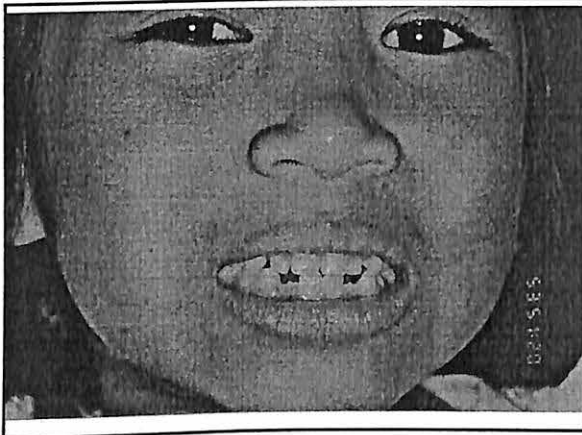
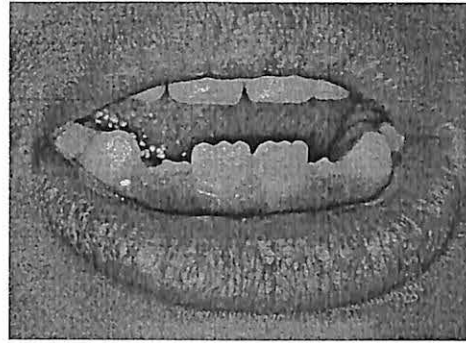
Male	Tooth		Female
6.0	Mand M1		6.0
6.4	Max M1		6.2
6.4	Mand I1		6.3
7.2	Max I1		7.1
7.5	Mand I2		7.3
8.6	Max I2		8.5
9.5	Max P1		9.2
9.9	Mand P1	Mand C	9.5
10.2	Mand C	Mand P1	9.7
10.4	Max P2	Max P2	10.2
10.9	Mand P2	Max C	10.5
11.0	Max C	Mand P2	10.6
11.4	Mand M2	Mand M2	11.0
12.2	Max M1	Max M1	12.0

I- Incisor, C-Canine, P-Premolar, M-Molar

ERUPTION OF PERMANENT
TEETH IN CHILDREN AND
ADOLESCENTS IN
NORTHEASTERN MALAYSIA



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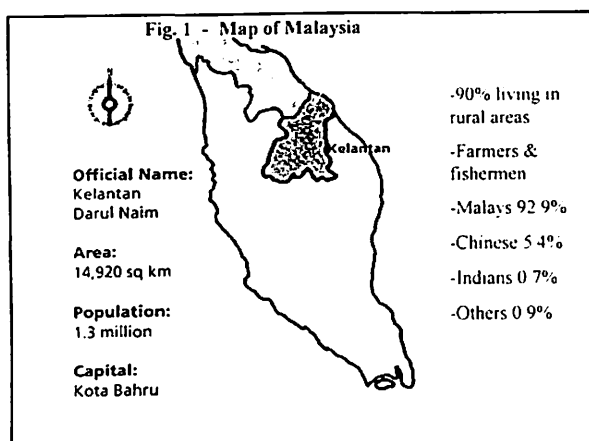


- Riitta *et.al* (1990) -Eruption of permanent teeth in rural children in Northeastern Finland is earlier compared to other parts of the country.
- Hurme (1957) UK- presented a comprehensive review of reports of tooth eruption which considered the effect of racial origins.
- Ainsworth (1925)
Butler (1962)
examined the eruption of teeth in children throughout the UK

- Sushma 1983- Age and sequence of permanent tooth Emergence among Khasis
- Shourie(1946)- compare to samples for tooth emergence derived from wheat-eating and rice-eating people from north and south of India

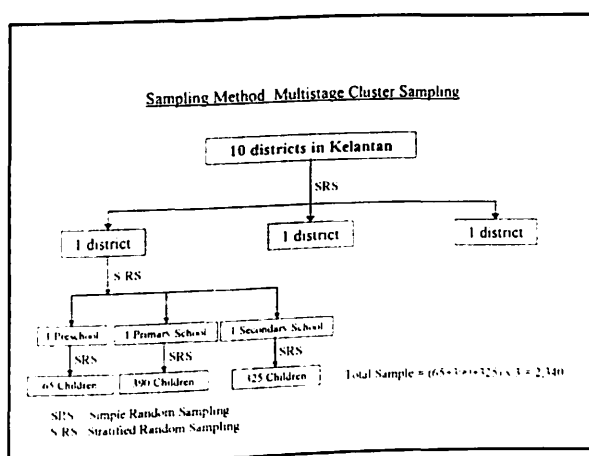
OBJECTIVE

- To determine the age and sequence of eruption of permanent teeth as well as gender differences in 5-17 year old boys and girls in the state of Kelantan, northeastern Malaysia



MATERIALS AND METHOD

- Study design:
cross-sectional
 - Sampling method:
cluster sampling
- All 10 districts in Kelantan were studied
3 schools from each district were selected by random sampling
In each school, sc. Children were selected by systematic random sampling from the school registry.
Sample size : 2382



- **Inclusion Criteria:**
Malays
Age – 5-17 years
without any congenital anomalies
- **Exclusion Criteria:**
History of systemic diseases
Undergoing orthodontic treatment

- Day, month, year of birth and sex are taken from the school register
- Age is determined by their birth-date to the day of the examination
- **The oral examination:**
4 dental officer, 4 recorders
School classroom
Normal chair
Two plain mouth mirrors
Normal daylight

Coding

- 'Present' or 'Absent'
- 'Present' – any part of it's crown has penetrated the mucous membrane.
- Extracted teeth is recorded as present
- Only permanent teeth are recorded

RESULTS

Fig.2: Proportion of gender of sample

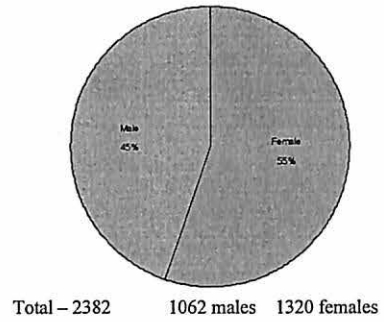


Fig.3: Age distribution of male and female

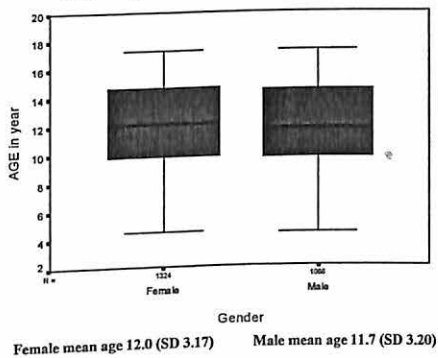


Table 1: Tooth eruption at fifth, 50th and 95th percentile-Male

Tooth	Sex	5%(95%CI)	50%(95%CI)	95%(95%CI)
1 L6	M	49(4.5, 5.2)	60(5.8, 6.2)	7.2(7.0, 7.5)
2 U6	M	54(5.1, 5.7)	64(6.3, 6.6)	7.4(7.2, 7.7)
3 L1	M	5.1(4.7, 5.4)	6.4(6.2, 6.6)	7.7(7.5, 8.0)
4 U1	M	5.8(5.5, 6.0)	7.2(7.0, 7.4)	8.6(8.4, 8.9)
5 L2	M	6.1(5.8, 6.4)	7.5(7.3, 7.7)	8.8(8.6, 9.1)
6 U2	M	7.0(6.7, 7.2)	8.6(8.4, 8.8)	10.3(10.1, 10.5)
7 U4	M	7.6(7.3, 7.9)	9.5(9.4, 9.7)	11.4(11.2, 11.7)
8 L4	M	7.7(7.4, 8.0)	9.9(9.7, 10.0)	12.0(11.8, 12.3)
9 L3	M	8.3(8.0, 8.5)	10.2(10.0, 10.3)	12.0(11.8, 12.3)
10 U5	M	8.1(7.8, 8.4)	10.4(10.2, 10.5)	12.6(12.4, 12.9)
11 L5	M	8.3(8.0, 8.6)	10.9(10.7, 11.1)	13.5(13.2, 13.7)
12 U3	M	8.9(8.6, 9.1)	11.0(10.8, 11.1)	13.1(12.9, 13.3)
13 L7	M	9.5(9.3, 9.7)	11.4(11.3, 11.6)	13.3(13.1, 13.5)
14 U7	M	10.3(10.1, 10.5)	12.2(12.0, 12.3)	14.0(13.8, 14.2)

Figure 4 Fifth, 50th & 95th percentiles of age of tooth eruption (Male)

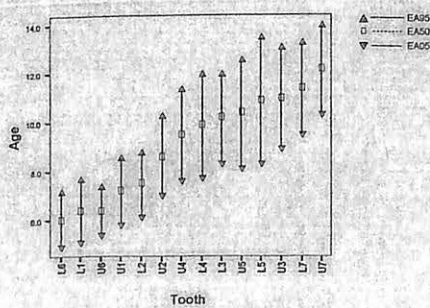
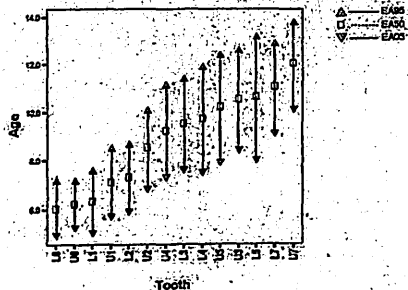


Table 2: Tooth eruption at fifth, 50th and 95th percentile-female

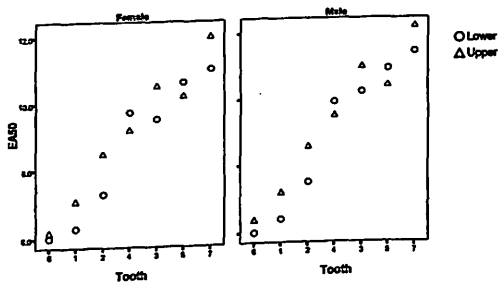
Tooth	Sex	5%(95%CI)	50%(95%CI)	95%(95%CI)
1 L6	F	49(4.5, 5.2)	60(5.8, 6.2)	7.2(7.0, 7.4)
2 U6	F	52(4.9, 5.5)	62(6.0, 6.4)	7.2(7.0, 7.5)
3 L1	F	5.0(4.6, 5.3)	6.3(6.1, 6.5)	7.6(7.3, 7.8)
4 U1	F	5.7(5.3, 5.9)	7.1(6.9, 7.2)	8.5(8.3, 8.7)
5 L2	F	5.9(5.6, 6.2)	7.3(7.1, 7.5)	8.7(8.4, 8.9)
6 U2	F	6.8(6.6, 7.1)	8.5(8.3, 8.6)	10.1(10.0, 10.4)
7 U4	F	7.3(7.0, 7.6)	9.2(9.1, 9.4)	11.1(10.9, 11.4)
8 L3	F	7.6(7.4, 7.9)	9.5(9.4, 9.7)	11.4(11.2, 11.6)
9 L4	F	7.5(7.2, 7.8)	9.7(9.7, 9.8)	11.9(11.6, 12.1)
10 U5	F	7.9(7.7, 8.2)	10.2(10.0, 10.3)	12.4(12.2, 12.7)
11 U3	F	8.4(8.2, 8.7)	10.5(10.4, 10.7)	12.6(12.4, 12.9)
12 L5	F	8.0(7.7, 8.3)	10.6(10.5, 10.8)	13.2(13.0, 13.5)
13 L7	F	9.1(8.9, 9.3)	11.0(10.9, 11.1)	12.9(12.7, 13.1)
14 U7	F	10.1(9.9, 10.3)	12.0(11.8, 12.1)	13.8(13.6, 14.0)

Figure 5: Fifth, 50th & 95th percentiles of age of tooth eruption (Female)



- All mandibular teeth erupt earlier than their maxillary counterparts in both males and females except for first and second premolars

Figure 6: Median age of tooth eruption



- Range of years during which the teeth erupted was similar in both sexes
 - 6-12 years
- the sequence of the individual teeth differ

Table 3 : For sequence of tooth eruption, Age at 50% eruption (EA₅₀) (for male and female)

Male	Tooth (code)	Female	
6.0	L6	6.0	
6.4	U6	6.2	
6.4	L1	6.3	
7.2	U1	7.1	
7.5	L2	7.3	
8.6	U2	8.5	
9.5	U4	9.2	
9.9	L4	L3	9.5
10.2	L3	L4	9.7
10.4	U5	U5	10.2
10.9	L5	U3	10.5
11.0	U3	L5	10.6
11.4	L7	L7	11.0
12.2	U7	U7	12.0

Discussion

The chronology of tooth eruption has often been used in the medico-legal cases for estimation of age

If tooth is present

- Age cannot be < EA05 (population) with (5% error)
- Age is probably >EA 95(population) with(5% error)

If tooth is absent

- Age is probably <EA05(population) with (5% error)
- Age cannot be>EA95 (population) with(5% error)

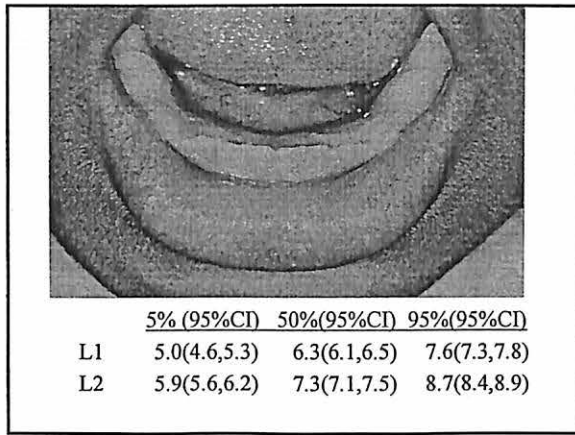
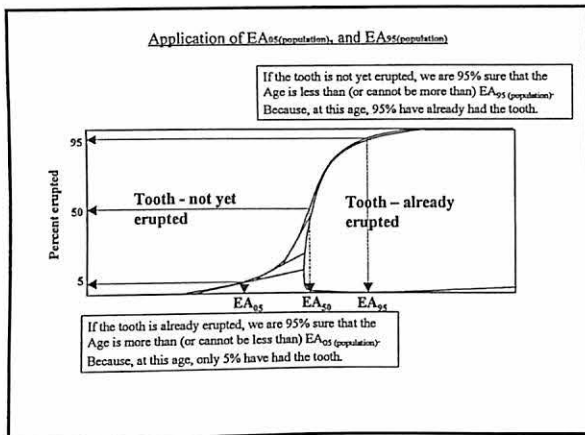


Table 5: Permanent tooth eruption times among some population-maxillary teeth

Population	Authors	M/F	1	2	3	4	5	6	7
Northeastern Malaysia	Present study	M	7.20	8.60	11.00	9.50	10.40	6.40	12.20
		F	7.10	8.50	10.50	9.20	10.20	6.20	11.90
Thailand	Kamalanathan et.al. (1960)	M	8.10	9.10	11.50	10.50	11.90	7.00	12.20
		F	7.80	8.80	10.90	9.80	11.60	7.00	12.10
Madras	Shourie(1946)	M	7.28	8.38	11.36	10.52	10.66	6.59	12.37
		F	7.30	7.62	10.92	10.50	11.57	6.91	11.86
English	Clements et al.(1953)	M	7.01	8.18	11.46	10.41	11.52	6.11	11.97
		F	6.62	7.82	10.67	9.79	10.06	5.94	11.50
Australia	Hallikis(1961)	M	7.60	8.30	11.60	10.40	11.20	6.40	12.10
		F	7.10	8.00	10.80	10.00	10.90	6.30	11.50

Table 6: Permanent tooth eruption times among some populations

Mandibular Teeth

Population	Authors	M/F	1	2	3	4	5	6	7
Northeastern Malaysia	Present study	M	6.5	7.6	10.1	10	10.9	6	11.4
		F	6.2	7.3	9.6	9.7	10.6	5.9	11.1
Thailand	Kamalanathan et.al.(1960)	M	7	8.2	11.3	11.1	11.8	7	11.7
		F	7	7.6	9.9	10.4	11.5	7	11.6
Madras	Shourie -1946	M	7.04	7.77	10.77	10.79	11.80	6.59	12.26
		F	7.2	7.7	10.42	9.46	11.36	6.91	11.59
English	Clements et al.(1953)	M	6.06	7.3	10.51	11.36	12.32	6.14	11.41
		F	5.77	7.01	9.41	10.36	11.64	5.84	11.16
Australia	Hallikis -1961	M	6.4	7.7	10.7	11.3	12.3	6.3	11.7
		F		7.2	9.8	10.5	11.5	6.1	11.1

Limitations

- Possible effects of premature eruption of permanent successor owing to early extraction
- Delayed eruption owing to delayed exfoliation of deciduous teeth

- Detail information about the timing of clinical eruption is obtainable only in longitudinal examinations using sophisticated instruments unsuitable for epidemiologic studies
- When a continuous process is divided into discrete categories-problem of classification

SUMMARY

- Results show differences in timing of eruption between male and female, indicating earlier eruption in females
- Mandibular teeth generally erupt earlier than maxillary antagonists
- Range of years during which the teeth erupted was similar in both sexes but the sequence of the individual teeth differed

