The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/18.4633

ORIGINAL PROF-4633

ERUPTION OF PERMANENT TEETH;

ASSESSMENT OF ERUPTION OF PERMANENT TEETH ACCORDING TO GENDER IN LOCAL POPULATION

Hassan Shahid[1], Sadia Hassan[2], Alvina Ali Shaikh[3]

1. BDS, MDPH
Associate Professor and Head
Department of Community and Preventive Dentistry,
Faculty of Dentistry & Allied Sciences, Isra University.
Hyderabad.
2. BDS. M.Phil.
Assistant Professor
Department of Oral Biology
Faculty of Dentistry & Allied Sciences, Isra University.
Hyderabad.
3. BDS. M.Sc
Senior Registrar
Department of Oral Surgery
Faculty of Dentistry & Allied Sciences, Isra University.
Hyderabad.

Correspondence Address:
Dr. Hassan Shahid
Associate Professor
Head
Department of Community and Preventive Dentistry
Faculty of Dentistry & Allied Sciences, Isra University.
Hala road, P.O.Box 313, Hyderabad.
dr_hassanshahid@hotmail.com

Article received on:
05/01/2018
Accepted for publication:
15/05/2018
Received after proof reading:
06/11/2018

ABSTRACT… Introduction: Tooth eruption is a long and complex physiological process which is responsible for the tooth's movement from its site of development in the jaw's bone where it is formed until reaching the occlusal plane and starting its function. **Objectives:** The objectives of this study were to assess the eruption of permanent teeth according to gender in local population. **Study Design:** Cross sectional study. **Setting:** Three hundred School children aged between 6-15 years were included in this study. **Period:** The study was conducted in September 2017. **Material and Methods:** Data was collected by undertaking the oral examination of each child present on the day of examination. **Results:** A sample of 300 children was studied; The Mean age and standard deviation was 9.86 ± 2.057 respectively. Frequency of male to female subjects remained 150 (50%) and 150 (50%) respectively. **Conclusion:** In conclusion we found that as per the normal eruption dates, delayed eruption was seen in all the teeth of both genders respectively, but we cannot conclude that in our region delayed eruption will certainly be seen in all the children as our sample size was small. In this study the main discrepancy was seen in 2nd premolar for males and 2nd Molar in females.

Key words: Eruption, permanent teeth, gender, Dental age, Molar Teeth.

Article Citation: Shahid H, Hassan S, Shaikh AA. Eruption of permanent teeth; assessment of eruption of permanent teeth according to gender in local population. Professional Med J 2018; 25(11):1741-1746. **DOI:**10.29309/TPMJ/18.4633

INTRODUCTION

Tooth eruption is a long and complex physiological process which is responsible for the tooth's movement from its site of development in the jaw's bone where it is formed until reaching the occlusal plane and starting its function.[1] The knowledge of permanent tooth eruption is of major importance for dentists working especially in the field of pedodontics and orthodontics.[2] The knowledge of normal tooth eruption and its variation is critical for diagnosing eruption disorders and in making a treatment plan.[3] For proper eruption, growth and alignment of permanent teeth, it's crucial that the subsequent primary teeth exfoliation be at proper stage [(4)]. Different studies have recognized various timings and sequential age of permanent teeth eruption, nevertheless the sequential age of a child may fluctuate immensely.[4] Proffit discussed the fact that each child may has explicit dental stages which are related with the consecutive sequential ages.[4] Table 1 shows different dental eruption stages.

Females and males show substantial variation in their peak height velocity and their pubertal developmental spurt. This growth spurt is seen earlier in girls than boys by approximately 2 years.[4,5] Average age for peak height in boys is fourteen years of age and for girls it is eleven years of age.[6] Differences in genders are seen in the timing of Dental development and skeletal growth. Development in boys and girls are almost similar till the ages of six, but as they grow up boys show less advancement than girls as reported by Levesque and Demirjian.[7]

Permanent dentition development starts about 5 to 6 years of age, on the distal side of the second deciduous molars, with the first tooth being mandibular first permanent molar, central incisors' and consequently the maxillary first permanent molars.[8-12] Unlike the incisors, canines and premolars who have succeedenous teeth, the permanent molars of mandibular and maxillary teeth have no primary teeth present above them

that undergo exfoliation, hence they erupt without any problems.[10] However, the permanent central incisor eruption is not that problem free as for proper eruption; the primary central incisor must go through exfoliation at the appropriate time. At age 7 the next phase of eruption occurs, where the permanent maxillary central and mandibular lateral incisors are erupting in place of the exfoliating primary maxillary central and lateral mandibular incisors.[4-9] Hereafter in the next five to six years of age the rest of the permanent teeth's timely eruption takes place. The sequence of eruption for Maxillary teeth is, at the age of six first molar erupts followed by central incisor at age seven, then at age eight lateral incisors, at age ten first premolar, at age eleven canine and second premolar erupts and at age twelve second molar erupts. The sequence of eruption for mandibular teeth is, at the age of six, central incisor and first molar erupts followed by lateral incisor at age seven, then at age ten canine and first premolar erupts, followed by second premolar at age eleven and second molar at age twelve respectively.[4]

Eruption order is just as significant as defining the patients' dental age.[4] The permanent teeth usually emerge between the ages of 6 -14 years, not including the 3rd molars that usually are seen emerging at the ages of 17-21 years.[13,14] As teeth are the most stable structures in the human body, it can be of paramount importance in forensic medicine where estimation of age is usually required for criminal investigations and also in persons who do not have proper birth certificates whether above or below 18 years of age.[15,16] Thus, present study was directed to find out the assessment of eruption of permanent teeth according to gender in local population.

MATERIAL AND METHOD

This was a cross sectional study of children aged 6-15 years. It was conducted in September 2017. Three schools adjoining the university were selected for the study. Basic information such as family history, place of birth, date of birth and educational level was asked from students or taken from school records. Prior to carrying out the research, parental permission which the school obtained (written informed consent) was acquired. All students fulfilling the inclusion criteria were selected i.e. students between the ages of 5-15 years, students in their mixed dentitions and all of the residents of Hyderabad district. All the children present on the day of examination were randomly selected for this study. Students with supernumerary teeth and history of congenital and systemic disorders were not included.

In adequate light, the examination was done by means of a wooden spatula to pull back the soft tissues and the status of eruption of the permanent teeth was noted.

A pre-designed proforma was used for recording the research data and was then analyzed by using SPSS version 22.0 (IBM, Corporation). The continuous variables were presented as mean ± SD. Categorical variables were examined by Chi-square test and results were presented as frequencies and percentages. Prior to the study, the ethical approval for this study was obtained from the ethical review board of the institute. Two calibrated dentists examined the students.

RESULT

Table-I shows the frequency of gender in relation to distribution of age. Age groups were from 6 till 15 years of age where the most common age was 10 years (19%). Followed by 11 years of age (18%) and 9 years of age (14.3%) respectively. Mean age was 9.86 ± 2.057.

Figure-1 shows the gender distribution of male and females. Frequency of male to female subjects remained 150 (50%) and 150 (50%) respectively.

Table-II shows the eruption times of maxillary teeth in males. It is seen that almost all teeth had delayed eruption according to the normal eruption dates. Maxillary lateral incisor was seen to be the most delayed tooth with 54.54% nevertheless, as the sample size was small so we cannot claim that every child will have delayed eruption in maxillary lateral incisor. Second premolar was also delayed where 61.19% children had delayed eruption.

Table-III shows the eruption times of mandibular teeth in males. It is seen that almost all teeth had slight delayed eruption according to the normal eruption dates but are much improved as compared with maxillary teeth. Mandibular second molar was the most delayed tooth with 53.57 % delay in eruption. Permanent teeth eruption starts around the age of 5-6. Mandibular teeth erupt first than maxillary teeth. In our study mandibular teeth erupted first and above 90% children had their 1st molars and central incisors erupted on time.

Table-IV shows the eruption times of maxillary teeth in females. It can be seen here also that almost all teeth had delayed eruption according to the normal eruption dates. As was with the males, Maxillary lateral incisor showed high percentage of not erupted teeth with 44.44%. Canine was the other tooth with delayed eruption where 60.41% children were seen.

Table-V shows the eruption times of mandibular teeth in females. It is seen that almost all teeth had slight delayed eruption according to the normal eruption dates but are much improved as compared with maxillary teeth. Mandibular second premolar was the most delayed tooth with 60.93 % delay in eruption. Lateral incisor was the other tooth with delayed eruption where 64.44% children were seen. Permanent teeth eruption starts around the age of 5-6. Mandibular teeth erupt first than maxillary teeth. In our study mandibular teeth erupted first and above 80% children had their 1st molars and central incisors erupted on time.

Age	Male	Female	Frequency	%
6	6	12	18	6
7	14	15	29	9.7
8	13	18	31	10.3
9	23	20	43	14.3
10	38	19	57	19.0
11	29	25	54	18.0
12	18	23	41	13.7
13	7	13	20	6.7
14	2	3	5	1.7
15	0	2	2	.7
	150	150	Mean 9.86 ± 2.057	

Table-I. Shows Age distribution of study population (n=300)

Maxillary Teeth	Normal Eruption time	No of cases	Erupted on normal time	Not erupted on normal time	% of Normal Eruption
Central Incisor	7	20	13	7	65 %
Lateral Incisor	8	33	18	15	54.54 %
Canine	11	47	33	14	70.21 %
1st Premolar	10	67	49	18	73.13 %
2nd Premolar	11	67	41	26	61.19 %
1st Molar	6	20	17	3	85 %
2nd Molar	12	56	38	18	67.85 %

Table-II. Eruption timing of permanent maxillary teeth based on chronological age in years in relation to gender (Male) [4]

Mandibular Teeth	Normal Eruption time	No of cases	Erupted on normal time	Not erupted on normal time	% of Normal Eruption
Central Incisor	6	20	18	2	90 %
Lateral Incisor	7	33	22	11	66.66 %
Canine	10	36	24	12	66.66 %
1st Premolar	10	90	58	32	64.44 %
2nd Premolar	11	90	54	36	60 %
1st Molar	6	20	18	2	90 %
2nd Molar	12	56	30	26	53.57 %

Table-III. Eruption Timing of Permanent Mandibular Teeth based on sequential age in years in relation to Gender (Male) [4]

Maxillary Teeth	Normal Eruption time	No of cases	Erupted on normal time	Not erupted on normal time	% of Normal Eruption
Central Incisor	7	27	17	10	62.9 %
Lateral Incisor	8	45	20	25	44.44 %
Canine	11	48	29	19	60.41 %
1st Premolar	10	44	34	10	77.27 %
2nd Premolar	11	44	31	13	70.45 %
1st Molar	6	27	20	7	74.07 %
2nd Molar	12	66	43	23	65.15 %

Table-IV. Eruption timing of permanent maxillary teeth based on chronological age in years in relation to gender (Female) [4]

Mandibular Teeth	Normal Eruption time	No of cases	Erupted on normal time	Not erupted on normal time	% of Normal Eruption
Central Incisor	6	27	23	4	85.18 %
Lateral Incisor	7	45	29	16	64.44 %
Canine	10	38	29	9	76.31 %
1st Premolar	10	64	49	15	76.56 %
2nd Premolar	11	64	39	25	60.93 %
1st Molar	6	27	22	5	81.48 %
2nd Molar	12	66	46	20	69.69 %

Table-V. Eruption timing of permanent mandibular teeth based on sequential age in years in relation to gender (Female) [4]

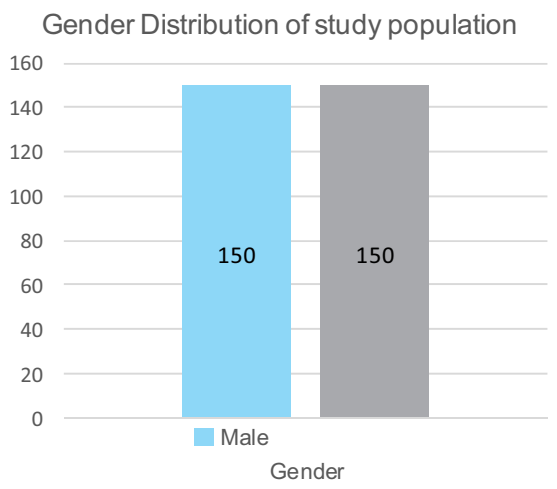

Figure-1. Gender distribution of study population

DISCUSSION

The dental system is an integral part of the human body, its growth and development can be studied in parallel with other physiological maturity indicators such as bone age, menarche and height.[17] Several authors have shown that dental parameters are more suitable for age estimation in children because the variability is lower since calcification rates of teeth are more controlled by genes than by environmental factors. Rate of formation of the permanent teeth is not affected by premature loss of the primary teeth. Gingival emergence also called tooth eruption represents only one stage in the continuous process of dental eruption.[18] In dentistry, any part of the tooth emerging or erupting in the oral cavity is

considered as an eruption of tooth. This is a biological process. Demirjian et al acknowledged the differences in gender in the development of the dentition where they stated that the development in boys is less advanced as compared to girls. Surprisingly, in this study it was seen that the eruption times of girls was delayed as compared to boys, for example, in maxillary central incisor it was seen that at the age of 6-7, 10 females had un-erupted teeth as compared to 7 males.[7] This is in contrast to studies done by Moslemi and Diamanti, who concluded that girls had more advanced eruption than boys.[19,20] Variation was also seen in Maxillary Lateral Incisor; on the right side 31 children out of sixty had delayed eruption while 29 out of 60 had delayed eruption of the left side of the maxilla. Since the sample size was small so we cannot claim that every child will have delayed eruption in maxillary lateral incisor. One of the reasons is also the retained deciduous max lateral incisor. It was seen during the survey that the deciduous lateral incisor was present. Since maxillary central incisor erupts first and is wider and bigger mesiodistally; this also causes the maxillary lateral incisor to get delayed because of less space to erupt. 2nd premolar of the right arch was also delayed where 41.5% children had delayed eruption. This is consistent to a previously reported study done in Uganda by Kutesa et al and in Iran by Anbiaee et al. but it was in contrast to a study done in India by Dahiya et al and Sharma at al who reported earlier eruption of teeth in females as compared to males.[10,21,22] Eruption of teeth was seen to occur first in mandible in both genders. This is consistent to studies done by Dahiya et al and Sharma et al.[10] Age of study population ranged from 6 – 15 years, of which 8-11 years was the most frequent range in age group. Age of subjects of present study is consistent with previous study reported by Dahiya et al, Hedayati et al, Anbiaee et al and Mishu et al.[10,20-24]

In this study, differences of eruption times of teeth were present among children with the same chronological age which is consistent with a study done in Iran by Booshehri et al, who similarly concurred the same finding.[15] Results of present study are in contrast to a study done by Zagreb which stated that both the upper and lower canines erupted later in girls than in boys.[25]

CONCLUSION

In conclusion it was found that as per the normal eruption dates, delayed eruption was seen in all the teeth of both genders respectively, but we cannot conclude that in our region delayed eruption will definitely be seen in all the children as our sample size was small. In this study the main discrepancy was seen in 2nd premolar for males and 2nd Molar in females.

We live in a nation where eruption times is related to many elements, hence we found there was a noteworthy difference in gender in association with eruption of teeth

RECOMMENDATION

Longitudinal studies should be done to ascertain the eruption times in children of a larger sample size in different parts of our country.

REFERENCES

1. Koch G, Poulsen S, Espelid I, Haubek D. **Pediatric dentistry: A clinical approach: John Wiley & Sons; 2017.**
2. Shaweesh AI. **Timing and sequence of emergence of permanent teeth in the Jordanian population. Archives of oral biology.** 2012;57(2):122-30.
3. Lakshmappa A, Guledgud MV, Patil K. **Eruption times and patterns of permanent teeth in school children of India.** 2011; Nov-Dec; 22(6):755-63.
4. Proffit WR, Fields HW, Sarver DM. **Contemporary Orthodontics-E-Book.** Elsevier Health Sciences; 2014 Mar 12.
5. Perinetti G, Contardo L. **Dental maturation is a reliable indicator of the pubertal growth spurt.** American Journal of Orthodontics and Dentofacial Orthopedics. 2016 Jul 1;150(1):4-6.
6. Mellion ZJ, Behrents RG, Johnston LE. **The pattern of facial skeletal growth and its relationship to various common indexes of maturation.** American Journal of Orthodontics and Dentofacial Orthopedics. 2013;143(6):845-54.
7. Demirjian A, Goldstein H, Tanner J. **A new system of dental age assessment.** Human biology. 1973:211-27.

8. Akpata E. **Eruption times of permanent teeth in southern Nigerians.** J Nigerian Med Assoc. 1971;1:34-5.

9. Chohan AN, Khan NB, Al Nahedh L. **Eruption time of permanent first molars and incisors among female primary school children of Riyadh.** Journal of Dow University of Health Sciences. 2007;1(2): 53-58.

10. Dahiya B, Singh V, Parveen S, Singh HP, Singh D. **Age Estimation from Eruption of Permanent Teeth as a Tool for Growth Monitoring.** Indian Academy of Forensic Medicine (IAFM). 2013;35(2):148.

11. Eveleth PB. **Eruption of permanent dentition and menarche of American children living in the tropics.** Human biology. 1966:60-70.

12. Khan N. **Eruption Time of Permanent Teeth in Pakistani Children.** Iranian Journal of Public Health, Vol. 40, No.4, 2011, pp.63-73

13. Agarwal K, Gupta R, Faridi M, Kalra N. **Permanent dentition in Delhi boys of age 5-14 years.** Indian Pediatr. 2004;41(10):1031-5.

14. Khan NB, Chohan AN, Al Mograbi B, Zahid T, Al Moutairi M. **Eruption time of permanent first molars and incisors among a sample of Saudi male schoolchildren.** SDJ-Saudi Dental Journal [The]. 2006;18: 18-24.

15. Zangouei-Booshehri M, Ezoddini-Ardakani F, Aghili HA, Sharifi A. **Assessment of the relationship between body mass index (BMI) and dental age.** Health. 2011; Vol 3(05):253-257.

16. Bang G, Ramm E. **Determination of age in humans from root dentin transparency. Acta Odontologica Scandinavica.** 1970;28(1):3-35.

17. Hegde RJ, Khare SS, Saraf TA, Trivedi S, Naidu S. **Evaluation of the accuracy of Demirjian method for estimation of dental age among 6-12 years of children in Navi Mumbai: A radiographic study.** Journal of Indian Society of Pedodontics and Preventive Dentistry. 2015;33(4):319.

18. Manjunatha B, Soni NK. **Estimation of age from development and eruption of teeth.** Journal of forensic dental sciences. 2014;6(2):73.

19. Moslemi M. **An epidemiological survey of the time and sequence of eruption of permanent teeth in 4–15□year□olds in Tehran, Iran.** International Journal of Paediatric Dentistry. 2004;14(6):432-8.

20. Diamanti J, Townsend GC. New standards for permanent tooth emergence in Australian children. Australian dental journal. 2003;48(1):39-42.

21. Kutesa A, Nkamba EM, Muwazi L, Buwembo W, Rwenyonyi CM. **Weight, height and eruption times of permanent teeth of children aged 4–15 years in Kampala, Uganda.** BMC oral health. 2013;13(1):15.

22. Anbiaee N, Rashed Mohassel A, Afzalinasab S. **The relationship between birth weight, birth height, and dental development by Demirjian's method.** Journal of Dental Materials and Techniques. 2013;2(4):121-4.

23. Hedayati Z, Khalafinejad F. **Relationship between body mass index, skeletal maturation and dental development in 6-to 15-year old orthodontic patients in a sample of Iranian population.** Journal of Dentistry. 2014;15(4):180.

24. Mishu MP, Hobdell M, Khan MH, Hubbard RM, Sabbah W. **Relationship between untreated dental caries and weight and height of 6-to 12-year-old primary school children in Bangladesh.** International journal of dentistry. 2013;2013.

25. Rajić Z, Rajić-Meštrović S, Verzak Ž. **Chronology, dynamics and period of permanent tooth eruption in Zagreb children (Part II).** Collegium antropologicum. 2000;24(1):137-43.

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Hassan Shahid	Methodology, Design, Data interpretation, references, formatting / Proof reading.	
2	Sadia Hassan	Data collection, Literature search.	
3	Alvina Ali Shaikh	Data collection, Drafting.	