

# Assesment of Eruption of Permanent Teeth According To Age And Its Relation With Body Mass Index In Local Population



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**ABSTRACT:** Objectives of the present study was to find out the assessment of eruption of permanent teeth according to age and its relation with body mass index in local population.

Three hundred School children were included in this study. The study was conducted from 1st March to 31st May 2016. The schools selected for research were Pak Turk International School (Isra University), Isra School (Hadi Nagar) and Government primary School, Village Haji Ismail Khan Chand (Hala Naka). Data was collected by measuring the height, weight and oral examination of each child. The height and weight were later used to calculate the child's B.M.I. A sample of 300 children was studied; 100 each of different socioeconomic school. The Mean age and standard deviation was  $9.86 \pm 2.057$  years respectively. Frequency of male to female subjects remained 150 (50%) and 150 (50%) respectively. Age category was from 5 to 15 years of age. It was seen that children were mostly in the normal weight category other than children of age 8 & 10 where underweight children were seen in excess.

It was found that almost all teeth had slight delayed eruption according to the normal eruption time but since the sample size was not big enough therefore we cannot conclude that every child in our region will have delayed eruption. In our sample the highest variation was seen in mandibular left second molar where delayed eruption was present.

**KEY WORDS:** B.M.I., eruption, permanent teeth, socioeconomic status, age

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## INTRODUCTION

Eruption time of the teeth and order are essential aspects in treatment planning, mainly when patients require orthodontic treatment, it also plays a pivotal role in forensic dentistry as it can help to find the age of an adolescent.<sup>1,2</sup> Exfoliation of primary teeth and in turn the eruption of new teeth, is a constant age-related progression by which the teeth arise through the upper and lower jaws and the overlaying mucosa to enter into the oral cavity and in turn occlude with the teeth of the opposite arch.<sup>1-3</sup>

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.<sup>4,5</sup> 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.<sup>6,7</sup> Body Mass Index

(BMI) is a reliable table for measurement of obese people and for those who are overweight especially teenagers and small kids. BMI is reliant on age and gender in kids and teenagers and is for the most part stated to as particular for a specific age<sup>8</sup> but, no sound research has been performed in Pakistan on the assessment of eruption of permanent teeth according to age and its relation with body mass index. The basis behind this research investigation was to provide adequate knowledge of timing in emergence of permanent tooth, especially in our part of the world where because of poverty, majority of the children are either underweight or

Permanent Tooth	Maxillary	Mandibular
Central	7	6
Lateral	8	7
Canine	11	10
1st Premolar	10	10
2nd Premolar	11	11
1st Molar	6	6

malnourished.<sup>9</sup> Hence, this will give an idea that BMI does play a role in eruption sequence. It also plays a pivotal role in Forensic dentistry as it can help to find the age of an

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adolescent. This also provides an opportunity for other local researchers to observe eruption pattern in other ethnic and racial background children, since we live in a country with diverse ethnic origin people. Normal eruption times has been given by Profit<sup>10</sup> as Several studies have been done in population of many countries of the world, and within these countries the different ethnic groups that are present.<sup>4,5,11-21</sup> Thus, this present study was directed to assess the eruption of permanent teeth according to age and its relation with body mass index in local population.

## METHODOLOGY

This was a cross sectional study of children aged 5-15 years. It was conducted from March to May 2016. The schools selected for research were: Pak Turk International School, Isra Foundation School and a Government primary School. These schools were selected based on socioeconomic standing where Pak Turk was high class, Isra foundation school was middle class and Govt School was low class. Basic information such as educational level, date of birth, place of birth and family history 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 included for the study. Students with supernumerary teeth and history of congenital and systemic disorders were not included. BMI was calculated by the formula given below, but first we took the height and weight of the child by carrying out the underlying procedures.

$$\text{BMI} = \frac{\text{Weight in kilograms}}{(\text{Height in meter})^2}$$

## FOR HEIGHT MEASUREMENT

The height measurement was taken on flooring that was not carpeted and against a flat surface such as a wall or cupboard. The child stand was made to stand with feet flat, together, and against the wall. Making sure that the legs were straight, arms at sides, and shoulders were at level. A tape was used to measure from the base on the floor to the marked measurement on the wall.

## FOR WEIGHT MEASUREMENT

For weight measurement we used a weighing scale. We

placed the scale on firm flooring (such as tile) rather than carpet as shown in figure. The child was asked to remove his / her shoes. The child was instructed to stand with both feet in the center of the scale.

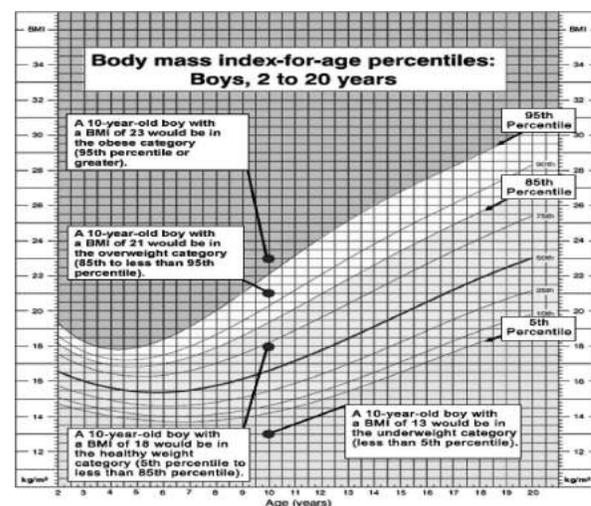
## FOR CLINICAL MEASUREMENT OF TEETH

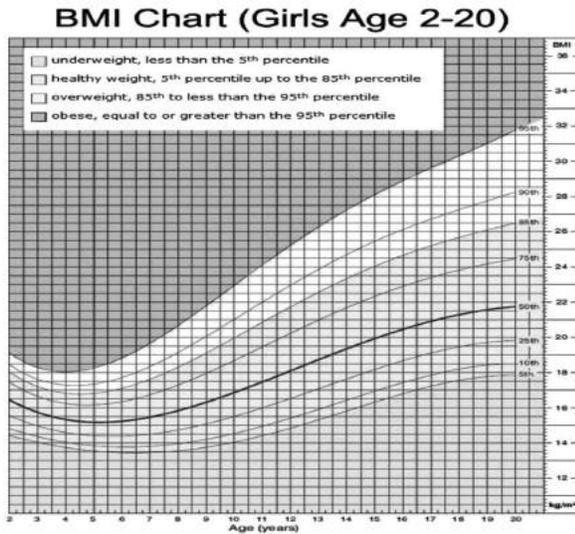
In adequate light, clinical examination was carried out using a wooden spatula to retract soft tissue, and the status of eruption of the permanent tooth was recorded. Any part of the tooth emerging or erupting in the oral cavity was considered as an eruption of tooth.

After calculation of BMI, the data was entered in the respective groups of underweight, normal weight, over weight and obese as given by Center for disease control and prevention. The BMI is calculated on this percentile chart according to the age of the child. The research data was recorded on pre-designed proforma and data was analyzed by using SPSS version 22.0 (IBM, Corporation). The continuous variables were presented as mean  $\pm$  SD. Categorical variables were analyzed by Chi-square test and results were presented as frequencies and percentages. Prior to the study, the consent was sought from the parents' of the students and the ethical approval for this study was obtained from the ethical review board of the institute. Two calibrated dentists examined the students in natural light.

This chart is used for children aged 2 - 20 for measurement of BMI.

Weight Status Category	Percentile Range
Underweight	Less than the 5th percentile
Healthy weight	5th percentile to less than 85th percentile
Overweight	85th to less than the 95th percentile
Obese	Equal to or greater than the 95th percentile





**RESULT**

The present cross sectional, observational and school based study was conducted on students of different schools from the ages of 5 to 15 in local population in relation to B.M.I. Age distribution of study subjects are shown in table 1. Age category was from 5 to 15 years of age whereas age of 10 (19%) was the most frequent age in the study

Table1 Shows Age distribution of study population (n=300)

Age	Frequency	%
5	3	1
6	15	5
7	29	9.7
8	31	10.3
9	43	14.3
10	57	19.0
11	54	18.0
12	41	13.7
13	20	6.7
14	5	1.7
15	2	.7
Mean	9.86 ± 2.057	

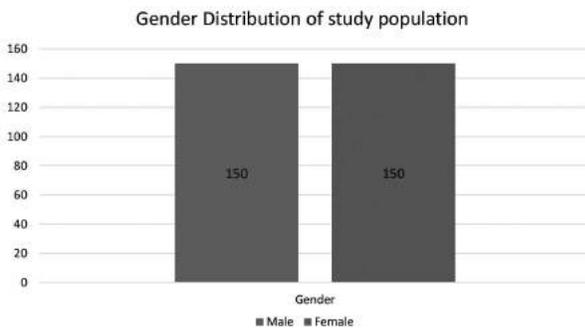
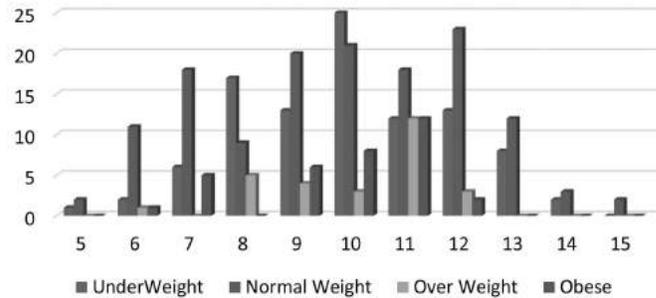


Figure 1 Gender Distribution of study population

population followed by 11 (18%) years and 9 (14.3%) years of age respectively. The mean and standard deviation was  $9.86 \pm 2.057$  respectively. Figure 1 shows the gender distribution of male to females which was equal that is 150 (50%) and 150 (50%) respectively. Age distribution of study subjects in association with B.M.I. is shown in table 2. It was seen that children mostly were in the normal weight

Table2 Shows Age distribution of study population according to age groups (n=300)

		Age Groups	
		Frequency	Percent
Valid	5-8	77	25.7
	9-12	196	65.3
	13-15	27	9.0
	Total	300	100.0



Graph 1 Age distribution of study population (n=300) in association with BMI

category other than Children of age 8 & 10 where underweight children were seen in excess. This data is also shown in graph form in Graph 1. Table 3 shows the eruption times of maxillary teeth. It is seen that almost all teeth had delayed

Age	Under Weight	Normal weight	Over weight	Obese	Total	$\chi^2$	df	P-value			
5	1	2	0	0	3	58.85	30	.001			
6	2	11	1	1	15						
7	6	18	0	5	29						
8	17	9	5	0	31						
9	13	20	4	6	43						
10	25	21	3	8	57						
11	12	18	12	12	54						
12	13	23	3	2	41						
13	8	12	0	0	20						
14	2	3	0	0	5						
15	0	2	0	0	2						
Total	99	139	28	34	300						

Table 3 Age distribution of study population (n=300) in association with BMI

eruption according to the normal eruption dates. Maxillary lateral incisor was seen to be the most delayed tooth with 51.7% delayed eruption in right max lateral incisor and

48.4% delay in the eruption of max left lateral incisor. Since the sample size was small so we cannot claim that every child will have delayed eruption in maxillary lateral incisor. 2nd premolar of the right arch was also delayed where 41.5% children had delayed eruption. Table 4 shows the eruption times of mandibular teeth. It is seen that almost all

Table 4 Eruption of Maxillary teeth in relation to age.

Maxillary Teeth	No of cases	Erupted on normal time	Not erupted on normal time	% OF NORMAL ERUPTION
11	44	29	15	65.9
12	60	29	31	48.3
13	61	42	19	68.8
14	154	111	43	72.0
15	152	89	63	58.5
16	44	36	8	81.8
17	61	53	8	86.8
21	44	28	16	63.6
22	60	31	29	51.6
23	61	38	23	62.2
24	154	110	44	72.3
25	152	93	59	61.1
26	44	36	8	81.8
27	61	51	10	83.6

Table 5 Eruption of Mandibular teeth in relation to age

Mandibular Teeth	No of cases	Erupted on normal time	Not erupted on normal time	% OF NORMAL ERUPTION
31	44	36	6	86.3
32	60	41	19	68.3
33	100	89	31	69.0
34	154	101	53	65.5
35	152	96	56	63.1
36	44	38	6	86.3
37	95	41	54	43.1
41	44	40	4	90.9
42	60	43	17	71.6
43	100	73	27	73.0
44	154	97	57	62.9
45	152	100	52	65.7
46	44	40	4	90.9
47	95	46	49	48.4

teeth had slight delayed eruption according to the normal eruption dates. Mandibular second molar of the right jaw was the most delayed tooth with 56.9% delay in eruption. And also on the left side the 2nd molar was delayed with 51.6% delay in eruption. Permanent teeth eruption starts around the age of 5-6. Mandibular teeth erupt first than maxillary. In our study mandibular teeth erupted first and above 90% children had their 1st molars and central incisors erupted on time.

## DISCUSSION

The present study is an original research conducted by Isra University at three different schools of Hyderabad. The present study was conducted in local population, which assessed the eruption of permanent teeth according to age and its relation with body mass index. Our study showed high percentage of children in the normal weight category of BMI. Present study used the BMI percentile chart to access the body mass index of children. It was validated that BMI was related but weakly connected with dental and skeletal development. BMI percentile in children is a

significant predictor of the difference between their chronological age and their dental age. As BMI percentile decreases, the dental age difference becomes more negative. There are very limited studies in Pakistan that have reported delayed development as a result of low body mass. Nevertheless our results are consistent with studies outside Pakistan that have observed delayed permanent tooth emergence in children who are malnourished and subsequently have low body mass.

Body Mass Index (BMI) is a reliable scale for measurement of obese people and for those who are overweight especially teenagers and small kids. Obesity in kids can cause skeletal complications in the head and neck area. BMI is reliant on age and gender in kids and teenagers and is for the most part stated to as particular for a specific age.

Our study showed high percentage of children in the normal weight category of BMI i.e. 139 children (46.33%) followed by underweight category i.e. 99 children (33%). The finding is in contradiction with previous study done in India by Shailee et al who reported high percentage children in the underweight category.<sup>22</sup> Shailee et al attributed the reason for underweight children in majority to the topography of the state i.e. the study was done in Shimla which is a hilly area so children have to walk up and down the hills to reach their schools or from one place to another.

Hedayati, et al (2014), reported BMI as an attribute for dental eruption ages as increase BMI showed early eruption of teeth. This finding is in line with our study as these findings indicated that nutritional status may have an effect on dental maturity but it is a minor effect and any certain role of B.M.I in connection with this should be studied on a larger scale.<sup>23</sup> However, our results are consistent with the study carried out by Kutesa et al (2013), who found no significant differences in the eruption times between teeth in the right and left side of the jaw.<sup>1</sup> In our study, age of study population ranged from 5 - 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 (2013), Hedayati et al (2014), Anbiaee et al (2013), and Mishu et al (2013).<sup>23-26</sup> Underweight children showed retarded eruption of teeth, this is consistent with a study done in India by Manjunatha (2014) and in Germany by Heinrich-Weltzien et al (2013), who reported that underprivileged children show comparative retarded eruption relative to their ethnic counterparts from higher socioeconomic status.<sup>27,28</sup> In our study, major 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 (2011), who also concurred that same finding.<sup>6</sup>

## CONCLUSION

In conclusion, we found that almost all teeth had slight delayed eruption according to the normal eruption dates but since the sample size was small so we cannot conclude that every child in our region will have delayed eruption. In our sample the highest variation was seen in mandibular left second molar where delayed eruption was present. We live in a country where eruption times is associated to many attributes, therefore we found there was a significant difference in age in association with eruption of teeth and B.M.I.

## RECOMMENDATION

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

### Conflict of Interest

None.

### Acknowledgment

None.

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