

# Association Between Weight and Height of Children and Eruption of Permanent Teeth in Mosul City Center-Iraq

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## الخلاصة

**الأهداف:** لتحديد العلاقة بين طول ووزن الأطفال بعمر 5-13 سنة ونبوغ الأسنان الدائمة في مركز مدينة الموصل. **المواد وطرائق العمل:** تكونت العينة من 894 طفل ومراهق؛ 412 ذكر و482 أنثى بأعمار تتراوح بين 5 و13 سنة. أعتُبر السن بازغاً في الفم عندما لوحظ أي جزء منه مخترقا الأنسجة الرخوة (اللثة). تم تقسيم العينة اعتماداً على العمر إلى أربع مجاميع المجموعة الأولى 5-7 سنة، المجموعة الثانية: 7-9 سنة، المجموعة الثالثة: 9-11 سنة و المجموعة الرابعة: 11-13 سنة و المجموعة الخامسة: 13-15 سنة. كما تم تسجيل بعض المعلومات الأخرى لكل طفل مثل الطول (بالمتر) والوزن (بالكيلوغرامات). **النتائج:** تم تسجيل عدد الأسنان البازغة في الفم حسب كل سن وكذلك استناداً إلى الجنس والمجموع العمري. لوحظ وجود علاقة معنوية قوية (بدلالة احصائية = 0.001) بين طول ووزن الأطفال من جهة وعدد الأسنان البازغة في الفم من جهة أخرى. **الاستنتاج:** خلُصت الدراسة إلى أن الأطفال الأثقل وزناً والأكثر طولاً لديهم تسريع في نمو الأسنان ونبوغها.

## ABSTRACT

**Aims:** To evaluate the effect of length and weight of 5-13 years old children on eruption of permanent teeth in Mosul City. **Materials and Methods:** The sample consisted of 894 children and teenagers; 412 males and 482 females ranging in age from 5-13 years. A tooth was defined as erupted when any part of its crown pierced its gingiva. The sample was divided into 4 age groups: Group 1: 250 child and teenager aged 5-7 years; group 2: 248 child and teenager aged 7-9 years; group 3: 257 child and teenager aged 9-11 years; and group 4: 139 child and teenager aged 11-13 years. Other information were also recorded including length of child (in meters) and weight of child (in kilograms). **Results:** The number of erupted teeth according to individual tooth, gender and age groups was recorded. There was a strong correlation ( $p = 0.001$ ) between length and weight of children on one hand and number of erupted teeth on the other hand. **Conclusion:** Children who had higher weight and length accelerated dental development.

**Key Words:** Eruption of teeth, weight of child, length of child.

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## INTRODUCTION

Tooth eruption is an essential process for the survival of many different species, and although the movement of teeth into function has been the subject of extensive researches there is no consensus as to the mechanism involved.<sup>(1)</sup> The chronology of tooth eruption is very complicated. Each tooth, in each dentition, in each jaw and in each sex has its own mean eruption time.<sup>(2)</sup>

Tooth eruption is a physiological phenomenon determined as a rule by the same

laws that govern the whole phylogenetic and ontogenic development of all living beings. It is a part of a physiological whole, so that the factors affecting the organism as a whole are reflected also on the growth and eruption of teeth. Human teeth do not appear simultaneously in either dentition. In general, the eruption time of permanent teeth is subjected to more variability than that observed in primary teeth. Studied on the eruption of both primary and permanent teeth have been con-

ducted since the middle of the 20<sup>th</sup> century.<sup>(3)</sup>

Although this process is genetically determined it is a subject to the effects of a series of important factors that cause chronological variations.<sup>(4)</sup>

The timing of eruption of the permanent dentition is of considerable importance in Child Dental Health planning of diagnostic, preventive and therapeutic measures. In the continuous process of permanent tooth eruption, the stage of clinical –or gingival– emergence is of particular interest.<sup>(5)</sup>

The timing of tooth eruption depends on a number of general factors such as: Heredity, constitution, stage of fetal development, fetal position, hormones, race, potential anomalies, climate, nutrition, various diseases.<sup>(6,7)</sup> Local pathological conditions such as supernumerary teeth, cyst, malformation and trauma are uncommon and unlikely to have a significant effect on epidemiological data but extraction of primary antecedents is a frequent and influential local factor which does not seem to have been recognized in many studies of the ages of tooth eruption.<sup>(6,7)</sup>

Low birth weight has been inconsistently associated with dental caries.<sup>(8, 9)</sup> Permanent teeth (first molars and central incisors, in which enamel deposition begin right after birth),<sup>(10)</sup> are also believed to be affected by hypocalcemia observed in the

first year of life of preterm/ LBW children.<sup>(11, 12)</sup>

The school–age period from childhood to adolescence is a critical life stage when health and oral health behaviours develop.<sup>(13, 14)</sup>

Studies have suggested that Caucasians have a delayed time of eruption when compared to other ethnic groups.<sup>(15, 16)</sup> In addition, Negroes have been shown to have an earlier eruption pattern than Caucasians.<sup>(17)</sup>

The aim of this study was to evaluate the effect of length and weight of 5-13years old children on the eruption of permanent teeth in Mosul City.

### MATERIALS AND METHODS

This cross–sectional study was conducted on a sample collected from four kindergartens, six primary and two intermediate schools. The schools were selected randomly from the City Center of Mosul City.

The age of children was calculated from the exact date of birth and recorded in years and months.

The total sample consisted of 894 children and teenaged, 412 males and 482 females ranging age from 5–13 years. The sample was divided according to age into 4 groups as shown in Table (1).

Table (1): Distribution of sample according to age groups

Age Group (Years)	Gender	Number	Percentage
5 – < 7	Males	103	41.20
	Females	147	58.80
	Total	250	27.96
7 – < 9	Males	93	37.50
	Females	155	62.50
	Total	248	27.74
9 – < 11	Males	126	49.00
	Females	131	51.00
	Total	257	28.75
11 – 13	Males	90	64.75
	Females	49	35.25
	Total	139	15.55
Total Sample	Males	412	46.09
	Females	482	53.91
	Total	894	100.00

Oral examination was performed in classrooms. The students were examined seated in ordinary chair under the normal daylight. The teeth were recorded as emerged or not in a special case sheet that also included other information: Age, gender, length of child (in meters) by using measuring tape, weight of child (in Kilograms) by using balance. A tooth was defined as erupted when any part of its crown pierced the gingiva, since no radiological examination was made.

The age of each child was calculated by subtracting the birth date from the examined date and then the age of child determined according to the nearest month. The children were of different socioeco-

nomie level. Any child with a history of serious systemic disease was excluded.

The analysis of data was performed using SPSS version 13.0 . Analysis included frequency distribution, mean and standard deviation. Correlation coefficient was used to observe if any relation existed between length and weight of children on one hand, and number of erupted teeth on the other hand. Correlation was reported at 0.01 level.

## RESULTS

Distribution of the sample with the number of the teeth according to gender was illustrated in Table (2).

Table (2): Distribution of the sample and descriptive statistics of erupted teeth according to individual teeth and gender

Teeth	Gender	No. of Children	No. of Erupted Teeth	Mean	± SD
<b>Second Molars</b>	<b>Males</b>	412	204	0.50	1.21
	<b>Females</b>	482	132	0.27	0.95
	<b>Total</b>	894	336	0.38	1.08
<b>First Molars</b>	<b>Males</b>	412	1474	3.58	1.09
	<b>Females</b>	482	1535	3.18	1.54
	<b>Total</b>	894	3009	3.37	1.37
<b>Second Premolars</b>	<b>Males</b>	412	257	0.62	1.16
	<b>Females</b>	482	248	0.51	1.19
	<b>Total</b>	894	505	0.56	1.18
<b>First Premolars</b>	<b>Males</b>	412	439	1.07	1.53
	<b>Females</b>	482	413	0.86	1.44
	<b>Total</b>	894	852	0.95	1.49
<b>Canines</b>	<b>Males</b>	412	305	0.74	1.37
	<b>Females</b>	482	328	0.68	1.31
	<b>Total</b>	894	633	0.71	1.34
<b>Lateral Incisors</b>	<b>Males</b>	412	975	2.37	1.83
	<b>Females</b>	482	1038	2.15	1.88
	<b>Total</b>	894	2013	2.25	1.86
<b>Central Incisors</b>	<b>Males</b>	412	1230	2.99	1.55
	<b>Females</b>	482	1334	2.77	1.69
	<b>Total</b>	894	2564	2.87	1.63
<b>Total Males</b>		412	4884	11.85	7.23
<b>Total Females</b>		482	5028	10.43	7.70
<b>Total Sample</b>		894	9912	11.09	7.52

Also, the Table revealed number of erupted teeth according to individual teeth and gender (there were 2564, 2013, 633, 852, 505, 3009, and 336 erupted teeth for centrals, laterals, cuspids, first and second bicuspid, first and second molars, respectively. The mean number of eruption for

each tooth was 2.87, 2.25, 0.71, 0.95, 0.56, 3.37 and 0.38, respectively. Also there were 4884 and 5028 erupted teeth for total males and females, respectively. The mean number of eruption according to gender was 11.85 and 10.43, respectively)

Distribution of the sample with the number of teeth according to age groups

was displayed in Table (3).

Table (3): Distribution of the sample and descriptive statistics of erupted teeth according to age groups

Age Group (Years)	Teeth	No. of Children	No. of Erupted Teeth	Mean	±SD
5 – < 7	Second Molars	250	0	0.00	0.00
	First Molars	250	495	1.98	1.83
	Second Premolars	250	0	0.00	0.00
	First Premolars	250	0	0.00	0.00
	Canines	250	0	0.00	0.00
	Lateral Incisors	250	28	0.11	0.52
	Central Incisors	250	188	0.75	1.14
	<b>Total Teeth</b>	250	711	2.84	2.85
7 – < 9	Second Molars	248	0	0.00	0.00
	First Molars	248	955	3.85	0.64
	Second Premolars	248	11	0.04	0.21
	First Premolars	248	52	0.21	0.57
	Canines	248	14	0.06	0.31
	Lateral Incisors	248	515	2.08	1.65
	Central Incisors	248	831	3.35	1.12
	<b>Total Teeth</b>	248	2378	9.59	3.10
9 – < 11	Second Molars	257	70	0.27	0.86
	First Molars	257	1018	3.96	0.30
	Second Premolars	257	200	0.78	1.19
	First Premolars	257	386	1.50	1.50
	Canines	257	260	1.01	1.38
	Lateral Incisors	257	976	3.80	0.68
	Central Incisors	257	1025	3.99	0.14
	<b>Total Teeth</b>	257	3935	15.31	4.35
11 – 13	Second Molars	139	266	1.91	1.82
	First Molars	139	541	3.89	0.56
	Second Premolars	139	294	2.12	1.64
	First Premolars	139	414	2.98	1.47
	Canines	139	359	2.58	1.57
	Lateral Incisors	139	494	3.55	1.23
	Central Incisors	139	520	3.74	0.93
	<b>Total Teeth</b>	139	2888	20.78	6.64

Table (4) revealed the correlation between length and weight of children on one hand, and number of erupted teeth on the other hand. There was a strong correlation ( $p = 0.001$ ) between length of children

and number of the erupted teeth for males, females and the total sample ( $r = 0.752, 0.843$  and  $0.804$ , respectively). Also there was a strong correlation ( $p = 0.001$ ) between weight of children and number of

the erupted teeth for males, females and the total sample ( $r = 0.658, 0.838,$  and  $0.722,$  respectively)

Table (4): Correlation coefficient between length and weight, and number of erupted teeth according to gender

Sample	Pearson Correlation	Length	Weight
Males	r-value	0.752	0.658
	p-value	0.001*	0.001*
	No.	412	412
Females	r-value	0.843	0.838
	p-value	0.001*	0.001*
	No.	482	482
Total Sample	r-value	0.804	0.722
	p-value	0.001*	0.001*
	No.	894	894

\* Correlation is significant at the 0.01 level.

Similarly, the correlation was strong between length and weight of children on one hand, and number of erupted teeth on the other hand for each age group as illustrated in Table (5) (For the correlation between length and erupted teeth,  $r = 0.403,$

$0.481, 0.464,$  and  $0.262$  for each age group, respectively. For the correlation between the weight and the number of erupted teeth,  $r = 0.398, 0.408, 0.387,$  and  $0.350$  for each age group, respectively).

Table (5): Correlation coefficient between length and weight, and number of erupted teeth according to age groups

Age Group (Years)	Pearson Correlation	Length	Weight
5 - < 7	r-value	0.403	0.398
	p-value	0.001*	0.001*
	No.	250	250
7 - < 9	r-value	0.481	0.408
	p-value	0.001*	0.001*
	No.	248	248
9 - < 11	r-value	0.464	0.387
	p-value	0.001*	0.001*
	No.	257	257
11 - 13	r-value	0.262	0.350
	p-value	0.002*	0.001*
	No.	139	139

\* Correlation is significant at the 0.01 level.

## DISCUSSION

Variation in the normal eruption of teeth is common finding but significant deviation from established norms should alert the clinician to take some diagnostic procedures in order to evaluate patient health and development.

In the present study the number of erupted teeth according to individual teeth and gender was similar to that of other study.<sup>(17)</sup> Similarly, the mean of eruption of each erupted tooth in the present study

was similar to that presented by other study.<sup>(18)</sup> The mean of eruption of teeth according to gender was similar to that of other study.<sup>(19)</sup>

Distribution of erupted teeth according to age groups in the present study was in agreement with that of other study.<sup>(20)</sup> On the other hand, mean of erupted teeth for each age group was in accordance with that described by Hilgers *et al.*<sup>(21)</sup>

There was a strong correlation between length and weight of children, and

number of erupted teeth for males, females and the total sample. These results were comparable to other studies.<sup>(3, 19)</sup>

Similarly, there was a strong positive correlation between length and weight of children and number of the erupted teeth for each age group. Results of the present study strongly supported with those described elsewhere in the rate of the dental development compared to normal children.<sup>(19)</sup>

Children with high length and weight had higher eruption rate. This finding was consistent with the results of the study in the USA in which over-weight children had a large number of the erupted teeth.<sup>(21)</sup> A study of a Brazilian children also detected this association. Moreover it was concluded that both weight and height influence tooth eruption.<sup>(22)</sup>

Stage of dental development height and weight are used to measure the state of over-growth.<sup>(23)</sup> Obesity is considered to be the most common cause to accelerate growth.<sup>(24, 25)</sup>

A positive association between body height and weight, and teeth emergence has been established in the earlier studies.<sup>(25, 26)</sup>

In obese children, suggest that sex hormone may play a key role in the acceleration of bone maturation.<sup>(28)</sup> Hormonal change in the obese patient may affect mineral metabolism.<sup>(29)</sup> It likely that the metabolic changes caused by obesity that have an impact on bone growth also affect tooth eruption.<sup>(28)</sup>

Further study showed different results, in which body condition was found to affect eruption in only one of five population; hence no consistent link between body condition and eruption was found.<sup>(30)</sup>

### CONCLUSION

Children who had higher weight and length had accelerate dental development, even after adjusting for age and gender. Accelerate dental development variable to consider in pediatric dental and orthodontic treatment planning were timing is crucial.

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