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Nutritional Status And Permanent Teeth Emergence For 7 Years Old Children

A Project
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By

Sewgi Abbas Sameen

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Supervised by

Assist.Lect. Dr. Meena O. Abdul Wadood

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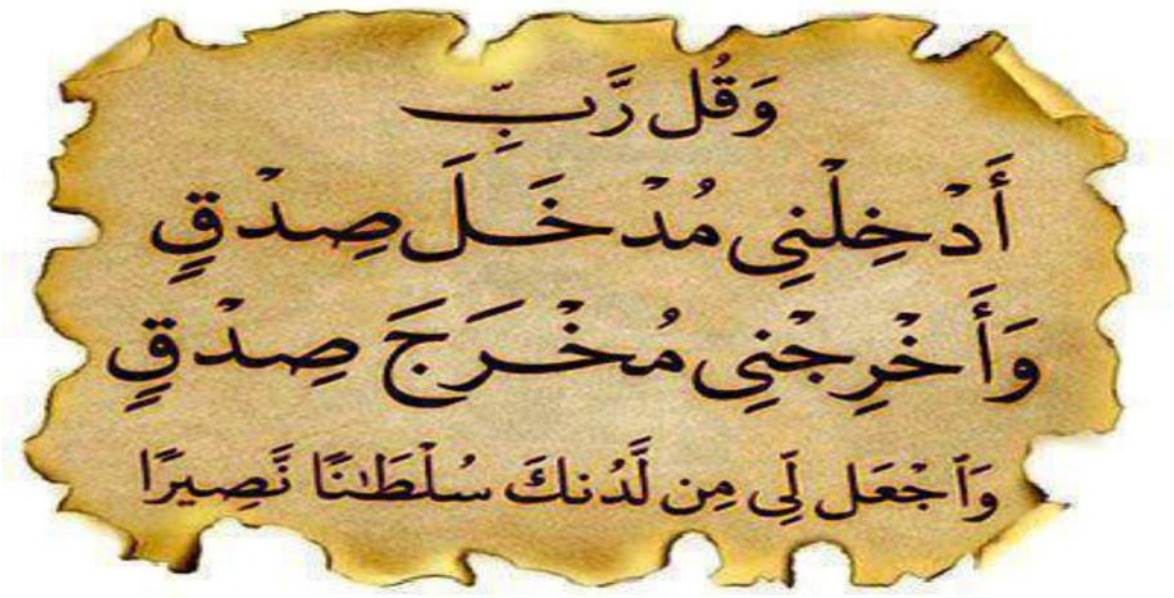
بسم الله الرحمن الرحيم



صدق الله العظيم

Dedication

To All My Lovely Family To My Dear Father and To Beloved Mother To My Brothers and Sisters for their love, support and encouragement.

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Acknowledgement

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Abstract

Background:

Tooth eruption is a continuous biological process by which the developing teeth emerge through the jaws and the overlying mucosa to enter into the oral cavity. Time and sequence of teeth eruption are important factors in dental treatment planning, particularly in orthodontics, but also in forensic dentistry to estimate age of a child. Tooth eruption time is influenced by many factors.

Aims of the study:

The aim of this study was to determine the eruption of permanent teeth according to the height and weight(BMI) of children aged 7 years in Baghdad, Iraq.

Materials and Method :

A total sample of 50 children aged 7 years old in Baghdad city were collected, children were weighed by bathroom scale, the height of the children was measured by using ordinary measuring tape then body mass index was calculated for each child and the emerged teeth determined clinicaly by using dental mirror and probe.

Results:

The results showed that percentage of the obese children were most common followed by normal weight, overweight and underweight recepectivly.

Furthermore the results showed that the percentage of erupted permanent first molar in the upper jaw was similar in the right and the left side while in the lower jaw the percentage of erupted permanent first molar was greater in the right than left side and the of erupted central incisors and lateral incisors showed similar percentage in both right and left side in both jaws.

Also the results demonstated that the percentage of the erupted first molar was greater in the upper jaw than lower on the other hand the precentage of erupted permanent centeral incisors was similar in both jaws, while percentage erupted permanent lateral incisors was more common in the lower jaws.

For total sample the erupted permanent central incisor percentage was more common in the 7^{th} years old chidren followed by the permanent first molars and lateral incisors recepectivly.

The results showed that the percentage of erupted permanent first molar was common in overweight followed by normal weight, underweight and obese children respectively while the precentage of erupted permanent central incisor was equal in underweigh, obese, norma weight and overweight children and the percentage of erupted permanent lateral incisor was more common in the overweight followed by obese, normal weight and underweight children.

For total sample, the under weight children showed the lowest erupted teeth percentage than normal weight, obese and overweight children recepectivly.

Conclusions:

There was an effect between body mass index and permanent teeth emergence, the under weight children had less number of the erupted teeth compared to overweight, obese and normal children in same age.

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Introduction

Tooth eruption is a continuous biological process by which developing teeth emerge through the jaws and the overlying mucosa to enter into the oral cavity and contact the teeth of the opposing arch (Bailit and Sung,1968). Several studies had shown that eruption of the permanent teeth was orderly, sequential and age-specific event (Agarwal et al, 2004; Khan et al, 2006). Furthermore, tooth eruption time as well as the sequence of tooth eruption had been reported to vary with races (Akpata, 1971).

It has also been reported that some other variables like genetics, hormonal factors, geographical location, ethnicity, sex, economic status, nutrition and growth exert their influences on tooth eruption time (Adler,1963). A few studies had indicated a relationship between the eruption times with the weight and height of the children. Children who are below average weight and height had been shown to have a later eruption times than those who were within the standard range (Triratana et al,1990). Khan (2011) reported that tall children exhibited delayed tooth eruption irrespective of their weight while heavy and short children had early eruption. Agarwal et al (2004) found that for the same age group (5-14), boys with more sexual maturity had enhanced dental eruption.

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1.1 Nutrition

Nutrition is the science of food and its relationship to health (Psoter et al, 2008).

1.1.1 Nutritional status indicator

Malnutritional can be diagnosed by anthropomoetics assessment using the basic measures which permit reasonable accurate assessment of nutritional state. Weight, height, upper arm circumference, triceps skin fold thickness, and head circumference are considered valuble indicator in the evaluation of malnutrition (Lissauer and Clayden, 2001).

The anthropometrical metods used widely to evaluate nutritional status in Nutritional Surveillance programmed and assist to classify person as mal or well-nourished in relation to specific level of diagnostic indicators. The most three frequentl used anthropmetrics indicators are weight for age, height for age and weight for height (Gorstein, 1994).

Antropometry represents on of the most widely used method to assess and predict health survival and preformance of individuals in all ages groups as well as compare change of body composition over time (WHO,1990).

1.1.1.1weight for age (W/A):

Has been used as the main indicator of nutritional status (Waterlow et al, 1997) and also to evaluate a program success in improving nutritional status (UNICEF, 1985).

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W/A is a good basic indicator, combining acute and chronic malnutrition. This measure is not time consuming, but it relies on age data (UNICEF, 1985). This indicator afford good expression of growth state on protein energy malnutrition, it reflects growth in term of body mass, adiposity musculature and skeletal development, but it can not distinguish between tall child who is slim and fat child who is short if they have the same weight and same age although there is a big difference in nurtitional status (Forrster and Gariballa, 2005).

High weight for age is seldom used for puplic health purpose because other indicators such as weight for height are more useful in the evaluation of over weight as a proxy for obesity (Blossner et al, 2005).

1.1.1.2 Height for age (H/A):

Although it is a good indicator of past nutrition problems, but in growth monitoring project, it should be supplemented by another indicator like W/A or W/H because change in height occure relatively slowly. It relies on age data (UNICEF, 1985).

1.1.1.3Weight for height (W/H):

This is an age independent indicator that reflect current nutritional status and used to measure acute malnutrition which is called wasting (WHO, 1986, Boss et al,1994). It can be calculate without knowing of the age which may be difficult to assess in less developing area (UNICEF,1985).

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1.1.1.4 Body mass index (BMI)

BMI is an index which its use as growth indicator, it has been widely used in the field of dentistry (Azizi et al, 2004;Willerhausen et al, 2007).

BMI has become a popular heuristic approximation for body fatness in epidemiology and clinical practice. The World Health Organization in 2000 defined BMI-based fatness categories of underweight (BMI < 18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2), overweight (25.0–29.9 kg/m^2) and obese (≥30.0 kg/m^2).

It is the most widely used height-weight index, Body Mass Index is a validated measure of nutritional status since it is inexpensive and easy to perform, and a good method of screening for weight categories that may lead to health problems for children and teens (Mei et al, 2000; Eknoyan and, 2008; Komiya et al, 2008).

Center for Disease Control and prevention (CDC, 2000) recommended the use of BMI for age to screen the nutritional status among children and teens aged from two years old through 19 years using CDC BMI for age growth reference tables (for either girls or boys). It indicates the relative position of the child's BMI number among children of the same age and gender.

Body Mass Index (BMI) for age is an indicator that is especially useful for screening for possible risk of overweight and obesity (Cole et al, 2000, Cole et al, 2007; WHO, 2008).

It is commonly used to classify underweight, normal and over weight or well nutrition and malnutrition (WHO, 2000; WHO, 2004).

Ogden et al (2006) in a study of prevalence of overweight and obesity in the United States found that 17.7% of US children and adolescents were overweight .

High BMI in children might also have immediate consequences, such as elevated lipid concentrations and blood pressure(Freedman et al, 1999).

1.2Teeth eruption

Eruption is defined as movement of the tooth through the jaw tissue into oral cavity, the tooth eruption is complicated and closely regulated process which divided in five stages : pre-eruptive movement, intra-osseous stage, mucosal penetration, pre-occlusal and post-occlusal stages (Proffit and Fields, 2000).

It has been suggested that blood pressure from the tissue that lies between the developing tooth and the bony jaw responsible for the tooth eruption, however; Changing the blood flow of the periodontal tissue did not change the eruption rate (Kumar, 2014).

It was suggested that root elongation is responsible for tooth eruption since it is happened together with eruption, but rootless teeth also erupt which mean that root elongation presence not required for root eruption but it might accelerate it, in addition, tooth eruption completes before completion of root (Wang, 2013).

Kjaer in 2014 suggested that mechanism of eruption depends on the eruption course created by crown follicle, hypothesis behind this theory depend on: (1) space

in the eruption path (2) pressure from apical root membrane (3) adaptability in the periodontal membrane.

Many studies in countries found that the permanent teeth erupted earlier in girls than boys (Daood, 2001; Sahib, 2008).

Studies reported differences in teeth emergence time among different races, permanent teeth eruption significantly earlier in African and American-African children than in Asian and Caucasians (Mugonzibwa et al, 2002).

1.2.1 Factors affecting on teeth eruption

1) Supernumerary teeth

Supernumerary teeth can produce crowding, displacing, rotation, impaction, or delayed eruption of the related teeth. Mesiodens is most common supernumerary tooth, followed by the fourth molar in the maxillary arch (Cunha et al, 2001).

2) Injuries to deciduous teeth

Injuries to deciduous teeth can be the cause delay tooth eruption of the permanent teeth. Traumatic injuries can result in disruption of the odontogenesis result in dilacerations or physical displacing of the permanent germ (Diab and elBadrawy; 2000).

3)Premature loss of the deciduous teeth

The eruption of the succedaneous teeth is frequently delayed after the early loss of deciduous teeth before resorption of their root begins, it can be clarified by abnormal changes that occur in the connective tissue covering the permanent teeth and the formation of dense, fibrous gingiva(Suri et al, 2004).

4)Arch length deficiency and skeletal pattern

In a study of the relationship between formation and eruption of the maxillary teeth and the skeletal pattern of the maxilla, a shortened palatal length was found to delay the eruption of the maxillary second molar, although no delay in tooth formation was observed, arch-length deficiency might lead to delayed teeth eruption, although more frequently the tooth erupts ectopically (Suda et al, 2002).

5) Radiation damage

X-radiation has been shown to affect the eruption of the teeth, impairment of root formation, damaging to periodental cell and lacking of mandibular growth (Piloni and Ubios, 1995).

6) Genetic disorders

General delay in the eruption of the teeth was reported in some families, it had been suggested that there was agen for tooth eruption and its delayed onset might participate in delay teeth eruption (Blankenstein et al, 2001).

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7) Socioeconomic factors

The sequence of permanent teeth eruption was different among children from different socioeconomic status.It was suggested that children from high socioeconomic backgrounds gain better health care and better nutrition and therefore their teeth erupted earlier than those with low socioeconomic status. The first teeth to erupt in child from high backgrounds was mandibular incisor while the mandibular first molar was first teeth to erupt in children from lower background (Nonaka et al,1990).

There are other causes lead to delay eruption of the teeth including fibromatosis gingiva, Albright heredity osteodystrophy, vitamin D-resistant rickets and hunter syndrome (McDonald and Avery, 1994).

1.2.2 Sequence of Permanent Teeth Emergence

Timing and sequences of permanent teeth emergence are an important resources for dental practitioner and specialists involved in managing dental problem in growing children, and this may be attributed to numerous racial and nutritional differences (Dahiya et al, 2013).

Timing of eruption of teeth is of clinical significance to the practitioner and of considerable importance to the child dental health planning for diagnosis, preventive and therapeutic measure (Mitchell, 2014).

Study was conducted by Ghaib in 1998 examined 3000 school children aged 6-15 years , this study showed that there was no differences between emergence time of corresponding right and left permanent teeth in both genders and girls teeth emerged at an average of 3month earlier than boys.

Eskeli et al (1999) in Filand had been found that all mandibular permanent teeth emerge before their corresponding maxillary teeth with large difference between maxillary and mandibular anterior teeth.

In the study of the Daood in 2001 in Baghdad city, it had been shown that emergence time of permanent teeth in the left and right sides in both arches for each gender had no statistical differences and all maxillary and mandibular teeth emerged statistically significant in girls earlier than in boys. The sequence found by Daood in 2001 was:
In the upper jaw in both gender, the eruption of first molar followed by first incisor, second incisor, first premolar, canine, second premolar and second molar. However in the lower jaw among girls, eruption of canine was occurred before the eruption of the first premolar but in the boys the eruption of canine was occured after the eruption of the the first premolar.

A study of Khamrco(2003) in Mousl city for the time of emergence of permanent teeth in which group of 2391 children consisted of 1296 boys and 1095 girls ranging age from 4-16 years were examined, the result of study showed that there was no differences between the mean time of corresponding right and left teeth in both genders, the results also demonstrated that the girls had their permanent teeth to

emerge earlier than those of boys and the differences between two genders were clearly seen in the eruption of mandibular canine.

Iraqi study was done by Sahib in 2008 for time emergence of permanent teeth in Hilla and Najaf cities in which 27340 girls and boys aged between four to sixteen years old, the result of the study showed that there was significant differences between the timing of maxillary and mandibular teeth emergence in boys and girls, earlier emerge in girls and the differences were very clear in canine emergence, also the mandibular teeth emerged before their maxillary opposing teeth in both genders. the sequences found by Sahib was :

In upper jaw among the girls, the eruption of the permanent canine was occured after the eruption of the first premolar but among boys the eruption of the canine was occured after the eruption of the second premolar. However in lower jaw among girls, the eruption of the canine was occurred before the eruption of the first premolar but in the boys it was occure after the eruption of the first premolar.

Nichifor et al. (2010) studied the sequence of eruption of permanent teeth in group of children from Buzau (and showed that the first tooth that erupted on the maxillary arch was the first molar, at the average age of 6 age, followed by central incisor, lateral incisor, first premolar, canine, second premolar, second molar, and the first tooth that erupted that erupted on the mandible was also the first permanent molar, followed by the central incisor, lateral incisor, canine, first premolar, second premolar, and the second permanent molar.

Annet et al.(2013) studied time of eruption of permanent teeth in Ugandan children and the results showed that there was no significant differences in the mean

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eruption of corresponding right and left permanent teeth for both maxillary and mandibular teeth.

1.3 Nutrition and eruption of teeth

Overweight and obese children were thought to be advanced in both dental formation and the number of erupted teeth compared to children of normal weight (Garn et al,1965).Meanwhile, a normal sequence of eruption of permanent teeth was observed in Nepal despite lifelong dietary deficiency (Fleshman, 2000).

Khan et al (2006) observed a non significant correlation between BMI and eruption times except for tooth lower right wisdom tooth, the eruption times were generally inversely related to the BMI.

Malnutrition during the first five years of life was reported to had little effect on the number of later erupting permanent teeth for age(Psoter et al, 2008).

There was evidence that chronic malnutrition that continue after the early childhood was linked with delayed teeth eruption (Poster et al, 2008) but one study reported faster eruption of permanent incisors and first molars in 6 year old age with early childhood-energy malnutrition, but the sample was small and they failed to report nutritional status at the time of examination (Alvarez, 1995).

Khan in 2011 reported that tall children exhibited delayed tooth eruption irrespective of their weight while heavy and short children had early eruption.

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Gaur and Kumar, 2012 study reports similar number of early erupting permanent teeth in wasted or stunted malnourished six year olds in Peru with more teeth present in the very small wasted and stunted group.

There was significant differences in the eruption time of the permanent teeth among well-nourished and stunted with an earlier eruption of the permanent teeth in well nourished children and teenaged in both genders (Ahmed, 2015).

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2.1The samples

The 50 sample of this study was conducted among 7 years old age children who attending Preventive and Pediatric Department in College of Dentistry/Baghdad university, the child was examined in standarized condition by seating him on the dental chair in an upright position, the dental examination was done for erupted permanent teeth, a tooth was defined as emerged when any part of its crown pierced the gingiva, the probe was used to be sure from crown emergence when any suspension exist(Virtanen,1994)

Any extracted permanent teeth were recorded as erupted(WHO,1987).

2.2 materials

case sheet.

Dental mirror.

Cloves and mask.

Pencils.

Scale for weight record.

Measurement tape for height.

Disinfictant and cotton.

2.3 Nutritional status assessment

BMI was measured for each child as follows:

2.3.1 Measurement of weight

The measurement of weight was done by using scale for weight record nearst to 0.1 Kg.the child weighted with minimum clothes without touching any thing with 500 gram substracted from the total weight to compensate for underneath clothes (Droosh, 2007).

2.3.2 Measurement of height

The measurment of the height was done by using the ordinary measuring tape fixed at the wall and the child standing up aftertaking off their shoes with feet parallel to each other and pointed forward and the back was straight in an upright position. The knee straight and the head in the position that frankfort plane(the line between the lower border of the orbit and the upper border of the external auditory meatus) must be horizontal (Buckler, 1978).

2.3.3 Body mass index measurement

This index is a number calculated from the child's weight and height,according to this formula:

Body weight / (height) ^{2} = BMI Kg/m^{2} (WHO, 2000).

According to specific chart (CDC, 2000). The values of nutritional indices were compared with international reference values using CDC growth charts (Center for Disease and Control and Prevention, 2000).

3.1 The samples

Nutritional status distribution is shows in table (3-1). The results showed that percentage of the obese children were most common followed by normalweight, underweight and overweight recepectivly.

Table (3-1): Nutritional status distribution.

BMI	NO	%
Under weight	11	22%
Normal	15	30%
Overweight	6	12%
Obese	18	36%
Total	50	100%

3.2 Teeth emergence

Distribution of the emergened teeth is shown in table (3-2). The results showed that the erupted permanent first molar percentage in the upper jaw was similar in the right and the left side while in the lower jaw the erupted permanent first molar percentage was greater in the right than left side and the erupted central incisors and lateral incisors showed similar percentage in both right and left side in both jaws.

The results demonstrated that the erupted first molar percentage was greater in the upper jaw than lower while the erupted permanent centeral incisors precentage was

similar in both jaws while erupted permanent lateral incisors precentage was more common in the lower jaws.

For total sample the erupted permanent central incisor percentage was more common in the 7^{th} years old chidren followed by the permanent first molars and lateral ncisors recepectivly.

Table (3-2): Distribution of the emergence teeth

Teeth	Upper						Lower						Total	
	Right		Left		Total		Right		Left		Total			
	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%
6	50	100%	50	100%	100	100%	49	98%	47	94%	96	96%	196	98%
1	50	100%	50	100%	100	100%	50	100%	50	100%	100	100%	200	100%
2	33	66%	33	66%	66	66%	47	94%	47	94%	94	94%	160	80%

3.3Nutritional status and emergence of teeth

emergence of teeth according their nutritional status is shown in table (3-3). The result showed that the percentage of permanent first molar was common in overweight followed by normal weight, underweight and obese children respectively while the precentage of the permanent central incisor was equal in underweigh, obese, normal weight and overweight children and the precentage of permanent lateral incisor

was more common in the overweight followed by obese, normal and underweight children.

For total sample, the under weight children showed the lowest erupted teeth percentage than normal, obese and overweight children recepectivly.

Table (3-3): emergence of teeth according to nutritional status.

Teeth	under weight		normal		overweight		obese		total	
	NO	%	NO	%	NO	%	NO	%	NO	%
6	43	97.72%	59	98.3%	24	100%	70	97.2%	196	98%
1	44	100%	60	100%	24	100%	72	100%	200	100%
2	32	72%	45	75%	24	100%	59	81.9%	160	80%
total	119	90.15%	164	91.1.%	72	100%	201	93.05%		

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4.1 Discussion

Nutritional status was recorded by using Body Mass Index (BMI).This index is inexpensive and easy to perform for screening weight categories (Komiya et al, 2008) as well as this index is widely followed by previous Iraqi studies. In the present study, special chart (BMI for age) was applied which was age and gender specific.

This study showed that most of children were obese, this result might be due to sample size, study design.

The results of the current study showed that the emergence time of the permanent teeth in the right and the left side of both jaws had the same precentage, this result in agreement with other studies (Elkeli et al, 1999; Dawood, 2001) this similarity of the permanent teeth eruption in right and left side indicate a more stability in the permanent teeth development(Mayhall et al, 1978 ; Heikkinen et al, 1999).

The results showed that the mandibular teeth emerged earlier than maxillary teeth exclution of the first molar and this agree with the study of the Eskeli et al in 1999 in Finland found that all mandibular permanent teeth emerge before their corresponding maxillary teeth, less variability reported for first molar which had no deciduous predecessors behind the second deciduous molar, as these teeth emerge they are guided the first molar in to it's position in the oral cavity (Scott and Symones, 1961). In general advancement of mandibular permanent teeth in their emergence than corresponding maxillary permanent teeth could be attributed to the early formation of the mandible in embryonic development than maxilla (Bhashar, 1991).

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this study showed that the eruption of the permanent teeth in the overweight children earlier than others, and the under weight children showed most delayed in the eruption, these result agree with Psoter et al (2008) who found that the chronic malnutrition that continue after the early childhood is linked with delayed teeth eruption while disagree with Alvarez (2009) who reported faster eruption of the permanent incisors with early childhood malnutrition , this result might be explaind by the fact that the eruption of teeth is a growth process of the body and therefore have relation with others growth processes of the body especialy height and weight (Jones et al, 2000).

conclusions

- the percent of the obese children was common among 7th years old children in this study followed by, normal, overweight and underweight respectivly.
- teeth emergence showed the same percentage between right and left side of the jaw with early teeth emergence in the mandible than maxilla and the erupted permanent central incisor percentage was more common in the 7th years old chidren followed by the permanent first molars and lateral incisors recepectivly.
- Under weight children showed the lowest erupted teeth percentage than normal weight, obese and overweight children recepectivly .

suggestions

1- Additional researchs are needed to involve other age group.
2- Laboratory investigations are needed to be conducted to evaluate nutritional status and it's relation to emergence time of permanent teeth.
3- This study should be extended to involve other part of Iraq to obtain data concerning teeth emergence in relation to body mass index.
4- This study need to be repeated after several years to evaluate and monitor changes in the emergence time of the permanent teeth in relation to BMI in Baghdad.

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