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Primary teeth emergence in relation to nutritional status among 4-48 months old children in Baghdad city

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Abstract

Nutritional status is one of the most important factor that affect the time of emergence of primary teeth. The aim of this research was to estimate emergence time of primary teeth among well- nourished Iraqi children from Baghdad city. The total sample composed of 2561children, aged 4-48 months, randomly selected from primary health care centers. Weight for age indicator was used for purpose of assessment of nutritional status**.** The prevalence of malnutrition described by weight for age indicator was found to be 8.4%. Among well nourished children at approximately (8 months +21 days) of age the first tooth emerges and the primary teeth are in full function at 27 months for both gender. Wile among underweight children the first tooth to be emerged at (10 months +21 days). Among well nourished children, the highest time span was found for second molar in maxilla and mandible while among underweighted children the highest time span was found for lateral incisor in maxilla and mandible. In conclusion eruption is a growth process and therefore have a relation with other process of the body especially height and weight

Introduction

The eruption of the first tooth is usually an anxious moment and gives a great satisfaction to parents. Tooth eruption if delayed is often a source of concern for parents [(1)]. Many factors had been studied which might cause variation in time of tooth eruption such as race [(2)], gender [(3)] hereditary factors [(4)] and poor nutritional status [(5)].

Malnutrition was expected to delay dental development; data from several comparative studies provide some evidence of the influence of mild to Moderate protein malnutrition on the eruption of primary dentition. Barret and Brown [(6)] found that inadequate prenatal and postnatal nutrition and sever illness may have affected the timing of eruption of incisors. Also Ulijasek [(7)] found that there is delay in deciduous teeth eruption which may be related to the poor nutritional status of Anga children. Singh et al [(1)] stated that the total number of teeth erupted among mal nourished children was lesser than healthy children. In longitudinal study conducted by Agarwal et al [(8)], in

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India, they observed that the number of deciduous teeth was lower among malnourished as compared to well nourished children. The need for deeper understanding of the influence of malnutrition on the human dentition and because there is no previous Iraqi study concerning the relation between nutritional status and teeth eruption for primary dentition in Baghdad city it was decided to conduct this study in order to evaluate the influence of nutritional status on primary teeth emergence and its estimation among well nourished Iraqi children from Baghdad city.

Materials and methods

The total sample composed of 2531children, aged 4-48 months that were chosen randomly from primary health care centers that located in the urban area of Baghdad city. The exact date of birth was recorded from child's mothers and supported by vaccination cards. The assessment of nutritional status was performed by anthropometric measurement(weight) using electronic bathroom scale and baby weight scale under standardized condition [9].Weight for age indicator was used for purpose of assessment of nutritional status, and was considered in term of standard deviation score (Z-score) as primary indicator of underweight

$$\text{The Z score} = \frac{\text{Individual value} - \text{median of reference population}}{\text{Standard deviation of the reference population}}$$

Because of unavailability of Iraqi standard for comparison, the value of nutritional indicator was compared with international reference value that defined by the US National Center for Health Statistics (NCHS).A recommendation endorsed by WHO [10] and urged the adequacy of these data for application from different ethnic background. The cut-off point used to define malnutrition was -2SD [11].Oral examination was performed under a natural day light. The tooth was defined as emergence when any part of its crown pierced the gingival, the probe was used to sure crown emergence, any extracted teeth was recorded as erupted [12],since no radiological examination was made, any congenital missing tooth was recorded as non emerged [13].

Statistical analysis was carried out using SPSS version 10. The Probit Model was used in current study to predict the expected proportion of subjects with eruption of a specific tooth for different age group and compute the median 5^{th} percentile and 95^{th} percentile range of emergence.

Results

The whole examined children were grouped in quarter year bases by age and gender as seen in table 1.Weight for age Z- score distribution is shown in table 2

The median emergence time for each primary tooth of maxilla and mandible among well nourished children described by weight for age nutritional status indicator is shown in table 3, concerning gender difference the results indicate that only the maxillary central and lateral incisors emerged significantly earlier among male than female ($P<0.05$). When the difference of emergence time of primary teeth were studied between arches, the result indicate that among females maxillary lateral incisor, canine and first molar emerged significantly earlier than apposing mandibular teeth ($P<0.05$). Among well nourished male most of their maxillary teeth emerged earlier than mandibular teeth.

The sequence of primary teeth emergence among well-nourished

female and male was illustrated in figure 1 as follows: central incisor, lateral incisor, first molar, canine and second molar. This figure also shows that the interval of rest for primary teeth was found between the emergence of mandibular canine and mandibular second molar. This interval is about (5 months +15 days) among well-nourished female and (6 months +15 days) among well-nourished males.

Among well nourished children at approximately (8 months +21 days) of age the first tooth emerges and the primary teeth are in full function at 27 months for both gender. Wile among underweight children the first tooth to be emerged at (10 months +21 days). In the present study, the mandibular central incisor was recorded to be the first to emerge among both well and malnourished children while maxillary second molar was recorded to be the last tooth to emerge. Second molar is not estimated among underweight children due to small sample size. The emergence of primary teeth among well nourished children were earlier than among underweighted children , the least difference was found for mandibular central incisor, while the highest difference was found for mandibular lateral incisor (table 4)

Figure 2 shows that the sequence of primary teeth emergence was the same for both well nourished and underweighted children respectively.

Among well nourished children, the highest time span was found for second molar in maxilla and mandible while among underweighted children the highest time span was found for lateral incisor in maxilla and mandible (table 5).Time delay (ranked by magnitude) in median age of emergence among under weight children compared to well nourished children are shown in figure 3 which illustrates the highest delay in tooth emergence was found for mandibular lateral incisor.

Discussion

This study was designed to evaluate nutritional status in relation to primary teeth eruption. The collected data are intended to be used as base line in estimating the eruption time of primary teeth among well-nourished children in the future.

The timing of primary teeth eruption among well nourished children in the present study is found to be earlier than those reported for Iraqi children in Mousil city by Khamarco and Qasim [14]. In comparison with other countries, the timing of primary teeth eruption in the present study found to be earlier than Saudi children by Al- Jasser and Bello [15] , while later than Swedish children by Haag and Taranger [16]. One must keep in mind that in the present study eruption time were estimated for well nourished children while other studies estimated for healthy children. On the other hand, the eruption time of the present study found to be differing than well nourished Indian children by Agarwal et al [8].

The result of the present study showed that the maxillary and mandibular teeth erupted earlier in females than male except for central and lateral incisor in maxilla, lateral incisor and canine in mandible the trend is reverse. This finding is in agreement with Yam et al [17] and in disagreement with [3,16, 18,14, 15].

In the present study most of maxillary teeth emerged earlier than apposing mandibular teeth for both genders this finding is in agreement with Baghdady and Ghose [3] and Choi and Yang [18], while disagreement with, Yam et al [17], Khamarco and Qasim [14].

The order of eruption of primary dentition in each jaw was the same in both genders, this finding in agreement with other studies [6, 3, 16, 1, 14, 8, 15].

The median age of emergence of primary teeth among malnourished children described by weight for age nutritional status indicator which was considered primarily a composite of height for age and weight for height indicators [11] found to be delayed than among malnourished children. This is in accordance with the observation noted by a number of clinicians and epidemiologists who found that the eruption is delayed among malnourished children [19, 7, 1, 8, and 20].

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Table (1): Distribution of the sample by age and gender

Age	Three months age interval	Female		Male		Total	
		No.	%	No.	%	No.	%
First year	2nd quart	104	4.10	127	5.0	231	9.1
	3rd quart	207	8.20	214	8.5	421	16.6
	4th quart	187	7.40	183	7.2	370	14.6
	Total	498	19.70	524	20.7	1022	40.4
Second year	1st quart	93	3.70	91	3.6	184	7.3
	2nd quart	172	6.80	158	6.2	330	13.0
	3rd quart	128	5.10	128	5.1	256	10.1
	4th quart	76	3.00	84	3.3	160	6.3
	Total	469	18.50	461	18.2	930	36.7
Third year	1st quart	66	2.60	57	2.3	123	4.9
	2nd quart	54	2.10	52	2.1	106	4.2
	3rd quart	51	2.00	42	1.7	93	3.7
	4th quart	34	1.30	42	1.7	76	3.0
	Total	205	8.10	193	7.6	398	15.7
Fourth year	1st quart	41	1.60	37	1.5	78	3.1
	2nd quart	23	0.90	37	1.5	60	2.4
	3rd quart	18	0.70	21	0.8	39	1.5
	4th quart	1	0.04	3	0.1	4	0.2
	Total	83	3.30	98	3.9	181	7.2
All ages		1255	49.60	1276	50.4	2531	100

Table 2: Distribution of children according to weight for age nutritional status indicator by gender

Gender	Nutritional status			
	Well nourished		Malnourished	
	No.	%	No.	%
Male	1134	91.0	112	9.0
Female	1169	92.3	98	7.7
Both	2303	91.6	210	8.4

Table 3: Median emergence time (in months and days) with their 95% confidence level of primary teeth among well nourished children according to weight for age nutritional status indicator by gender and arch type

Tooth type	Gender	Maxilla			Mandible			Difference**	Mann-Whitney test
		Lower limit of 95% cl	Effective age	Upper limit of 95% cl	Lower limit of 95% cl	Effective age	Upper limit of 95% cl		
Central incisor	Female	10+9days	10+21days	11+3 days	8+6 days	8+18 days	8+27 days	-(2+3 days)	S
	Male	9+21days	10+0days	10+12 days	8+15 days	8+24 days	9+6 days	-(1+6 days)	S
	*Differ		-(0+21)days*			0+6 days			
Lateral incisor	Female	12+3 days	12+15 days	12+27 days	13+12 days	13+27 days	14+12 days	1+12 days	S
	Male	11+0 days	11+15 days	12+0 days	13+9 days	13+24 days	14+9 days	2+9 days	S
	*Differ		-(1+0) days*			-(0+3) days			
Canine	Female	18+12 days	18+27 days	19+12 days	19+12 days	20+0 days	20+15 days	1+3 days	S
	Male	18+18 days	19+6 days	19+24 days	19+12 days	19+27 days	20+15 days	0+21 days	NS
	*Differ		0+9 days			-(0+3) days			
First molar	Female	15+3 days	15+18 days	16+0 days	15+24 days	16+9 days	16+21 days	0+21 days	S
	Male	14+27 days	16+0 days	17+0 days	14+21days	16+12 days	17+27 days	0+12 days	NS
	*Differ		0+21 days			0+3 days			
Second molar	Female	25+24 days	26+12 days	27+3 days	24+15 days	25+15 days	26+15 days	-(0+27 days)	NS
	Male	26+21 days	27+15 days	28+9 days	25+12 days	26+12 days	27+15 days	-(1+3 days)	NS
	*Differ		1+3 days			0+27 days			

*Male-Female
**Mandible- Maxilla

Table 4 Differences in median emergence times (in months and days) with their 95% confidence level of primary teeth among children according to weight for age nutritional status indicator by arch type

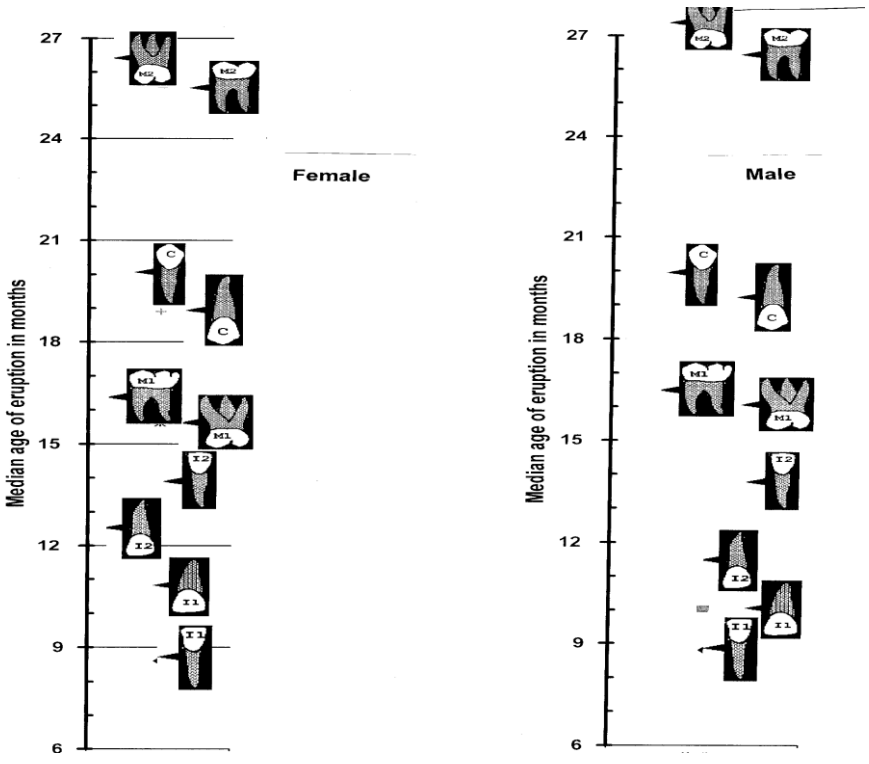
Tooth type	Arch type	Nutritional Status						Difference* *
		Well nourished			Malnourished			
		Lower limit of 95% CL	Effective age	Upper limit of 95% CL	Lower limit of 95% CL	Effective days age	Upper limit of 95% CL	
Central	Maxilla	10+3 days	10+12 days	10+18 days	11+18 days	21+12 days	13+0 days	2+0 days
	Mandible	8+12 days	8+21 days	8+27 days	9+21 days	10+12 days	11+0 days	1+21 days
	*Difference		-(1+21) days			-(2+0) days		
Lateral	Maxilla	11+21 days	12+0 days	12+9 days	13+9 days	14+6 days	15+0 days	2+6 days
	Mandible	13+15 days	13+24 days	14+6 days	16+6 days	17+3 days	17+27 days	3+9 days
	*Difference		1+24 days			2+27 days		
Canine	Maxilla	18+21 days	19+3 days	19+15 days	20+15 days	21+9 days	22+6 days	2+6 days
	Mandible	19+18 days	19+27 days	20+9 days	21+15 days	22+12 days	23+12 days	2+15 days
	*Difference		0+24 days			1+3 days		
First molar	Maxilla	15+0 days	15+24 days	16+15 days	17+12 days	18+6 days	19+0 days	2+12 days
	Mandible	15+6 days	16+9 days	17+12 days	18+8 days	19+12 days	20+6 days	3+3 days
	*Difference		0+15 days			1+6 days		
Second molar	Maxilla	26+9 days	27+0 days	27+18 days				
	Mandible	25+9 days	26+0 days	26+21 days				
	*Difference		-(1+0) days					

*Mandible – maxilla

**Malnourished- well nourished (effective age)

Table 5 the 5th and 95th percentiles range time for primary teeth emergence with time span by weight for age nutritional status indicator and arch type

Tooth type	Arch type	Nutritional status					
		Well nourished			Malnourished		
		Lowest 5th percentile	Highest 95th percentile	Time span	Lowest 5th percentile	Highest 95th percentile	Time span
Central	Maxilla	6+27 days	15+15 days	8+18 days	7+27 days	19+12 days	11+15 days
	Mandible	5+21 days	13+9 days	7+18 days	6+21 days	15+27 days	9+6 days
Lateral	Maxilla	8+0 days	18+0 days	10+0 days	8+6 days	24+18 days	16+12 days
	Mandible	9+3 days	21+3 days	12+0 days	10+15 days	27+21 days	17+6 days
Canine	Maxilla	13+0 days	28+0 days	15+0 days	15+9 days	29+21 days	14+12 days
	Mandible	13+24 days	28+24 days	15+0 days	16+0 days	31+12 days	15+12 days
First molar	Maxilla	11+6 days	22+6 days	11+0 days	12+0 days	27+21 days	15+21 days
	Mandible	11+21 days	22+7 days	11+6 days	13+6 days	28+15 days	15+9 days
Second molar	Maxilla	18+27 days	38+15 days	19+18 days			
	Mandible	18+3 days	37+12 days	19+9 days			



Median Median

Figure 1 Sequence of emergence for maxillary and mandibular primary teeth among well nourished children (female and female)

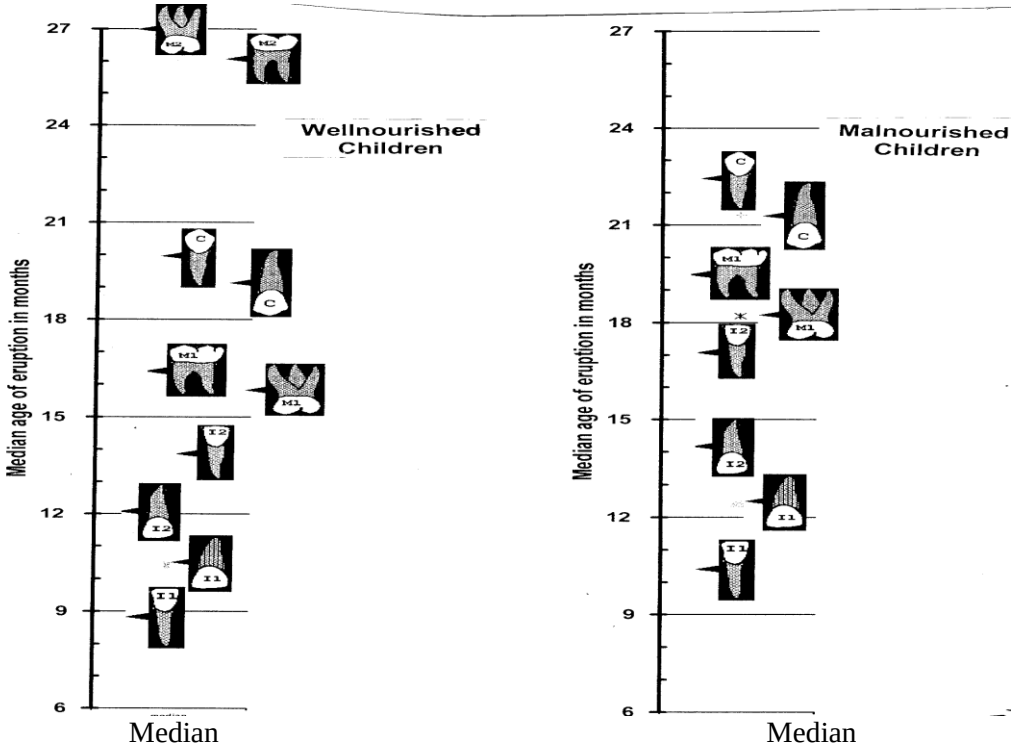


Figure 2 Sequence of emergence for maxillary and mandibular primary teeth among well nourished and malnourished children.

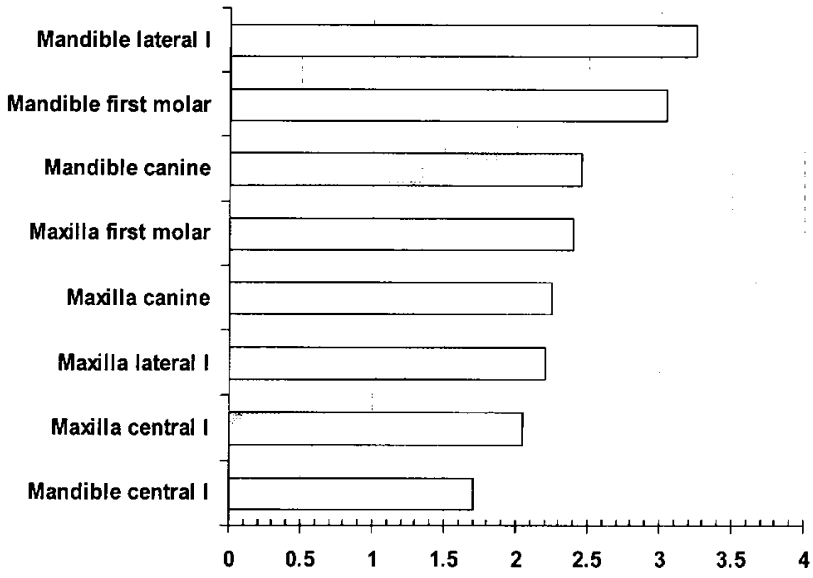


Figure 3 Time delay in months (ranked by magnitude) in median age difference of primary tooth emergence among malnourished children compared to well nourished.