Original Article

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Dentistry Section

Impact of Socio-demographic and Anthropometric Variables on Eruption Time of Permanent Teeth among Kurds Aged 5-15 Years in Duhok Governorate-Kurdistan Region, Iraq

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ABSTRACT

Introduction: Many variables affect tooth eruption time. Eruption time and sequence of teeth is important as part of dental treatment planning in paediatric dentistry, orthodontics treatment, and forensic dentistry to estimate age of the child.

Aim: The aim was to study the effect of different socio-demographic and anthropometric variables on eruption time of permanent teeth among Kurds aged 5-15 years in Duhok governorate-Kurdistan Region-Iraq.

Materials and Methods: A cross-sectional study was conducted on 1418 randomly selected healthy Kurdish students aged 5-15 years of both genders in Duhok governorate. All were clinically examined for tooth emerging through the oral mucosa. Normally and delayed teeth eruption time was correlated to different variables such as gender, residency, socio-economic status, Body Mass Index (BMI), parents' job, smoking habits, education, consanguinity, nutritional details, feeding pattern, birth weight, and pregnancy outcomes. Data were analysed using the Statistical Package for Social Sciences (SPSS, version 22.0). Numerical variables were presented and summarised as means and Standard Deviation (SD). Categorical variables were presented as frequencies and percentages. Chi-square test was used to test association between categorical variables. A p-value of ≤0.05 was considered statistically significant.

Results: There were a statistically significant differences with p-value <0.05 between permanent teeth eruption time in relation to gender, BMI, second year nursing pattern variables, while there were no statistically significant association (p>0.05) among eruption time and socio-economic status, residence, parents (education, job, smoking habit), several nutritional details, pregnancy outcome, birth weight, nursing at first year, and finally the introduction of supplementary food for the child.

Conclusion: Normal and delayed eruption time and factors affecting it will be useful in treatment planning in paediatric and orthodontic dentistry as well as in forensic dentistry.

Keywords: Body mass index, Nutrition, Pregnancy outcome, Socio economic status, Tooth eruption time

INTRODUCTION

Eruption of tooth is defined as the movement of the tooth from its developmental location inside alveolar bone through oral mucosa to the occlusal level in the oral cavity [1]. Eruption of tooth is a unique developmental process in the organism. The factors or the mechanisms of eruption have never been understood and the literature in this field is extremely scarce. The eruption of permanent teeth after deciduous teeth are shed is an age related process wherein the teeth erupt in upper and lower jaws and eventually the oral cavity [2].

Different factors influence the eruption and sequence of the permanent teeth. Genetic and hormonal factors, disparities in geography, environment, race, sex and ethnicity, economic status, body mass, diet, exposure to fluoride, birth weight, outcome of pregnancy, chronological variations and growth parameters in accordance with unusual general pathological conditions such as endocrine pathology, irradiation and syndromes of development that affect eruption pattern. Relationship was also recorded between the time of children's tooth eruption, height, and weight. Kids below normal weight and height for a particular age have a later eruption period than kids within the standard range [3,4]. The eruption timing of the teeth are important for planning out paediatric and orthodontic procedures [1,5]. This helps to find the exact age.

Eruption time of the teeth and its sequences are important in dental treatment planning, mainly when patients require orthodontic treatment also in paediatric dentistry. It also can help to find the age of adolescents and plays an essential role in forensic dentistry [1,5]. Study was done on the chronology of permanent teeth among school children aged 5-15 years in Duhok Governorate-Kurdistan Region [6], but researches on factors affecting the eruption time of permanent teeth had not been done before in Duhok governorate, so the results of this study will serve as database for the future researches. The aim of this study was to estimate the effect of different socio-demographic and anthropometric variables that might have affected the mean eruption time of permanent teeth among school children aged 5-15 years in Duhok Governorate-Kurdistan Region-Iraq.

MATERIALS AND METHODS

A cross-sectional study of school students aged 5-15 years was conducted from November 2017 to May 2018 in Duhok city, Kurdistan Region-Iraq. Duhok governorate is one of the four governorates in Kurdistan region of Iraq. Two kindergartens, four primary schools and four secondary schools were randomly selected from the governorate by simple random sampling. All children in each selected kindergarten and school were included in the study making a total sample size of 1418. Scientific approval and ethical permission were obtained from Hawler Medical University (no.317) and a written consent was obtained from parents/caregiver of each participant.

Sample size calculation: The anticipated sample was estimated from equation $N=(PQZ^2D)/E^2$ where N=sample size, P=estimated prevalence of tooth eruption time=0.50, Q=1-P, Z=1.96 confidence level=95%, D=design effect=2, E=accepted standard error=0.04, giving a target sample size of 1200 [7].

Inclusion criteria: An obviously healthy Kurdish child aged 5-15 years who had parental permission to participate in the study was included.

Exclusion criteria: Children with a systemic disorder or older than the specified range, or who did not have full questionnaire details or was absent on the day of the were excluded.

Study Procedure

Intra and interexaminers calibration was conducted on a sample of (15 children) between one of the researchers and another specialised dentist for assessment of an eruption for interexaminer calibration at the same day of examination and after one week for intra examiner calibration by using two-digit Fédération Dentaire Internationale (FDI) tooth numbering system. Kappa test was done to determine the inter and intraexaminer consistence in recording tooth eruption, Kappa value was 1 for interexaminer and 0.79 for intraexaminer calibration.

Examination of teeth was conducted using day light and portable Light-emitting Diode (LED) light was used with the help of disposable mouth mirrors, probes and tweezers. The teeth were first cleaned and dried by cotton for better visibility then each permanent tooth was recorded using the two-digit system of the FDI system [8]. The eruption of the teeth into the oral cavity was divided into four stages:

0=the is tooth not visible in the oral cavity.

1=at least one cusp is visible in the oral cavity.

2=the entire occlusal surface/mesio-distal width of the tooth is visible.

3=the tooth is in the occlusion or at the occlusal level [7].

For this study, only 0 and 1 were analysed as non erupted and erupted respectively. Both score 2 and 3 were examined but not analysed. Recording of extracted teeth due to caries was based on the World Health Organisation (WHO) guidelines [9]. Wisdom teeth were excluded.

The date of birth was verified from the school records and was used to compute the age of the child at the date of examination. The mean age was calculated as mean age in years and months. Anthropometric measurements were assessed with light clothes after removal of shoes and any overcoat, the body height was recorded to the nearest centimeter 0.01 m with a wall mounted tape. Body weight was recorded in kg to the nearest 0.01 kg using a self-zeroing digital scale [10]. Paediatric Z-Score calculator was used to calculate BMI z-scores by entering the individual's height, weight, age and gender into the software [11].

To define the groups using WHO statistical packages of Z-score for both BMI and Height for Age (HA) were used to select the children to define the groups. The nutritional status was classified according to the WHO (2007) as follows [11]:

1. BMI z-score < minus (-) 2 Underweight
2. BMI z-score minus (-) 2 to 2 Normal
3. BMI z-score >2 Obese

A specially designed questionnaire by authors consisted of 26 questions. The questionnaire was designed according to the objectives of this study with the help of six seniors (specialist dentists) in the college. The questionnaire was designed originally in Kurdish and English language and filled in the presence of one of the researchers (HM Najman), any unclear question was further explained by the researcher (reliability score: Cronbach's alpha score was 0.975). It was arranged in addition to general information regarding age, gender, and residency. The forms included detailed information regarding father and mother, job, education, smoking habits among parents or caregivers. Parents consanguinity whether they were relatives or not, pregnancy outcome whether premature or full term, birth weight either below 2.5 kg or equal or above it. The form also included detailed information regarding child's favourable food, frequency of consuming dairy product, fruit and sugar intake, the type of feeding during first and second year of nursing and time of addition of supplementary foods.

Pilot study was conducted on 20 students within the age range selected randomly from one of the schools and the main aim was to estimate the time needed for the filling of the questionnaire and examination and the clarity of the questions which were not clear. The pilot sample was not included in the original study. Both pilot and main study had the same questions.

Socio-economic Status (SES) estimation was calculated using the following scores: Two scores had been given for each parent's job. Four scores for the education for each of parents. For each level of education, one score for primary, two scores for intermediate, three scores for secondary school, four scores for university and above respectively for each father and mother. Two scores for owning house. One score for owning the car. Total will be 15 score categorised into three categories as below [12]:

1. Category one low SES <6.
2. Category two moderate SES from 6-10.
3. Category three high SES from 11-15.

The questionnaire form was written originally in languages Kurdish, supported by both Arabic and English languages added for those who want it, and they were instructed how to be filled by parents or caregivers. The parents/caregivers have also provided information through the questionnaire about children's nutritional characteristics and habits.

Grouping of teeth was done for comparison of delayed eruption time with different socio-economic, anthropometric, and other factors. The Mean eruption time of each tooth has been combined in eight groups with the same or near eruption time according to the American Dental Association in order to determine the delayed erupted teeth beyond the normal age of eruption for each age group as shown in [Table/Fig-1]. For all age groups each socio-demographic variable, student's teeth were categorised into normally erupted teeth and delayed teeth with two groups, first group from 1-2 delayed teeth, second group from ≥3 teeth delayed had been estimated. The tooth had been considered delayed, if it had been erupted later than its normal range as shown below [13,14].

Groups	Teeth included (FDI notation)	Age group of eruption according to ADA (Years)
Group One	16,26,36,46,31,41	6-7
Group Two	11,21, 32,42	7-8
Group Three	12,22	8-9
Group Four	33,43	9-10
Group Five	15,25,34,44	10-12
Group Six	13,23,35,45	11-12
Group Seven	17,27 37,47	12-13 11-13
Group Eight	14,24	10-11

[Table/Fig-1]: The Mean eruption time of each tooth has been combined in eight groups as per ADA [14].
ADA: American dental association; FDI: Fédération dentaire internationale

STATISTICAL ANALYSIS

Data were analysed using the SPSS, version 22.0. Numerical variables were presented and summarised as means and standard deviations. Categorical variables were presented as frequencies and frequency percentages. Chi square test was used to test association between categorical variables. A p-value of ≤0.05 was considered statistically significant.

RESULTS

The total sample of the study was 1418 students (718 males and 700 females) and the mean age for the subjects was 9.97 years, and ±SD=2.90.

Mothers mean age was 37.36 years, median 37, St. Deviation=6.15, minimum=21, maximum=61. But it was not included in comparison and analysis. n=1159 out of 1418 is the sum of all students had normally erupted teeth for each variable and its categories in all tables. [Table/Fig-2] shows detailed mean age (±SEM) and median eruption time of each tooth that had been published before [6].

Tooth	n*	Mean age (years)	SEM	Median
11 upper R* central incisor	12	7.72	0.30	7.92
12 upper R lateral incisor	29	8.34	0.20	8.25
13 upper R canine	52	11.26	0.17	11.17
14 upper R 1st premolar	24	9.73	0.27	9.25
15 upper R 2nd premolar	12	10.63	0.47	10.21
16 upper R 1st molar	10	6.56	0.35	6.17
17 upper R 2nd molar	20	12.43	0.29	12.42
21 upper L*central incisor	9	7.49	0.22	7.58
22 upper L lateral incisor	24	8.50	0.21	8.33
23 upper L canine	55	11.23	0.19	11.17
24 upper L 1st premolar	19	9.69	0.28	9.50
25 upper L 2nd premolar	12	11.53	0.43	11.33
26 upper L 1st molar	13	6.62	0.25	6.33
27 upper L 2nd molar	20	12.37	0.24	12.41
31 lower L central incisor	17	6.47	0.23	6.25
32 lower L lateral incisor	23	7.67	0.17	7.58
33 lower L canine	34	10.30	0.18	10.00
34 lower L 1st premolar	26	10.16	0.17	10.13
35 lower L 2nd premolar	13	10.87	0.39	10.92
36 lower L 1st molar	9	6.27	0.23	6.08
37 lower L 2nd molar	22	11.97	0.26	11.71
41 lower R central incisor	16	6.52	0.23	6.42
42 lower R lateral incisor	23	7.76	0.18	7.92
43 lower R canine	38	10.50	0.17	10.46
44 lower R 1st premolar	28	10.33	0.21	10.46
45 lower R 2nd premolar	18	10.35	0.37	10.04
46 lower R 1st molar	11	6.20	0.27	5.83
47 lower R 2nd molar	29	11.77	0.18	11.67

[Table/Fig-2]: Mean age of eruption, ±SEM and Median in years of maxillary and mandibular teeth among Kurds aged 5-15 years of both genders.
n*=students' number, R*=right; L*=left; SEM: Standard error of means

The [Table/Fig-3] shows the association of socio-demographic factors with delayed eruption time among the study population. Males had statistically significant delayed mean eruption time in comparison to females (p-value=0.001). No significant differences with p>0.05 of tooth delayed eruption was found with socio-economic status, residence, parent's job, parent's education and smoking habits of both parents, consanguinity, pregnancy outcomes and nutritional details of child variables.

Parameters		Normal		1-2 years delayed		≥3 years delayed		Total	p-value
		No.	%	No.	%	No.	%	No.	
Sex	Male	562	78.3	101	14.1	55	7.7	718	0.001
	Female	597	85.3	75	10.7	28	4.0	700	
Residence	Urban	707	82.4	100	11.7	51	5.9	858	0.562
	Rural	452	80.7	76	13.6	32	5.7	560	
SES	Low	142	84.0	22	13.0	5	3.0	169	0.484
	Medium	748	81.0	117	12.7	59	6.4	924	
	High	269	82.8	37	11.4	19	5.8	325	
Mother education	Illiterate	815	80.5	131	13.1	63	6.25	1009	0.405
	Secondary	200	83.3	31	12.9	9	3.8	240	
	Higher education	144	85.2	14	8.3	11	6.5	169	
Father education	Illiterate	715	81.5	115	12.85	50	5.6	880	0.921
	Secondary	203	84.2	25	10.4	13	5.4	241	
	Higher education	241	81.1	36	12.1	20	6.7	297	
Mother's job	Housewife	967	81.6	147	12.4	71	6.0	1185	0.882
	Civil servant	192	82.4	29	12.4	12	5.2	233	
Father job	Self-employed	425	82.0	63	12.2	30	5.8	518	0.945
	Civil servant	436	82.4	64	12.1	29	5.5	529	
	Military	298	80.3	49	13.2	24	6.5	371	
Mother smoking	Yes	5	71.4	1	14.3	1	14.3	7	0.617
	No	1154	81.8	175	12.4	82	5.8	1411	
Father smoking	Yes	558	82.2	82	12.1	39	5.7	679	0.916
	No	601	81.3	94	12.7	44	6.0	739	
Pregnancy outcome	Full term	1091	81.4	168	12.5	81	6.0	1340	0.344
	Premature	68	87.2	8	10.3	2	2.6	78	
Parents consanguinity	Yes	560	80.3	94	13.5	43	6.2	697	0.400
	No	599	83.1	82	11.4	40	5.5	721	
Child favourable food	Hard	24	88.9	1	3.7	2	7.4	27	0.727
	Mixed	547	81.9	83	12.4	38	5.7	668	
	Soft	588	81.3	92	12.7	43	5.9	723	
Intake of Calcium containing foods	Daily and more	829	81.8	119	11.7	65	6.4	1013	0.065
	2-3 times/ week	305	81.6	55	14.7	14	3.7	374	
	One or less/ week	25	80.6	2	6.5	4	12.9	31	
Intake of fruit	Daily and more	681	81.5	101	12.1	54	6.5	836	0.401
	2-3 times/ week	426	82.4	68	13.2	23	4.4	517	
	One or less/ week	52	80.0	7	10.8	6	9.2	65	
Intake of sugar-containing foods/drinks	Daily and more	498	79.8	91	14.6	35	5.6	624	0.116
	2-3 times/ week	506	83.2	69	11.3	33	5.4	608	
	One or less/ week	155	83.3	16	8.6	15	8.1	186	
Total		1159		176	12.4	83	5.9	1418	

[Table/Fig-3]: Distribution of normal and delayed teeth eruption according to socio-demographic variables and child's nutritional habits (Chi-square test was used to test association between categorical variables).
p-value was calculated by Chi-square test of association to compare between proportions. p<0.05 statistically significant

The [Table/Fig-4] shows eruption time according to children nutritional intake and feeding during infancy. Children who continued milk formula in the second year of life had significantly less percentage of delayed eruption in comparison to those who stopped the nursing in second year of child (p<0.05). No significant association were found between delayed eruption time and nursing in the first year, and introduction time of supplementary food variables (p>0.05).

The [Table/Fig-5] reveals that underweight students had a significantly (p=0.01) more delayed teeth eruption in comparison with normal and overweight/obese. Underweight seem to have more percentage of >3 delayed teeth than the other categories. It also reveals that overweight/obese had less delayed eruption (1-2 delayed) in comparison to normal weight. No significant difference was detected between delayed eruption time and birth weight, with p-value >0.05.

Parameters		Normal		1-2 delayed		≥3 delayed		Total	p-value
		No.	%	No.	%	No.	%	No.	
Nursing in the first year	Mother's milk	610	80.7	96	12.7	50	6.6	756	0.423
	Mixed	440	81.9	68	12.7	29	5.4	537	
	Formula	109	87.2	12	9.6	4	3.2	125	
Continue milk formula in the second year	Yes	874	83.6	118	11.3	53	5.1	1045	0.007
	No	285	76.4	58	15.5	30	8.0	373	
Introduction time of Supplementary food (months)	<6	106	82.8	10	7.8	12	9.4	128	0.281
	6-<12	806	82.4	120	12.3	52	5.3	978	
	12-<24	215	79.0	41	15.1	16	5.9	272	
	24-36	32	80.0	5	12.5	3	7.5	40	
Total		1159	81.7	176	12.4	83	5.9	1418	

[Table/Fig-4]: Distribution of normal and delayed teeth eruption according to nursing in the first year continue milk formula in the second year and introduction time of Supplementary food variables (Chi-square test was used to test association between categorical variables).
p-value was calculated by Chi square test of association to compare between proportions.
p<0.05 statistically significant

Parameters		Normal		1-2 delayed		≥3 delayed		Total	p-value
		No.	%	No.	%	No.	%	No.	
BMI	<2 Underweight	32	74.4	5	11.6	6	14.0	43	0.010
	-2 to 2 Normal	1000	81.4	163	13.3	66	5.4	1229	
	>2 Overweight/ obese	127	87.0	8	5.5	11	7.5	146	
Birth weight	<2500 g	189	80.1	29	12.3	18	7.6	236	0.445
	>=2500 g	970	82.1	147	12.4	65	5.5	1182	
Total		1159	81.7	176	12.4	83	5.9	1418	

[Table/Fig-5]: Distribution of normal and delayed teeth eruption (number and percentages) according to BMI categories and birth weight. (Chi-square test was used to test association between categorical variables).
p-value was calculated by Chi-square test of association to compare between proportions

DISCUSSION

Most of the teeth emergence studies indicating that in girls permanent teeth erupt earlier than in boys are formally accepted. In the case of maxillary canines, second molar and mandibular canines, substantial variations were found. On average, the difference between eruption times is 4-6 months, with the main difference being the permanent second molar. The earlier onset of maturation is correlated to earlier eruptions of permanent teeth in females. Only one study documented the earlier development of second molars in boys than in girls and clarified this anomaly as a catch-up development due to the later onset of puberty in males by the age of second molar eruption [4,15-17]. About the compares for number of delayed teeth between outside city and inside city area in this study there was no statistically significant difference but, inside city had little early eruption generally more than outside city, this little change was agreed with a study conducted in Jordan by Shaweesh Al et al., which is also concluded for most permanent teeth, the emergence ages in inside city schoolboys were usually advanced in comparison to their fellows in outside city schools. Nevertheless, the variations for the maxillary canine and maxillary premolars were only statistically significant. In this study, there was no individual tooth comparison, otherwise there might be significant differences between teeth separately [18].

The present study found no association between delay of permanent teeth eruption and usual eruption period with in children's socio-economic status (statistically insignificant), backed by an Indian primary teeth study by Vinod K et al., and Ugandans children done on the third molar eruption time [19]. In other side of disagreement with this study results, previous studies among the Nigerians and Portuguese reported earlier primary tooth emergence among children of higher socio-economic background as compared to those from a low socio-economic status. The relationship reported was attributed to the fact that individuals' socio-economic status could be used as an indicator of their nutritional status. Good socio-economic status is stipulated to indicate access to adequate nutrition and thus affect growth and development [20].

About mother's education, there were no statistically significant differences between the groups. There was a relative accordance with Brickhouse TH who hypothesised that higher parental educational levels would translate into increased likelihood of preventive dental care for their child counseling and motivation that might positively affect teeth eruption [21]. Mother's job had no effect on teeth eruption and there was no statistically significant difference between housewife and civil servant mother. No previous research on the impact of mother work on delayed teeth eruption was conducted. There was no statistically significant difference between smoking and non-smoking parents (mothers and fathers), only with slight less delayed teeth eruption in non-smoking mothers. This could be because smoking mothers for secondary smoker kids were more indoors than fathers and usually had impaired growth cycle and maturation. Furthermore, the influence of nicotine and/or tar intrauterine, as smokers is expected to continue this habit throughout pregnancy and affect foetal growth.

There was no statistically significant difference between father's education and the number of delayed teeth, and accordingly no previous study had been conducted to investigate that for comparison. There was no statistically significant difference between the two forms of consanguinity but there were slightly fewer percentages of delayed teeth in parents who were not relatives. No previous study was found about the effect of parent consanguinity on delayed teeth eruption time. Generally speaking, about nutritional details of the child for the frequency of intake pattern of calcium, sugar and fruits, it appeared that statistically there was no significant difference between daily, 2-3 time in a week and one time per week, concluding that malnutrition had no direct effect on the time of tooth eruption [22]. Similar results were found in this study when Elamin F and Liversidge HM concluded in 2013 that, despite extreme malnutrition, it appears to have a minimal effect on the timing of tooth formation. The great difference that occurs between people. This research highlights the integrity of dentition in comparison to other biological structures that are known to be impaired by malnutrition [23].

A reverse outcome had been found in a study done by Alnemer KA et al., in 2017, about impact of birth characteristics, It has been suggested in Saudi Arabia that breastfeeding is the perfect stimulus for the physiological growth of both the muscular and skeletal components of the orofacial complex, as well as vital statistics on the eruption of primary teeth among healthy infants. There was a growing strong interest in the role of breastfeeding on the emergence of the first primary tooth [24]. This might be due to many factors like tooth type differences primary and permanent, environmental differences and methodological variation. This study revealed that there was a significant difference between these two feeding pattern, signaling that the children who continue the nursing by milk formula at the second year of childhood have higher normally erupted percentage (83.6%) than of children (76.4%) who stopped feeding with formula in the second year of their childhood this may be due to that formula contain more supplements like minerals and vitamins than daily meals of these children, this outcome was disagreed with the Viggiano D et al., who's data supported an etiological role of non-nutritive sucking on open bite, and did not find the type of feeding to be a risk factor [25]. This might be also because the difference between primary and permanent teeth.

Finally, parents had been asked about the starting time or introduction of supplementary food with the milk during the first years of child's life. Again, there was no statistically significant difference between the child who starts the supplementary food at age <6 months, 6-12 months, 12-24 months and finally the children who started supplementary food lately at age category from 24-36 months. Probably no previous study had been done to study the effect of

time supplementary food intake during the first three years of child life. Limitation for this type of information there was a wide range of the age when the child starts the supplementary food intake, might be due to misunderstanding of the question or difficulty of remembering of the time exactly.

About BMI a significant statistical difference with p-value 0.010 between underweight and both normal and overweight, suggested that both normal about (81.4%) and overweight about 87.0% had higher percentage of normal eruption time of permanent teeth and less percentage of delayed teeth eruption. Such findings were not found to be specifically increased by decreased BMI in line with an earlier study among Indian children in Uttar Pardesh, and were not completely but partially accepted with a study among Pakistani children in Karachi, Khan N and Sabharwa IR et al., who detected that taller children showed delayed tooth eruption regardless of their weight while early tooth eruption had been noticed among heavy and short children [26,27].

According to Must A et al., and Arid et al., the findings of this study are that obesity is substantially associated with a higher average number of teeth erupting than underweight children [28,29]. Furthermore, in other recent study done in Uganda by same researcher Kutesa AM et al., they found an agreement with this study when their study concluded that the mandibular third molar eruption time is predisposed by the nourishing status of the child, i.e., the earlier tooth eruption associated with higher the BMI [22]. In the current study, there were no statistically significant differences between full- term and premature infant and also between low birth weight and normal birth weight, but premature babies tend to have more than (87.2%) of fully erupted teeth than full- term babies with more delayed teeth. This might be attributed to the fact that mother of premature babies follows the instructions of paediatricians to compensate the deficiency of low-birth-weight baby through better feeding and food supplements and vitamins.

This was partially in line with a study by Salama GS et al., who reported that if total parenteral nutrition was given to low birth weight premature infants then it gives rise to early first tooth eruption [30]. Another study but on primary teeth eruption, also found no association between the birth weight of the child and the timing of eruption of the first primary tooth [25]. This in contrast to Ntani G et al., who found birth weight to be associated with the emergence of the primary dentition, with heavier babies showing earlier eruption patterns [31]. About the nursing type or pattern during the first year of the child according to this study, there was no statistically significant difference between the nursing by mother milk, formula and the mixed type of nursing in reverse to the result of Alnemer KA et al., a study on primary teeth among healthy infants in Saudi Arabia [24], but there was significant differences (p-value <0.05) in the percentage of delayed teeth between children who continue milk formula in the second year than others who stopped feeding on formula at second year of child's nursing.

Limitation(s)

One of the limitations of the cross-sectional study design is memory recall bias, where the mother couldn't accurately remember the details of first year feeding. The most likely drawback was that this study was performed on students, and was not a study based on community. This, however, may have limited impact as primary school attendance is mandated in the Kurdistan region. In addition, some potential drawbacks in this type of cross-sectional tooth eruption study may have been some teeth wrongly reported as unerupted rather than missing (it was difficult to be reported due to need for an invasive radiographic confirmation). It is also likely that such teeth reported as missing might have been removed or avulsed for orthodontic purposes. Nevertheless, these possibilities would be too limited, particularly with such a large sample size, to have a significant impact on the results. This data is very significant in the modification of the dental care plan for orthodontic and paediatric dentistry in all age groups of Kurds children.

CONCLUSION(S)

In relation to gender, BMI, second year nursing pattern variables, there were statistically significant differences with p-value <0.05 between permanent teeth eruption time, while there was no statistically significant association between eruption time and socio-economic status, residence, parents' (education, job, smoking habit), several nutritional details, birth weight. These factors will be useful in treatment planning in paediatric and orthodontic dentistry. In order to expand Duhok City's database, it is recommended that other studies on primary teeth eruption period and also the same research be conducted in other cities to compare and test their relationship with various factors that may affect the eruption time of teeth.

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QUESTIONNAIRE

1. Date:
2. School Name:
3. Student Name:
4 Class:
5 Caregiver's mobile number:
6. Date of birth:
7. Gender
   (1) Male (2) Female
8. Socio-economical indicators;
   House
   (1) Yes (2) No
   Car
   (1) Yes (2) No
9. Father education level
   (1) Illiterate (2) Primary school (3) Secondary school (4) Higher education
10. Father's employment
    (1) Yes (2) No
    Father's job
    (1) Self-employed (2) Civil servants (3) Military
11. Is the father smoker
    (1) Yes (2) No
    If yes no. of cigarettes/day
    (1) Less than 10 (2) 10-20 (3) >20
12. Mother age in years
13. Mother's job;
    1-house wife 2-civil servants
14. Mother education level
    1-illtreat 2-primary school 3. secondary school 4-higher education
15. Parent consanguinity;
    1-relative 2-not
16. Pregnancy outcome of the child
    1-full term 2-premature
17. Birth weight:
    1-low, <2500 g 2- normal, ≥2500 g
18. Is the Mother smoking;
    1-yes 2-no
19. If yes no. of cigarettes/day
    1-≤10 2-10-20 3-more than 20
20. Child's favourable food;
    1-hard 2-mixed 3-soft
21. Child intake of calcium containing foods dairy product (milk, cheese, yogurt, eggs);
    1-daily and more 2-2-3 times weekly 3. once weekly or less
22. Child fruits intake
    1-daily and more 2-2-3 times weekly 3. once weekly or less
23. Sugar containing food and drink:
    1-daily and more 2-2-3 times weekly 3. once weekly or less
24. Child nursing during 1st year
    1-mother's milk 2-mixed 3. Formula milk-3
25. Had the child continue on milk formula in second year?
    1-yes 2-no
26. Time of introduction of complementary or solid food in month

Note: Filling of this questionnaire by parents was considered an agreement for participation in this study.