

# The Impact of Breastfeeding Duration on the Development of Normal Occlusal Features of the Primary Dentition among Baghdad Preschool Children

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## ABSTRACT

**Background:** Normal occlusal features of primary dentition are crucial for normal development of the permanent dentition. Breastfeeding is an important factor for both general and dental health of children. Aim: The aim of the present study is to assess the impact of the breastfeeding duration on the prevalence of normal occlusal features of the primary dentition among preschool children in Baghdad.

**Materials and Methods:** The sample was 630 Iraqi children (270- boys, 360 girls), aged 3-5 years selected from four kindergartens in Baghdad city. The study was carried out through questionnaire and clinical examination. Normal occlusal features were examined as the presence or absence of interincisive spaces (IS) and primate spaces (PS), terminal relationship of the primary second molar that classified as: Flush terminal (FT), mesial step (MS) and distal step (DS). The presence or absence of ideal incisor overbite was also recorded. Data were statistically analyzed using SPSS (version 21). Chi square and z test were used in data analysis.

**Results:** A significant relation was present between the duration of breastfeeding and the presence of: primate and interincisive spaces, flush terminal plane, mesial terminal plane and ideal incisor overbite.

**Conclusion:** Breastfeeding duration has a positive impact on the development of normal occlusal features of the primary dentition. Efforts should be taken to enhance the knowledge of the community, especially the mothers, about this impact to encourage them to practice exclusive breastfeeding for more than 12 months.

**Keywords:** Breastfeeding, Normal Occlusal features, Primary dentition, Children health. (Received: 19/7/2018; Accepted: 6/8/2018)

## Introduction

More than 14 centuries ago, Al-Quran was sent down by Almighty Allah for the whole humanity to regulate almost all human's life issues (1). Quran and Hadiths stated the values of breastfeeding and the regulations of breastfeeding were discussed in fourteen times in eight verses of seven suras (AL-Baqarah 234, AL-Nesa 24, AL-Hajj 3, ALQasas 8,13, Luqman 15, AL-Ahqaf 16 and AL-Talaq7) in the Holy Quran which emphasizes the importance of breastfeeding for humans(2).

Breastfeeding duration of the child had been the matter of a great deal of scientific interest, such as its effect on the subsequent cognition development (3). Its role in the educational, mental, psychomotor and neuropsychological performance was studied by Julvezi et al (4), while its impact on the behavioral functioning of the child had been shown by Oddy et al.(5).

For the child, there was some evidence that breastfeeding had a protective effect against asthma (6) as well as an effect in reducing neonatal mortality and morbidity (7). However, for the mothers it had a protective role against breast and ovarian carcinoma(8) . These features of primary teeth directly influences the development of the permanent dentition.

Breastfeeding is beyond just nutrition; it is a crucial and fundamental factor for the proper growth and development of the body as well as the stomatognathic and orofacial musculature. Therefore, "breastfeeding is the best orthopedic appliance one can offer to get an adult's face in terms of harmonious development, which is imperative for the good development of the entire craniofacial complex during the most important period of the newborn life"<sup>(9)</sup>. Primary teeth largely affect the growth and development of a child dentition. It plays critical role in esthetics, eating, speech, encourage normal function and growth. Primary teeth ensure the eruption of permanent successors in their position and time<sup>(10)</sup>. Therefore, development of normal occlusion is essential for good general health <sup>(11)</sup>. Four features found in primary dentition, can indicate good dental development, had been described as features of "normal" occlusion of the primary dentition. They are: spacing of the incisors, presence of "primate spaces", existence of a deep incisor overbite, and the relationship of the distal surface of the upper and lower second primary molars (terminal plane)<sup>(12)</sup>.

The relation between the distal surfaces of the maxillary and mandibular second primary molars is one of the most important factors that influence the future occlusion of the permanent dentition <sup>(13)</sup>. Flush or mesial step is molar relation that is more favorable in the primary dentition as it reduces the chances of malocclusion in the

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permanent dentition. However, distal step molar relation in the primary dentition led to class II Spacing often presents between all primary anterior teeth. The most obvious spaces is that present mesial to canines in the maxilla and distal to canines in the mandible which are termed as primate or anthropoid spaces. Another form of space in the primary dentition is the secondary or developmental spaces, which are usually found between the incisors. Such dental spaces are termed "physiological spaces." These spaces are significant later on for the correct alignment during the eruption of the permanent teeth and the settlement of occlusion. Absence of these spaces in the primary dentition (non-spaced dentition) is an indication for the disharmony between jaw/tooth size<sup>(15)</sup>. The presence of incisal overbite is considered as one of the characteristics for normal occlusion in the primary dentition<sup>(16)</sup>.

The purpose of the present study, which was done in Baghdad city the capital of Iraq, was to assess the impact of the of breastfeeding duration on the prevalence of these occlusal features in the primary teeth among the preschool children and furthermore to investigate their family's knowledge toward this impact.

## MATERIALS AND METHODS

The scientific committee of research and development in College of Dentistry / Al-Mustansiriya University approved the research protocol of the present study. So it was conducted among a sample consisted of 630 Iraqi children (270 boys, 360 girls) their age ranged between 3-5 years, randomly selected from four kindergartens in Baghdad city.

A cross-sectional study was conducted through a clinical examination to the children and questionnaire to their parents. The questionnaires were sent through the principals to the child's mothers to get a signed parental consent for the child's participation.

The questionnaire contained information regarding the child's name, sex, age, history of systemic disease, history and duration of the child feeding whether it was breast /bottle-feeding, history of thumb or dummy sucking. Moreover, the mothers asked in the questionnaire if they had any a knowledge concerning the relation between breastfeeding and the development of normal occlusion. Children included in this study should had the following criteria: 1. no history of any systemic disease nor a history of bad habit (thumb sucking, pacifier (dummy) sucking, nail biting, and mouth breathing) or a history of previous orthodontic treatment. 2. Children should had a complete

molar relation in the permanent dentition cannot be redressed with the growth of the child<sup>(14)</sup>.

intact set of primary teeth (without damaged due to caries or fracture) with symmetrical terminal plane in both sides.

The duration of breastfeeding defined as "the number of months elapsed between birth and the termination of breastfeeding, regardless of whether the child was fed any other solids or liquids during this period"<sup>(17)</sup>. For statistical analysis purposes, duration of breastfeeding was categorized as: never breastfed, 0-6 months, 0-12 months and more than 12 months.

The clinical examination was performed for all children in their kindergarten premises while seated in front of the examiner (a single orthodontist who was blind to the child's questionnaire data) under natural light, using disposable gloves, mask, and cheek retractor.

The intraexaminer calibration was done by having twice examination for 20 children for two-day intervals by the same examiner. There was complete agreement for all parameters using Kappa statistic. The following parameters were evaluated during the assessment of occlusion while the jaws in centric occlusion:

*Incisors spaces (IS)*: spaces between incisors of maxillary and mandibular arches.

*Primate spaces (PS)*: In the maxilla, it presents between the lateral incisor and canine. In the mandible, it presents between the primary canine and first primary molar,

*Incisors spaces (IS)* and *Primate spaces (PS)* in both maxillary and mandibular arches were recorded as spacing present or spacing absent according to Facal-Garcia et al.<sup>(18)</sup>.

Molar relationship was evaluated according to the criteria used by Abualhaija and Qudeimat<sup>(19)</sup> and recorded as present for each of the followings:

Flush terminal (FT): Present when the distal surfaces of the upper and lower second primary molars were in the same vertical plane when the jaws were in centric occlusion.

Distal step (DS): Recorded when the distal surfaces of the lower primary second molar present in posterior relationship to the distal surface of the upper second molars when the jaws were in centric occlusion.

Mesial step (MS): It was listed as present when the jaws were in centric occlusion and if the distal surfaces of the lower primary second molar occurred in anterior relationship to the distal surface of the upper second molars

Deep incisor overbite were assessed as present ,when the incisal tips of the primary lower central incisors contacting the palatal surfaces of the upper primary central incisors

when the jaws were in centric occlusion, or absent according to the ideal overbite recommended by Abualhaija and Qudeimat<sup>(19)</sup>.

The collected data was transferred into the computer using Excel 2010 after which it was subjected to statistical analysis using SPSS Version 21 and analyzed using Chi square and Z score tests.

## RESULTS

Feedback from only 572 questionnaires was obtained, as 58 questionnaires were never returned, so that only 422 child (251 boys, 171 girls) were included as the other 150 children were excluded because they were not met the inclusion criteria. Distribution of the sample according to gender and duration of breastfeeding was shown in table 1.

### *Spaces IS and PS* (Table 2,3,4)

Among children who breastfeed for more than 12 months the interincisive spaces present in very highly significant value in both maxillary (75.25%) and mandibular (76.24 %) arches. The lowest values of IS in both maxillary (21.42 %) and mandibular (0%) arches were present among children who never breastfeed. Also the highest PS values were present among children who breastfeed for more than 12 months in both maxillary (80.2%) and mandibular (67.33%) arches. Again the lowest values of PS in both maxillary (14.29%) and mandibular (0%) arches were present among children who never breastfeed.

There were highly significant differences in the presence of IS between maxillary (52.13 %) and mandibular arches (38.86 %). There was highly significant differences in PS values between maxillary (63.74%) and mandibular arches (43.37%).

Regarding gender differences of IS and PS, the only significantly high value was present in PS within the maxillary arch of male (70.12%). Otherwise there were no gender significant differences in the IS values of both maxillary and

mandibular arches and PS values of mandibular arches.

### *Terminal plane* (Table 5 and 6)

There were significantly high relation between the duration of breastfeeding and the terminal plane relations. Flush terminal plan relation present in 64.36 % and mesial step relation in 30.69% among children who breastfeed for more than 12 months. While there was a significantly highly (71.43 %) presence of distal step terminal relation among children who never breastfeed.

There were gender differences in terminal plane relations in both flush terminal plane relations (57.37 % for boys and 35.67 % for girls) and distal step (16.34 % for boys and 38.01 % for for girls). A mesial step were present with no significant differences (26.30 % for boys and 26.32% for girls).

### *Overbit* (Table 7,8)

Regarding the presence of ideal overbite, a higher percentage of the presence of ideal overbite was present among children who were breastfed more than 12 months in both boys (77.94%) and girls (90.91 %) while the lowest percentage of it was present among children who were never breastfed which was (0 %) for both boys and girls. On the other hand, there were no significant differences in the presence of ideal overbite ( 63.347 % for boys and 70.175 % for girls) among boys and girls (Table 8).

### *Mother's knowledge regarding the impact of breastfeeding on the occlusion* (figure 1)

Regarding the level of mother's knowledge about the impact of breastfeeding on the development of normal occlusion, feedback from all the returned questionnaires (572) were statistically analyzed and the results showed that 66 % of mothers had no knowledge about the association of breastfeeding and the occlusal development which mean that they had low level of knowledge.

**Table 1:** Distribution of the sample according to gender and duration of breastfeeding.

Duration of breast feeding	Total	boys	girls
No breastfeed	14	8	6
0-6 months	106	58	48
6-12 months	201	72	129
More than 12 months	101	33	68
Total	422	171	251

**Table 2:** the relation between the duration of breast feeding and the presence of IS and PS in both maxillary and mandibular arches

Type of space	Duration	MAX %	MAND %
IS	No breastfeed	21.42	0
	0-6 months	33.02	16.04
	6-12 months	52.54	34.83
	More than 12 months	75.25	76.24
	P value	0.001	0.001
PS	No breastfeed	14.29	0
	0-6 months	46.22	22.64
	6-12 months	68.16	45.27
	More than 12 months	80.2	67.33
	P value	0.001	0.001

N = 422 , IS = incisal space, PS = primate space

**Table 3:** differences in the presence of IS and PS between arches

Arch	IS				PS				
	Present		Not		Present		Not		
Max.	220	52.13%	202	47.87%	269	63.74%	153	36.26%	
Mand.	164	38.86%	258	61.14%	183	43.37%	239	56.63%	
N = 422				P v =0.001	N = 422				P v =0.001

**Table 4:** gender differences in the presence of IS and PS in both maxillary and mandibular arches

Arch	Gender	IS				PS			
		Present		Not		Present		Not	
Max.	boys (251)	131	52.19%	120	47.81%	176	70.12%	75	29.88%
	girls (171)	89	52.05%	82	47.95%	93	54.39%	78	45.61%
	PV= 0.977				PV= 0.001				
Mand.	boys (251)	103	41.04%	148	58.96%	109	43.43%	142	56.57%
	girls (171)	61	35.67%	110	64.33%	74	43.28%	97	56.72%
	PV= 0.267				PV= 0.975				

**Table 5:** the relation of breastfeeding duration and the presence of terminal plane relations types

Terminal plane	Duration of breastfeeding		Present(n)	%	Not (n)	%	P V
FT	No breastfeed	n=14	1	7.14	13	92.86	0.001
	0-6 months	n=106	33	31.13	73	68.87	
	6-12 months	n=201	106	52.74	95	47.26	
	More than 12 months	n=101	65	64.36	36	35.64	
DS	No breastfeed	n=14	10	71.43	4	28.57	0.001
	0-6 months	n=106	56	52.83	50	47.17	
	6-12 months	n=201	35	17.41	166	82.59	
	More than 12 months	n=101	5	4.95	96	95.05	
MS	No breastfeed	n=14	3	21.43	11	78.57	0.041
	0-6 months	n=106	17	16.04	89	83.96	
	6-12 months	n=201	60	29.85	141	70.15	
	More than 12 months	n=101	31	30.69	70	69.31	

**Table 6:** gender differences in the presence of different types of terminal plane relations.

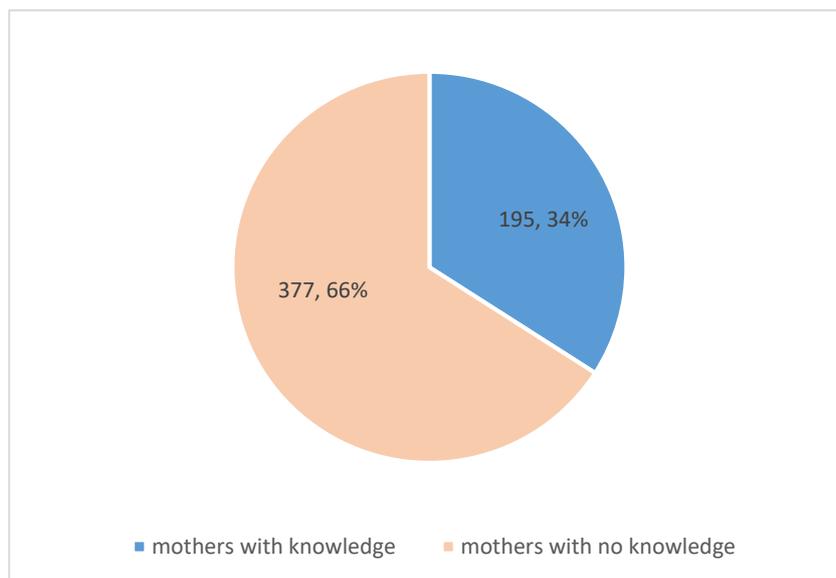
Terminal plane relations	Boys (251)	Girls (171)	P value
FT	57.37 %	35.67 %	0.001
MS	26.295 %	26.316 %	0.996
DS	16.335 %	38.012 %	0.001

**Table 7:** the association between the duration of breast feeding and the presence of ideal primary dentition overbite

Duration	Boys					Girls					
	present		Not		Total	present		Not		Total	
	N	%	N	%		N	%	N	%		
0	0	0	6	100	6	0	0	8	100	8	
1	27	56.25	21	43.75	48	30	51.72	28	48.28	58	
2	79	61.24	50	38.76	129	60	83.33	12	16.67	72	
3	53	77.94	15	22.06	68	30	90.91	3	9.09	33	
PV = 0.001						PV = 0.001					

**Table 8:** gender differences in the presence of primary dentition ideal over bite

Presence of ideal overbite		
Boys (251)	Girls (171)	P value
63.347 %	70.175 %	0.146

**Figure 1:** the level of Mother's Knowledge regarding the impact of breastfeeding on the occlusion (N=572)

## DISCUSSION

"Childhood is the mirror that reflects the propensity of adulthood" <sup>(13)</sup>. Hence, perfect permanent dentition is the sequela of ideal primary dentition.

A vast number of studies confirmed the relationships between duration of breastfeeding and the occurrence of malocclusion among different age groups <sup>(20)</sup>.

One of the diminished Islamic teachings is the breastfeeding practice. It is advisable to return it back.

The present study aimed to assess the relation between the duration of breastfeeding and the development of normal occlusal features in the primary dentition among preschool children as well as to determine the level of knowledge about this relation among their mothers in Baghdad city.

### Spaces (IS, PS)

According to the findings of the present study, highly significant difference was found between the duration of breastfeeding and the presence of IS and PS spaces in both maxillary and mandibular arches.

The presence of IS and PS spaces were greater in both of the maxillary and mandibular arches among children who breastfed more than 12 months (longer duration), however, the lowest percentage for the present of these spaces were found among children who were never breastfed.

These findings came in accordance with that found by other researchers who concluded that a short duration of breast-feeding was directly associated with space deficiency <sup>(21,22)</sup>.

On the other hand, the higher frequency of both interincisive and primate spaces was significantly present in the maxillary arch. This in agreement with the result of Im et al <sup>(23)</sup> who showed that the frequency of spacing in primary dentition was greater in the maxilla than in the mandible.

Regarding gender differences, the present study showed that there was a statistical difference concerning the present of the PS value in the maxillary arches among boys (70.12%) which was in agreement with the result of Joshi and Makhija <sup>(24)</sup> who found that the amount of spacing was greater among boys.

### Terminal plane

The present study showed that long duration of breastfeeding was significantly related to the higher frequency of flush terminal and mesial step terminal planes relationships (64.36 %, 30.69 % respectively). On the other hand, short duration of breastfeeding was associated with high frequency of distal step terminal plane (71.43 %). These findings confirmed by that reported by Nahás- Scocate et al. <sup>(25)</sup> who demonstrated the association between longer periods of breastfeeding and lower prevalence of distal step. However, Agarwal et al. <sup>(26)</sup> found no statistical significant association concerning the distal step terminal plane frequency among

children who were breastfed  $\leq 6$  months and  $\geq 6$  months which could be due to the differences between the present study and the past one in the sample size, age of children and methods by which the study was carried out.

In regards to gender, there was a significant difference in the prevalence of flush terminal and distal step with no differences in the prevalence of mesial step. These findings were in agreement with that found by Vegesna et al.<sup>(16)</sup> and Fernandes et al.<sup>(27)</sup>.

#### **Overbite**

In this study, the presence of ideal overbite presented with a highly significant difference among children who were breastfed more than 12 months for both boys (77.94 %) and girls (90.91 %). This can be explained according to Romero et al.<sup>(28)</sup> who suggested that long duration of breastfeeding could enhance proper tongue position and nose breathing that in turn apply a positive impact on the development of overbite.

There were no significant gender differences in the presence of ideal overbite. This agree with the result of Vegesna et al.<sup>(16)</sup> who found that no significance with regard to overbite in primary dentition.

#### **Mother knowledge regarding the impact of breastfeeding on the occlusion**

According to the findings of the present study, there was low level of knowledge about the impact of duration of breastfeeding on the development of normal occlusion among the mothers' children. This may be explained by the shortage of the dental health education so it is important to engage the community to increase the knowledge about the importance of breastfeeding duration to the dental health and occlusion.

### **CONCLUSION**

There is strong relationship between the duration of exclusive breastfeeding and the prevalence of normal occlusal features of primary dentition. Therefore, Exclusive breastfeeding for more than 12 months is considered as an early component of preventive orthodontics for developing normal primary dentition.

The author feel that there is a need to develop a strategic plan by dental government organization for promoting breastfeeding through media, campaign and support theme by the instructions and guidance from the Holy Quran, Hadiths and evidence based dentistry.

It is the responsibility of dental academics to develop educational programs to aware mothers, girls, and the entire community about the importance of breastfeeding in the development

of normal occlusion as a part of the third mission of university (community service).

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#### المستخلص

خلفية البحث: تعتبر سمات الإطباق الطبيعية للأسنان اللبنية ضرورية للنمو الطبيعي للأسنان الدائمة. كما تعد الرضاعة الطبيعية من العوامل المهمة لصحة الأسنان والصحة العامة للطفل. أهداف البحث: الهدف من هذه الدراسة هو تقييم تأثير مدة الرضاعة الطبيعية على انتشار السمات الإطباقية الطبيعية في الأسنان اللبنية لدى الأطفال في مرحلة ما قبل المدرسة في مدينة بغداد. المواد والطرق: بلغت العينة 630 طفلاً عراقياً (270 ذكور، 360 أنثى)، تراوحت أعمارهم بين 3-5 سنوات ضمن أربعة رياض أطفال في مدينة بغداد. وقد أجريت الدراسة من خلال الاستبيان والفحص السريري حيث تم فحص الخصائص الإطباقية كوجود أو غياب المسافات بين الأسنان، ومدى وجود العلاقات الطبيعية لأطباق الطواحن اللبنة النهائية في الفكين العلوي والسفلي ووجود أو عدم وجود العضة المثالية. وبعد ذلك تم تحليل البيانات إحصائياً بواسطة الحزمة الإحصائية للعلوم الاجتماعية (الإصدار 21). وتم استخدام مربع Chi واختبار z في تحليل البيانات. النتائج: أظهرت نتائج الدراسة وجود علاقة ذات دلالة إحصائية بين مدة الرضاعة الطبيعية ووجود المسافات بين القواطع ووجود العلاقات الطبيعية لأطباق الطواحن النهائية اللبنة بين الفكين العلوي والسفلي وكذلك وجود العضة المثالية. الاستنتاجات: فترة الرضاعة الطبيعية لها تأثير إيجابي على تطوير ميزات الإطباق الطبيعية للأسنان اللبنية. يجب بذل الجهود لتعزيز معرفة المجتمع، وخاصة الأمهات، حول هذا التأثير لتشجيعهن على ممارسة الرضاعة الطبيعية

الحصرية لأكثر من اثني عشر شهر.