

# The Impact of Feeding Pattern and Mother's Oral Health on Infant's Growth Parameters

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## ABSTRACT

**Background:** Oral health of mother in postpartum period had some effect on the growth of infants especially with breast feeding.

**Objectives:** The purpose of this study was to evaluate the effect feeding pattern and mother's oral health on infants growth parameters by using salivary growth hormone biomarker among a sample of infants in Baghdad city.

**Subject's materials and methods:** The selected sample included 110 mothers with an age range of 18-25 years from health center. Infants of the mothers with age range of 3-6 months were subjected to anthropometric measurements (weight, length and head circumference) to assess growth pattern. Ninety infants were selected for salivary growth hormone analysis, and the analysis was performed by using Enzyme-Linked Immune Sorbent Assay. Infants divided into two groups according to feeding pattern into exclusive breastfeeding and bottle feeding. Oral health status of mothers was assessed by measuring dental caries Decay1-4Missing –Filled Surface index.

**Results:** The present study demonstrates salivary growth hormone level higher in breastfeeding group than bottle feeding group with non-significant statistical result. Also the result found for all grades of caries severity

The results demonstrates that the values of weight for length, body mass index and head circumference increased in breast feeding group and the values of weight for age and length for age increased in bottle feeding, however all these differences were not-significant.

**Conclusions:**

Infant 'salivary growth variables were no significantly affected by feeding pattern and caries status of the mother.

**Key words:** Anthropometric, Nutritional status, Growth hormone, Breast feeding, Dental caries

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## INTRODUCTION

Exclusive breastfeeding (EBF) can be defined as "a practice whereby the infants receive only breast milk without mixing it with water, other liquids, tea, herbal preparations or food in the first six months of life, with the exception of vitamins, mineral supplements or medicines". The World Health Organization (WHO) recommended that infants should be exclusively breastfed for the first 6-months, followed by breastfeeding along with complementary foods for up to two years of age; also it is recommended that breastfeeding should begin within one hour after birth [1].

Breastfeeding is a dynamic biological process in which biochemical; physical, psychosocial and hormonal exchange takes place, designed for the transmission of

much needed nutrients, as well as for building a firm psychosocial bond between the infants and their mothers [2]. A mother's milk has the right amounts of fat, sugar, water, and protein that are needed for a baby's growth and development, human milk contains many immune substances, such as immunoglobulin, cytokines, growth factors and hormones. It also contains other nonspecific compounds such as specific peptides, lactoferrin and other proteins. All these compounds are transferred to the infant by breastfeeding [3].

Proper nutrition throughout infancy is required for healthy growth in which breast feeding is considered the best and ideal food for infants up to two years of age with exclusive breast feeding during the first 6 months [4], because replacing the breast milk with food at early time decreases the important nutrients in the breast milk which are required for healthy growth and put the infant under the risk of illness and may affect the growth and development of the infant. Many researchers have illustrated the protective effects of breastfeeding for both weight gain and increase BMI status at the age of three months in a large sample of children [5]. In addition, a

study in Yogyakarta also found that children who did not receive exclusive breastfeeding had a risk of stunting 1.74 times higher [6]. Studies in Surakarta in children aged 24-59 months also found a significant correlation between the incidences of stunting with non-exclusive breastfeeding, which can conclude that breastfeeding in children, is crucial in the development [7].

Stunting or failure to grow is a condition that describes underweight nutritional status during the golden period lead to impaired tooth development [8]. There is evidence that malnutrition during the vulnerable developmental stages of the tooth, especially during the early years of children can cause enamel hypoplasia, thus the teeth are more susceptible to demineralization and dental caries [9].

Growth faltering or high weight gain in early childhood influences health in the later part of life. The diet in early childhood has a strong relation with the likelihood of obesity later in life. 'Early Protein Hypothesis' reveals that lowering the protein supply through infancy helps achieve normal growth and decrease obesity in early childhood. This concept of the early protein hypothesis helps in improving the food products for children [10].

Growth hormone (GH) is a stress hormone [11]. It release in the pituitary which in turn is affected by several physiological stimulators (e.g., exercise, nutrition, sleep) and inhibitors (e.g., free fatty acids) of growth hormone secretion [12]. Feeding and sleep release and stimulate GH secretion at this early stage in infant [13].

As far as there is no previous Iraqi study concerning the effect feeding pattern and mothers oral health on infants growth parameters by using salivary growth hormone biomarker among a sample of infants in Baghdad city this study was conducted.

## MATERIALS AND METHODS

Across sectional comparative study design was used. A representative study sample size according to special statistical equation was collected. This study was conducted among pooled from mothers with age range between 18-25 years and their infants with age range between 3-6 months who attend the dental unit at the health centers of Baghdad city (Rusafa Sector) Iraq. Over period of 5 months, from March 2021, to the end of July 2021. It involved time at which biochemical analyses were carried out. An ethical approval was obtained from the ethical approval committee, College of Dentistry / University of Baghdad to perform this study. Prior to data collection, legal permission was obtained from Ministry of health (Rusafa Sector) to perform clinical examinations and questionnaire at health centers. Also a special consent form prepared and distributed to mothers to obtain permission to participate in this study.

They were assigned according to patterns of infant feeding in to breast feeding in which the Infants depended only on breastfeeding without any artificial milk or nutrient

while the other group will be the bottle feeding as the duration and time of feeding will be collected from each group. Mothers who are on contraceptive pills or other medication, pregnancy, smoking, and systemic disease were excluded from the study to avoid separate infants from their mothers and any need for artificial feeding or any drug may disturbed infant growth and mothers healthy.

For mother, oral examination were carried out under standardized condition according to the procedures of oral health surveys of World Health Organization (WHO, 1997). The dental caries of the mother was recorded using mouth mirror and dental explorer according to decayed, missing, filled index (DMFS). The severity of dental caries was according to the criteria of Manjie [14], this allows recording decayed lesion by severity.

Use Saliva Bio infants swab (SIS) for salivary collection from 45 infants in each group. Salimetrix saliva Bio swabs are made from nontoxic, inert polymer. These swabs were manufactured in longer lengths and narrower widths to allow one side of the swab to be held by parent while the other side was placed in the infant's mouth. The diameters were appropriated for the size of infant's mouth. The polymer material was durable and can withstand chewing and its taste and texture preferred to infants children [15].

Human Growth hormone (GH) ELISA Kits is going to be used to assay them on the basis of the biotin double antibody sandwich technology to measure salivary growth hormone level of infants in salivary samples. CDC/NCHS Infant Growth Percentiles (<36 months) were used to assess the growth of the infant by measuring the weight, length, and head circumference [16].

Data description, analysis and presentation were performed using Statistical Package for social Science (SPSS version 21) as the descriptive and inferential test was used.

## RESULTS

Salivary growth hormone level (pg/ml) in infant of breastfeeding and bottle feeding is shown in Table 1 the data demonstrated that the salivary growth hormone level was higher in breastfeeding than bottle feeding with non-significant statistical result.

Table 2 illustrates the mean value of salivary growth hormone of infants with caries severity of mothers in relation to feeding pattern. Data analysis showed that the level of salivary growth hormones was more among breast feeding infants than bottle feeding for all grades of caries severity. Table 3 shows that the salivary growth hormone decrease with increasing severity of dental caries for breastfeeding groups except the mild severity for bottle feeding infants as it was less than severe grade of dental caries, however all these differences were not significant.

Table 4 illustrates the mean value of z score for growth

Table 1: Salivary growth hormone for infants by feeding pattern.

	Feeding pattern				T test	P value
	Breast feeding		Bottle feeding			
	Mean	SE	Mean	SE		
Salivary growth hormone (pg/ml)	0.28	0.07	0.23	0.07	0.53	0.596 NS

Table 2: Infants Salivary growth hormone by caries severity of mother in relation to feeding pattern.

Caries severity	Feeding pattern				T test	P value
	Breast feeding		Bottle feeding			
	Mean	±SE	Mean	±SE		
0-16 (Mild	0.47	0.19	0.28	0.12	0.87	0.39
17-26 (Moderate	0.21	0.06	0.15	0.04	0.79	0.44
>=27 (Severe)	0.2	0.1	0.19	0.06	0.06	0.95
not significant at p>0.05						

not significant at p&gt;0.05

Table 3: Z-Score (mean ± SE) of growth measurements (weight-for-length, length-for-age, weight-for-age, body mass index and head circumference-for-age) in relation to feeding pattern.

	Feeding pattern				T test	P value
	Breastfeeding		Bottle-feeding			
	Mean	±SE	Mean	±SE		
weight-for-length	-0.25	0.17	-0.35	0.18	0.4	0.69
length-for-age	-0.55	0.16	-0.3	0.2	0.92	0.36
weight-for-age	-0.62	0.16	-0.54	0.17	0.35	0.73
body mass index	-0.43	0.17	-0.49	0.17	0.26	0.8
head circumference	-0.07	0.15	-0.28	0.15	1.58	0.12

not significant at p&gt;0.05

Table 4: Z-score (mean ±SE) of growth measurements (Weight-for-length, length-for-age, weight for , Body Mass Index and head circumference-for-age) in relation to caries severity of mother by feeding pattern.

Caries severity		Feeding pattern				T test	P value
		Breast feeding		Bottle feeding			
		Mean	±SE	Mean	±SE		
0-16 (Mild)	Weight-for-length	-0.23	0.36	-0.52	0.26	0.6	0.552
	Length-for-age	-0.58	0.31	-0.26	0.28	0.62	0.54
	Weight-for-age	-0.63	0.22	-0.63	0.26	0.01	0.996
	Body Mass Index	-0.41	0.3	-0.64	0.24	0.52	0.608
	Head circumference	-0.3	0.21	0.18	0.18	1.47	0.148
17-26 (Moderate)	Weight-for-length	-0.22	0.31	-0.15	0.43	0.13	0.894
	Length-for-age	-0.71	0.29	-0.88	0.42	0.33	0.743
	Weight-for-age	-0.73	0.3	-0.85	0.22	0.29	0.777
	Body Mass Index	-0.44	0.3	-0.46	0.33	0.02	0.983
	Head circumference	-0.03	0.26	-0.09	0.37	0.13	0.897
>=27 (severe)	Weight-for-length	-0.28	0.24	0.01	0.22	0.86	0.398
	Length-for-age	-0.34	0.24	0.07	0.39	0.93	0.359
	Weight-for-age	-0.49	0.29	-0.02	0.23	1.25	0.22
	Body Mass Index	-0.41	0.26	-0.06	0.22	1.03	0.313
	Head circumference	0.08	0.3	0.87	0.38	1.65	0.111

not significant at p&gt;0.05

indices of infants with caries severity of mothers in relation to feeding pattern. Data analysis showed that in mothers with mild caries severity the mean value of weight for height and BMI were higher in breast feeding infants than in bottle feeding infants, while in mothers with moderate caries severity the mean values of all anthropometric measurement were higher in breast feeding infants than in bottle feeding infants except weight for height was more in bottle feeding infants, but in mothers with severe caries all anthropometric measurement higher in bottle feeding infants than in

breast feeding infants, however all these data were not significant.

## DISCUSSION

In the current study the results revealed that although the differences salivary growth hormone level higher in breastfeeding group than in bottle feeding group with non-significant difference, this result disagree with results of previous study that showed the breastfeeding children follow a different growth pattern than bottle

feeding children. As breastfeeding lowers the levels of the growth hormones IGF-I in the blood, which means that growth is slightly slower. This is believed to reduce the risk of overweight later in life [17]. In addition the current study showed that the differences in all nutritional status indicators were not significant between breast and bottle feeding this result agree with Hussein that found no significant association between infant feeding with length for age Z-score. This results is dissimilar to the result of Hussein [18] that showed the length for age percentiles was statistically significantly differ among infant with different feeding pattern. Also disagree with Hussain who reported that infants who were breast fed had lower rate of overweight they attributed to that the bottle infants consume more milk and gain body weight more rapidly than breastfed infants, and prone to a higher obesity risk [19]. It is mentioned by Butte [20] that the epidemiological studies have identified several risk factors for childhood obesity, including infant-feeding practices. Breastfeeding appears to have a small but consistent protective effect against childhood obesity [21].

### CONCLUSION

Growth hormone higher in breastfeeding group than bottle feeding group.

Caries experience showed higher mean values mothers with breast feeding concerning all component of decayed, missing, and filled surfaces index, while caries severity was higher among mothers with breastfeeding respect to grade 2 and 3.

The percentage of infants with normal growth measurements (Weight-for-length, length-for-age, head circumference-for-age) was higher mothers with breastfeeding non-significant differences statistically.

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