



## Impact of Human Milk Interleukin 6 in Lactating Mothers with Chronic Periodontitis on Infants Growth

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### ABSTRACT

**Background:** Chronic periodontitis is a multifactorial disease which has several promoting effect on general health and when the lactating mothers are affected the cytokines associated with it is secreted in milk that had a severe effect on the health of the infant. Interleukin-6 is an anti-inflammatory and pro-inflammatory cytokine with extensive range as a biological mediator in chronic inflammation of periodontal disease; its elevation had an effect on infant growth. The purpose of the present study was to assess the effect of interleukin-6 in human milk on infant's growth. **Materials and methods:** A comparative study includes lactating mothers with age range 30-40 years and their infants with age range 3-12 months. The study group includes mothers with chronic periodontitis and the control group includes 45 mothers with healthy periodontium. Milk interleukin-6 is measured in lactating mothers by using the enzyme-linked immune sorbent assay (ELISA). Infant growth was recorded according to CDC growth charts and National Health and Nutrition Examination Surveys in 2007. **Results:** The results show mothers with chronic periodontitis have a higher level of milk IL6 than mothers with healthy periodontium; the result was statistically highly significant, even though the result of the effect of milk IL6 on infant's growth wasn't significant statistically. **Conclusion:** Mothers with chronic periodontitis have a higher level of milk IL6 than mothers with healthy periodontium. High level of proinflammatory milk IL6 will effect infant growth and result in retardation of normal infant growth like underweight, overweight and short stature infants. High level of milk interleukin 6 in mothers with chronic periodontitis could influence negatively on their infant's growth.

**Keywords:** Milk interleukin 6, Lactating mothers, Chronic periodontitis, Infant growth

### INTRODUCTION

Periodontitis is an oral infection produced by many types of oral microorganisms [1]. Oral bacteria are important for periodontal disease to take place, also susceptible host is very important, inflammatory response either hypo responsive or hyper responsive that result in soft tissue inflammation, pocket formation and finally bone destruction and tooth loss [2].

Interleukin-6 (IL-6) is a very important mediator to control the acute phase of the response. It is an indicator of any inflammation within the body; it is cytokine with a high range of biological activities [3]. IL6 produced by macrophage and monocyte after stimulation of toll like receptor by pathogen related molecular pattern play an important role in inflammation which is essential for chronic periodontitis [4]. Cytokine produces bone destruction and bone loss [5].

Human breast milk is a natural method for infant feeding and it is superior and very specific for infant growth [6]. Breast feeding is essential for the infant's growth, development, and health [7]. Human breast milk contains the right amount of water, fat, protein and sugar, and all these content are essential for infant growth and development [8].

Infant growth is affected by multiple factors like hormonal, maternal, environmental and genetic factor all these factors affect directly on the result of infant growth [9]. Intrauterine growth especially if it is slow will effect later on infant growth and result in multiple risk disease like type 2 diabetes, hypertension and finally coronary heart disease [10]. Growth assessment of children at a population level means estimating the prevalence of undernourishment,

overweight is very important for pediatrics care to understand the difference between the population and its effect later on life [11].

This is an Iraqi study concerning the effect of IL6 secreted in breast milk among lactating mother which result in chronic periodontics on the growth of their infant, this study was conducted and the result provides information about the negative impact of periodontal disease on the growth of the infant. The purpose of the present study was to assess the level of IL6 in the milk of a lactating mother with chronic periodontitis on the growth status of the infant in comparison with mothers with healthy periodontium or had mild periodontitis.

#### **PATIENTS AND METHODS**

The selected sample was composed of lactating mothers aged 30-40 years. Total 45 mothers with chronic periodontitis (discussed below) and 45 mothers with healthy periodontium were included in the study. The participants were informed about the aim of the study and were freely allowed to accept the examination. Informed consent and ethical approval had been obtained. The participants were selected and examined in health centers of Diyala Governorate. Exclusion criteria involved mothers who were on contraceptive pills or other medications, pregnancy, smoking, and systemic diseases. At least 3 ml of milk in total should be collected by hand expression after a feeding or while the infant is nursing on the other breast. The collected samples were preserved by freezing at -20°C directly after centrifugation. IL6 was measured in lactating mothers by Enzyme-linked immune sorbent assay (ELISA).

According to the World Health Organization, the oral examination was done for the study and the control group of lactating mothers [12]. The pocket depth was measured using calibrated periodontal probes (William's probes) at 4 surfaces of all examined teeth except the third molars. The sites for measurements were mid-buccal, mid-palatal, mesiobuccal and distobuccal lines. A scale was used for ease of estimation as for study group must be within score 1, 2 or 3 while the control group must be with score 0 (normal depth).

- Score 0: 1-3 mm
- Score 1: >3-5 mm
- Score 2: >5-7 mm
- Score 3: >7 mm

The attachment loss was measured by using the periodontal probe at 4 sites for all examined teeth except the third molar by:

1. Estimating the distance from the free gingival margin to the cemento-enamel junction
  2. Estimating the distance from free gingival margin to the bottom of the sulcus or pocket at each site. The interproximal recording should be secured at the buccal aspect of the interproximal contact
  3. The attachment loss was obtained from subtracting the first measurement from the second one
  4. The recession was recorded as a negative value that means the attachment loss was obtained from adding the first measurement to the second one. A scale was used for ease of estimation for the study group only as the control group must be absent from attachment loss
- Score 1: 1 mm
  - Score 2: >3-5 mm
  - Score 3: >5-7 mm
  - Score 4: >7 mm

Infant growth measured was recorded according to the National Health and Nutrition Examination Surveys and by using the CDC which is a national reference that is used to assess physical growth among infants from birth to 36 months [13,14].

#### **RESULTS**

The participants of the study were composed of 45 mothers with chronic periodontitis and 45 mothers with healthy

periodontium. The data of the current study revealed a statistically significant difference in mean values of milk interleukin 6 among study and control group of mothers as shown in Table 1.

**Table 1 Milk interleukin 6 level (pg/ml) (mean  $\pm$  SE) in study and control group of mothers**

Groups	Mean	$\pm$ SE	T-test	df	p-value
Study	5.20	0.08	2.01	47.64	0.000*
Control	2.99	0.01			

The percentage of weight/length status according to anthropometric index in control and study group of the mothers is shown in Table 2.

**Table 2 Distribution of infant according to weight for length status among study and control group**

Weight for length status	Sample		F.E.P.T*	df	p-value
	Control	Study			
Underweight (<5 percentile)	N	5	1.33	2.00	0.57
	%	41.66%			
	Total (%)	5.00%			
Normal weight (5-95percentile)	N	31			
	%	50.00%			
	Total (%)	31.00%			
Overweight (>95 percentile)	N	9			
	%	56.25%			
	Total (%)	9.00%			

Although the results showed no significant association between the weight/length status with regard to periodontal condition for the study and control group is shown in Table 3, but the occurrence of underweight was higher among the study group. Concerning length/age, the percentage of infants with short stature among study group mothers was higher than those of control group mothers. However, no significant statistical association was found between the samples (study and control group of mothers) and the length status of the infants.

**Table 3 Distribution of the infant according to length for age status among study and control group**

Length for age status	Study group	Control group	F.E.P.T*	df	p-value
Short stature (<5 percentile)	N	3	0.570	1.000	0.501
	%	75.00%			
	Total (%)	3.00%			
Normal stature (5-95 percentile)	N	42			
	%	48.83%			
	Total (%)	42.00%			

## DISCUSSION

Since there were no previous available Iraqi studies concerning the relationship between IL6 in human milk, periodontal health status, and infant growth, this study was conducted to investigate the impact of periodontal health of lactating mothers on their infant growth. Periodontal disease is a bacterial infection which produces chronic inflammation and results in the pathological pocket, bone destruction and finally teeth loss [15]. This agrees with the present study as the milk IL6 was higher among the group with chronic periodontitis.

The growth of infants was affected by multiple factors but the most important one was the maternal factor [9]. Many causes for growth failure in infants was due to exposure to chronic inflammatory illness [16]. In chronic inflammation, there is an up regulation for cytokines which results in bone destruction [17]. Some extent in the present study, the occurrence of underweight and short stature infants were higher among the group with chronic periodontitis.

## CONCLUSION

IL6 in human milk of lactating mothers with chronic periodontitis influences the infant growth, so motivation and instruction for oral hygiene of lactating mothers would allow improving the oral health of the mothers and improving their infant's growth.

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**DECLARATIONS****Conflict of Interest**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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