

The Impact of Feeding Pattern and Mother's Gingival Health on Infant's Salivary Oxytocin in Relation to Postpartum Depression Status

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ABSTRACT

Background: Feeding pattern of infant earlier found to be associated with bonding status with mother as their gingival health had some effect on this relation that associated with depression status of mother. The purpose of this in study was to evaluate the effect feeding pattern and mother's gingival health in relation to postpartum depression on infants bonding by using salivary oxytocin biomarker among a sample of infants in Baghdad city.

Materials and methods: The selected sample included 46 mothers with breast feeding and 44 mothers with bottle feeding with an age range of 18-25 years with their infants aged 3-6 months. They were divided according to feeding pattern in breast feeding and bottle group. All samples were subjected to postpartum depression questionnaire. Mother gingival health was measured by using gingival index of loe and Silness in 1963 while oral hygiene status by using dental plaque index of loe in 1967. Ninety infant were selected for salivary oxytocin analysis, and the analysis was performed by using Enzyme-Linked Immune Sorbent Assay.

Results: The data of present study revealed that among mother with healthy gingiva and moderate grade of gingivitis the salivary oxytocin level were non significantly higher among breast feeding infant than bottle feeding. Data revealed that the percentage of mothers with postpartum depression were less among breastfeeding mother with significant association between depression status and feeding pattern. However the mean value of salivary oxytocin hormone of infants was non-significantly higher in breast feeding group for both depressed and non-depressed group.

Conclusions: The postpartum depression occur less among breast feeding mother that their infant showed a non-significantly higher oxytocin level while the gingival health of mothers shown a non-significant effect on salivary oxytocin of infants.

Key words: Feeding type, Breast feeding, Gingivitis, Oxytocin, Postpartum depression

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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 [1]. A mother's milk has the right amounts of fat, sugar, water, and protein that is needed for a baby's growth and development, human milk contains several immune substances, such as immunoglobulin, cytokines and chemokines, growth

factors, hormones, and antibodies. All these components are transferred to the infant through breastfeeding [2]. Human milk contains many of hormones and growth factors and it also contains small amounts of oxytocin which is the most biological marker associated with maternal bonding. Sucking, in new born is associated with infant oxytocin release [3]. Oxytocin (OT) can be defined as a Nona peptide hormone and a neurochemical mediator that is made by the paraventricular and supraoptic nucleus of the hypothalamus in the brain [4]. Breastfeeding women are at a higher risk concerning orodental health compared to their peers due to different reasons. The rate of dental caries and gingival problems, including periodontitis, increase due to hormonal changes, changes in dietary habits and changes in the oral cavity pH, buffering capacity, concentrations of immunoglobulins and electrolytes, hormonal changes, among other factors [5,6]. The study showed that the mean values of probing

pocket depth and clinical attachment loss were higher among depressed mothers [7].

Both lay and academic literature end to favour breastfeeding as a vehicle for promoting maternal bonding and care. Indeed, breastfeeding naturally supplies the opportunity for skin to skin contact and thus in theory should encourage affiliative emotions and while the conceptualization of bonding has since evolved [8,9].

Postpartum depression is a common and serious mental health problem. It may begin at any time during the first 12 months after delivery. Risk factors for postpartum depression include: decrease level of education, absence of partner or relative support, infant health disorder, history of abortion and medical or surgical history. Postpartum depression can have a negative effect on the mother's health of life, in the form of intimate relationship with her husband, the attachment between the mother and her infant, infant bond and child developmental outcomes from infancy until school age [10]. According to postpartum progress, not only does the issue with a milk let-down affect a woman suffering from Postpartum Depression (PPD), but she also has a difficult time bonding with her baby, making her depression even more debilitating [11].

As far as, there is no previous Iraqi study evaluate the impact of feeding pattern and mother's gingival health in relation to postpartum depression on infants bonding by using salivary oxytocin biomarker this study was conducted in order to assess the impact of feeding pattern and mother's gingival health infants salivary oxytocin in relation to postpartum depression status.

MATERIALS AND METHODS

This is cross sectional comparative study designed to pool mothers with age range between 18-25 years and their infants with age range 3-6 months who attend medical health care centres of Baghdad city (Rusafa Sector) 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 centres also a special consent form prepared and distributed to mothers to obtain permission to participate 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 will be excluded from the study in order to avoid any treatment may separate

infants from their mothers and any need for artificial feeding or any drug may disturbed infant growth and mothers healthy.

Saliva bio Infants Swab (SIS) was used for saliva collection from infants in breast and bottle feeding groups [12]. Human Oxytocin (OT) ELISA Kit (96 test) was be used on the basis of the biotin double antibody sandwich technology to measure salivary oxytocin hormone level of infants in salivary samples. For mother, oral examination was carried out under standardized conditions according to the basic methods of oral health surveys of World Health Organization (WHO) the oral variables include oral hygiene status by using dental plaque index, gingival health status by using the gingival index [13].

Depression was measured by self-descriptive questionnaires used to assess postnatal depression. As a measure of depression, the Edinburgh Postnatal Depression Scale (EPDS) was used. The EPDS is a ten items questionnaire rated on a four-point scale (0 to 3). The mother draws a line under word which of the four possible responses is closest to how she has been feeling during the last week. The mothers finish the scale without difficulty in lower than five minutes. Care should be taken to abolish the possibility of the mother discussing her answers with others. The scale will not detect mothers with anxiety neuroses, phobias or personality disorders. All 10 items must be completed. Responses are scored 0, 1, 2 and 3 depend on the seriousness of the symptom. Items 3, 5 to 10 are reverse scored (*i.e.*, 3, 2, 1, and 0). The total score is found by adding together the scores for each of the 10 items. Mothers scoring over 12 or 13 are likely to be suffering from depression and should research medical attention [14].

Additional confirmation for the validity and reliability was done. The validity of the questionnaire was achieved after presenting the questionnaire to expert in the field of psychology for judgment of its validity. Correlation of item score with total score of scale (Item validity).

It is method that is used in the analysis which expresses the extent of validity of the item, by finding the correlation coefficient between the score of each item and the total score in the test, as the total score reflects what the test actually measures, and the significance of validity of items of the hyperactivity and inattentive scale had been verified [15]. To achieve that the researcher used Pearson correlation, when correlating the values of the correlation with a value Pearson correlation coefficient of (0.20) at (0.05) and freedom (108) showed that all correlations are statistically significant and Table 1 illustrates that.

Table 1: Statistical analysis of the items of the scale of postpartum depression to the total degree.

Item	Correlation Coefficient	significant	Item	Correlation Coefficient	significant
1	0.51	significant	6	0.66	significant
2	0.42	significant	7	0.67	significant
3	0.62	significant	8	0.7	significant
4	0.61	significant	9	0.75	significant
5	0.73	significant	10	0.51	significant

Reliability: The concept of the reliability of test scores means that they are free from irregular errors in measurement. Reliability in this sense means consistency or accuracy in measurement. The researcher has verified the stability of the scale of postpartum depression in way Alpha Cronbach, by relying on the overall sample data and the coefficient of reliability by this method was (0.83).

Data description, analysis and presentation were performed using Statistical Package for social Science (SPSS version 21, Chicago, Illionis, USA). P value was considered significant if it's less than or equal to 0.05 otherwise it considered not significant.

Table 2: Infants salivary oxytocin by feeding pattern.

	Feeding pattern						P value	
	Breast feeding			Bottle feeding				
	N	Mean	SE	N	Mean	SE		T test
Salivary Oxytocin ng/ml	46	8.55	1.57	44	7.38	1.18	0.59	0.557

Mean value of salivary oxytocin hormone for infants by gingival health condition of mother in relation to feeding pattern is illustrated in Table 3. Data revealed that among mother with healthy gingiva and moderate grade of

RESULTS

A subsamples was selected randomly (46 from the breastfeeding group and 44 from bottle feeding group) from the whole sample (110 mothers), salivary sample were collected from them for biochemical analysis Table 2. Shows the mean value of salivary oxytocin hormone of infants in breast feeding and bottle feeding group, the result showed that it was higher in breast feeding group than bottle feeding group with non-significant statistical result.

gingivitis the salivary oxytocin level were higher among breast feeding infant than bottle feeding. While it was lower in breast feeding group than bottle feeding group among mothers with mild gingival index, however all these differences were not significant?

Table 3: Infants salivary oxytocin by gingival health condition of mother in relation to feeding pattern.

GIS	Feeding	Feeding pattern										P value ^
		Breast				Bottle				T	df	
		N	Mean	± SD	± SE	N	Mean	± SD	± SE			
Healthy-Mild (0-1)	Oxytocin	35	6.33	5.89	1	34	7.77	8.72	1.5	0.81	67	0.42
Moderate (1.1-2)	ng/ml	11	15.6	17.86	5.39	10	6.06	3.48	1.1	1.74	10.83	0.11

The results demonstrates the percentage of mothers with postpartum depression were less for breastfeeding than

bottle feeding and there's significant association between depression status and feeding pattern, as shown in Table 4.

Table 4: Distribution of samples according to postpartum depression status.

Variable	Category	Feeding pattern				P value
		Breastfeeding		bottle feeding		
		N.	%	N.	%	
Depression	Yes	9	18.75	47	75.81	0.000*
	No	39	81.25	15	24.19	

*significant at $p \leq 0.05$

Mean values of infant's salivary oxytocin by depression status of mother for both feeding type described in Table 5. The data revealed that the level of salivary oxytocin in

breast feeding group was more than in bottle feeding group in both depressed and non-depressed mothers, all differences were not significant the same table shows

that among breast feeding group the level of infant mother than depressed however opposite result found salivary oxytocin was higher among non-depressed concerning bottle feeding group.

Table 5: Infants salivary oxytocin by depression status of mother in relation to feeding pattern.

Depression	Feeding pattern ^						T test	df	P value
	Breast feeding			Bottle feeding					
	N	Mean	± SD	N	Mean	±SD			
Yes	9	7.65	9.37	38	7.39	8.02	0.08	45	0.94
No	37	8.77	11.03	6	7.31	7.23	0.31	41	0.76

The data revealed among depressed and non-depressed mothers the mean values plaque index and gingival index were higher among breast feeding than bottle feeding group. The differences were not significant except plaque index in non-depressed mothers it was significant Table 6.

Table 6: Plaque and gingival indices of mothers by depression status according to feeding pattern.

Depression		Feeding pattern				T	df	P value
		Breast feeding		Bottle feeding				
		Mean	± SE	Mean	± SE			
Yes	Gingival index	0.9	0.16	0.82	0.06	0.49	54	0.62
	Plaque index	10.99	0.26	10.8	0.23	0.36	54	0.72
No	Gingival index	0.62	0.07	0.37	0.13	1.86	52	0.07
	Plaque index	1.57	0.1	1.16	0.15	2.28	52	0.03*

*significant at $p \leq 0.05$

DISCUSSION

The role of oxytocin in the social bonding may be the dynamic biological properties of the bonds that create the ring in oxytocin and that allow the oxytocin molecule to form temporary and long-lasting unions with other chemical entities [17]. The current study showed that the mean value of salivary oxytocin hormone of infants was higher in breast feeding group than bottle feeding group with non-significant statistical results. This disagrees with Kim, et al. [18]. Who stated that the development of bonding relationship is affected by the pattern of feeding?

The current study demonstrated that the percentages of mothers with postpartum depression were less for breastfeeding than bottle feeding and there's significant association between depression status and feeding pattern. This come in agreement with previous study that found the depressed mothers were less frequently breast feed their infants and experienced decline in oxytocin levels [19]. In addition to that mothers with depression have infants with more admission to hospitals, emergency situations, and fewer check-up visits than mother without depression [20] which might influence the infants' physical health among infants of poor maternal bonding status and causes chronic health problems [21]. Additionally, mothers who are depressed are more possible to experience a less healthy lifestyle and to engage in less healthy feeding and sleep practices with their infants [22,23]. However the depression status affect oral hygiene as among non-depressed mother the breast feed mother had significantly higher plaque index than bottle feeding mother this could be that the breast

fed mother had less healthy lifestyle as they were more bonded with her infant that also shown by a higher oxytocin level among their infant [24-26]. However although the plaque index was higher but the gingival index was not significantly differ among them this indicate a higher immunity among them. While among depressed mother other picture was found as the no significant difference for both plaque and gingival index this could be explained by the depression affect more on oral health.

CONCLUSION

The gingival health of mothers had no effect on salivary oxytocin of infants while the feeding pattern affect the depression status as the breast feeding mother with significantly less occurrence of depression on the same time depression status affect the oral hygiene related to feeding pattern.

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