Dental caries and salivary Interleukin-6 among preterm postpartum women in relation to baby birth weight (Comparative study)

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ABSTRACT

Background: The physiologic, biochemical and anatomic changes that occur during pregnancy are extensive and may be systemic or local. However, most of these changes return to pre pregnancy status six weeks postpartum. The aim of the study was to investigate the effect of dental caries among preterm postpartum women and it's relation to baby birth weight and salivary interleukin-6 (IL-6).

Materials and methods: 66 postpartum women were examined, 33 preterm postpartum women (study group) and 33 full term postpartum women (control group). Dental caries was recorded using, decayed, missing and filled surfaces index, also assess the decayed lesion by severity. Salivary samples were taken from all subjects to estimate salivary IL-6 levels. Babies' birth weight also was measured.

Results: Data of the present study showed a higher caries severity among study group compared to control group, with no statistically significant difference (P> 0.05). For both groups, the initial decayed surface D_2 was the lightest value for both groups. While the deep frank cavitations D_4 was the lowest in study group with no data recording among control group. The result revealed highly significant difference in baby birth weight between the two groups. The correlation between DS and salivary IL-6 was highly significant, and a significant correlation noticed between D_3 and salivary IL-6 in study group. In control group, a highly significant positive correlation was detected between baby birth weight and DMFS, and a significant correlation was obscured between baby birth weight with decayed surface, also a significant correlation was found between salivary IL-6 and decayed surface in the same group.

Conclusion: During pregnancy, a woman may be particularly amenable to disease prevention and health promotion interventions that could enhance her oral health on that of her infant's, due to the potential associations between oral health and preterm delivery and baby birth weight.

Keywords; Dental caries, salivary IL-6, preterm postpartum women, baby birth weight. (J Bagh Coll Dentistry 2013; 25(Special Issue 1):174-177).

INTRODUCTION

Dental caries is an infections micro biological disease that results in localized dissolution and destruction of the calcified tissue of teeth [1]. Dental calcium is present in a stable crystalline form and is not mobilized during pregnancy to supply fetal demand as in bone calcium, since no histological evidence that calcium can be removed from erupted teeth during pregnancy was reported [2].

Hill et al [3] proposed that oral bacteria might reach aminotic fluid and influence foetuses via haematogenous spread, giving rise to suspicious that chronic inflammatory processes in the oral cavity such as periodontitis might influence pregnancy. So, this association must be further explored in observational and intervention studies to establish whether it is causal in nature or incidental and to determine the possible benefits of intervention and the potential to generalize the finding in diverse populations. In Iraq, some studies regarding the assessment of dental carries among pregnant women were reported [4-7].

Yet, no previous studies were established to found the relation between dental caries and salivary IL-6 among preterm postpartum women with baby birth weight, so for this reason this study was designed.

MATERIALS AND METHODS

Dental caries was recorded from 66 postpartum women with an age rang at 20-25 year old, 33 preterm postpartum women (study group PPW) and 33 full term postpartum women (control group FPW), selected from the different maternity wards in Baghdad. Dental caries was recorded by using decayed, missing and filled surfaces index according to the criteria described by world health organization 1987 [8] and D_{1-4} criteria by Muhelmman [9] to assess the severity of decayed lesion. Saliva samples were collected from all samples and collected in plastic tubes after stimulation by chewing Arabic gums, then centrifuged at 4000 rpm for 30 minutes, the clear supernatant was separated by micro pipette, stored at ($-20°$C) in a deep freeze till being assessed. The expected day of delivery (EDD) was calculated by counting back 3 months and adding 7 days to the first day of last menstrual period [10]. Baby weight was measured by taking the baby with his light cloths and the weight was measured carefully.

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Mean and standard deviation (SD) were calculated. Spearman`s correlation coefficient and Student`s t-test were used for statistical analysis, at level of significance 0.05.

RESULTS

Table (1) demonstrates the mean values of DMFS index and by the fractions among both groups. It showed that the mean values of DS, MS, FS and DMFS were higher among preterm postpartum women (PPW) than that among full term postpartum women (FPW) with no statistically significant difference (P > 0.05). The mean values of dental caries by grades of lesion severity (D_{1-4}) were illustrated in Table (2). The PPW had a higher grade of (D_{1-4}) than that of control group, statistically no significant difference was found between the two groups. Table (3) shows the mean and SD of baby birth weight (BBW) among the two groups. A highly significant difference was noticed between them. The correlation coefficient between BBW and salivary IL-6 is seen in Table (4). It is cleared that a weak negative correlation was found between salivary IL-6 and BBW in study group, while among control group it was weak positive correlation. However, statistically this correlations were recorded to be not significant (P>0.05).

Tables (5 and 6) show the correlation between salivary IL-6 and BBW with dental caries severity among both groups. A highly significant positive correlation was detected between salivary IL-6 and DS, also a significant positive correlation was noticed between salivary IL-6 and D_3. On the other hand, the relation between BBW and (DS, MS, DMFS, D_1, D_2 and D_3), and between salivary IL-6 with MS and D_1, were weak negative correlation. But the correlation between BBW with FS and D_4 and between salivary IL-6 with DMFS, D_2 and D_4, were weak positive correlation. While the correlation between salivary IL-6 and FS was strong negative correlation. All these correlations statistically were not significant (P>0.05). It could be noticed that a highly significant positive correlation was observed between BBW and DMFS, also a significant correlation were noticed between BBW and salivary IL-6 with DS. On the other hand, weak negative correlations were detected between salivary IL-6 with MS and FS and between BBW with FS, D_1 and D_3. While the relation between BBW with MS and D_2 were weak positive correlations, and the same between salivary IL-6 with DMFS, D_1, D_2 and D_3.

DISCUSSION

Caries is a multifactorial disease; it is a complicated process depends on many factors [11, 12]. Result of the present study showed that (PPW) had a higher caries intensity (DMFS) than that among control group, but the difference was statistically not significant. For both groups, decated surface (DS) was the major component of DMFS index followed by (MS) then filled surface (FS). This indicates that those women received less dental care during their pregnancy and that they had a more caries teeth and even when treatment was applied it was directed toward tooth extraction rather than conserving the tooth. This might had to the popular notions that pregnancy leads to tooth loss ("a tooth for every pregnancy") [6, 13]. No statistically significant difference was observed between both groups regarding DMFS mean value. This might be attributed to the accumulative nature of dental caries. So, no difference between women who deliver preterm and full term. This result agrees with Buduneli et al study [14], in which no statistically significant difference among study and control groups regarding number of teeth mean value and number of teeth with restoration mean value. In this study, the initial decayed surfaces (D_2) were found to be the highest, while frank cavitation (D_4) was the lowest in occurrence among both groups with no statistically significant difference was found between the two groups. This is due to that dental caries is a chronic disease; it may need years to progress, unfortunately, no previous studies were available to compare with, therefore, further studies are needed regarding preterm delivery in relation to dental caries.

Highly significant difference was found in BBW between study and control groups. This result could be attributed to the fact that low birth weight is very closely related to preterm birth as it is estimated that approximately 50% of preterm infants weight less than 2500 g, whereas only 2% of full term infant's weight below that threshold [15]. Also babies are born with a wide range of birth weight, while those born prematurely are more likely to be low birth weight [10, 16, 17]. The present study improved that in the study group a negative correlation was detected between BBW and salivary IL-6, this result may due to produce of mean inflammatory cytokines, although produced with the intention to compact the infection, also may cause tissue destruction. Because the structural integrity of the placenta is vital for the normal exchange of nutrients between the fetus and the mother, this placenta tissue damage contribute to impaired fetal growth could lead to LBW [18-20].

From other side, the relation between BBW and DMFS was positive and highly significant for the second group, this could be explained by, the second group as documented [21] pregnancy may be accompanied by increased dental caries incidence, this is due to that, the number of certain salivary cariogenic microorganisms as *Streptococcus mutans* and *Lactobacilli* may increase during pregnancy, concurrently with a decrease in salivary pH and buffer effect which may predispose to tooth decay [4, 22, 23]. Also alterations in the psychology, behavior with a tendency toward decreased of personal care have been confirmed during pregnancy [24]. Furthermore, increased appetite and craving for unbalanced meal with frequent snacking on candy or other decayed- promoting diet all are sharing in placing pregnant women at high risk towered developing dental caries, also will increase pregnant weight gain and this will lead to increase BBW [10, 17, 25]. Any infection that may cause chorioaminonitis resulting in increase cytokine and prostaglandin levels in the aminotic fluid leads to premature rupture and the initiation of birth [18, 19, 20]. Highly significant correlation was found between salivary IL-6 and DS among study group which was higher than that seen in control group which was a significant correlation also, a significant correlation was found between salivary IL-6 and D_3 among study group which was also higher than that seen among control group which was a positive correlation. Unfortunately, no previous studies were available to compare with. Therefore further studies regarding these variables are needed.

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Table 1: Caries severity DMFS and its components among preterm and full term groups.

Groups	DS Mean ± SD	Sig.	MS Mean ± SD	Sig.	FS Mean ± SD	Sig.	DMFS Mean ± SD	Sig.
Preterm	6.585 5.52	N.S.	6.79 12.62	N.S.	0.97 1.99	N.S.	14.70 14.02	N.S.
Full term	5.94 4.80		5.30 9.51		0.58 1.41		11.79 10.46	

Table 2: Decayed surfaces by severity among preterm and full term groups

Groups	D_1 Mean ± SD	Sig.	D_2 Mean ± SD	Sig.	D_3 Mean ± SD	Sig.	D_4 Mean ± SD	Sig.
Preterm	2.58 2.62	N.S.	3.82 3.17	N.S.	1.88 2.97	N.S.	0.18 0.77	N.S.
Full term	2.70 2.26		3.15 2.74		1.21 2.76		0.00 0.00	

Table 3: Baby birth weight among preterm and full term groups

Groups	BBW (Gram) Mean ± SD	Sig.
Preterm	1848.48 371.75	t =16.72*
Full term	3284.85 324.39	

*P< 0.01, d.f = 64

Table 4: Correlation coefficient between salivary IL- 6 and baby birth weight among preterm and full term groups

Groups		BBW
Preterm	Salivary IL-6	r = - 0.03 p = 0.83
Full term	Salivary IL-6	r = + 0.02 p = 0.88

Table 5: Correlation coefficient between caries severity and salivary IL-6 and baby birth weight among preterm group

	Salivary IL - 6	BBW
DS	r = + 0.44** p = 0.009	r = - 0.12 p = 0.49
MS	r = - 0.12 p = 0.48	r = - 0.10 p = 0.55
FS	r = - 0.89 p = 0.62	r = + 0.22 p = 0.21
DMFS	r = + 0.15 p = 0.38	r = + 0.11 p = 0.53
D_1	r = - 0.08 p = 0.62	r = - 0.01 p = 0.92
D_2	r = + 0.18 p = 0.29	r = - 0.18 p = 0.29
D_3	r = + 0.41* p = 0.01	r = - 0.01 p = 0.93
D_4	r = + 0.01 p = 0.95	r = + 0.23 p = 0.19

*Significant correlation, n=33
** Highly significant correlation, n=33

Table 6: Correlation coefficient between caries severity and salivary IL- 6 and baby birth weight among full term group

	Salivary IL - 6	BBW
DS	r = + 0.40* p = 0.02	r = 0.39* p = 0.02
MS	r = -0.10 p = 0.57	r = + 0.29 p = 0.09
FS	r = -0.12 p = 0.47	r = - 0.02 p = 0.87
DMFS	r = + 0.07 p = 0.67	r = + 0.45** p = 0.009
D_1	r= + 0.10 p = 0.56	r = - 0.05 P = 0.75
D_2	r = + 0.09 p = 0.58	r = + 0.33 P = 0.06
D_3	r = + 0.18 p = 0.30	r = - 0.01 p = 0.91

*Significant correlation, n=33
** Highly significant correlation, n=33