

The Role of Anticardiolipin and Antiphospholipid Antibodies in Pregnants with Chronic Periodontitis

Mahmoud Y Taha
BVMS, MSc, PhD (Prof)

Department of Dental Basic Science
College of Dentistry, University of Mosul

Heba F Hamodat
BDS, MSc (Asst Lec.)

الخلاصة

الاهداف: تهدف الدراسة إلى قياس التغيرات المناعية والكيميائية في الدم واللغاب بالنسبة للنساء الحوامل اللواتي لديهن إجهاض متكرر سابق مع التهاب ما حول الأسنان المزمن. **المواد وطرائق العمل:** تكونت مجموعة الدراسة من ٥٠ امرأة حامل وبمختلف مراحل الحمل، حيث تراوحت أعمارهن ما بين (١٧-٤٠) سنة و اللواتي لديهن حالة إجهاض واحدة أو أكثر غير معروفة السبب مع حدوث حالة التهاب ما حول الأسنان المزمن، بينما المجموعة المضابطة تكونت من عشرة نساء حوامل ذوات أعمار مقارنة لأعمار مجموعة الدراسة وليس لديهن أي إجهاض سابق وغير مصابات بالتهاب اللثة أو ما حول الأسنان المزمن. تم إجراء دراسة لفحص الفم سريريًا كما تم إجراء التحليل المناعي للدم والكيميائي لللعاب البشري الكلي غير المخفّض. حيث تمت دراسة المؤشرات الآتية: مؤشر الصفيحة الجرثومية (PI)، واختبار ألنزف عند التفسير (BOP)، وعمق الجيوب المخيطة بالأسنان لدى التفسير (PPD)، وقيمة الأجسام المضادة للدهون ألقيلية للصف (IgG)، وقيمة الأجسام المضادة للدهون الفوسفاتية للصف (IgG)، وتركيز البروتين التفاعلي سي ألعالي الحساسية (hs-CRP)، وفعالية أنزيم البيروكسيد. **النتائج:** أظهرت الدراسة أنّ هناك بعض التغيرات المناعية والكيميائية حيث تبين بأن مستوى الأجسام المضادة للدهون ألقيلية للصف (IgG)، ومستوى الأجسام المضادة للدهون الفوسفاتية للصف (IgG) مرتفعاً معنوياً في مجموعة الدراسة بالمقارنة مع المجموعة المضابطة، بينما كان تركيز البروتين التفاعلي سي ألعالي الحساسية (hs-CRP) متشابه في كلتا المجموعتين (المضابطة و الدراسة) وكان الفرق غير معنوي بين المجموعتين، أما بالنسبة لفعالية أنزيم البيروكسيد كان الفرق معنوياً في مجموعة الدراسة عنه في المجموعة المضابطة، وكذلك كان هناك فروقات معنوية في مؤشرات التهاب ما حول الأسنان (مؤشر الصفيحة الجرثومية (PI)، واختبار ألنزف عند التفسير (BOP)، وعمق الجيوب المخيطة بالأسنان لدى التفسير (PPD)) بين مجموعة الدراسة والمجموعة المضابطة.

ABSTRACT

Aims: The aim of the study is to measure immunological and biochemical changes in blood and saliva of pregnant women with history of abortion and having chronic periodontitis. **Materials and Methods:** The study group consisted of (50) pregnant women at different stages of pregnancy with ages between (17-40) years old with history of one or more consecutive unexplained abortion and having chronic periodontitis, while the control group consisted of (10) pregnant women of comparable age to the study group with no history of any abortion with healthy periodontal conditions. Oral examination and the following parameters were studied: plaque index (PI), periodontal pocket depth index (PPD), bleeding on probing index (BOP), and anticardiolipin value (IgG), antiphospholipid value (IgG), highly sensitivity CRP concentration, and peroxidase enzyme activity were evaluated. **Results:** The serological and biochemical changes showed that highly levels of ACLA (IgG) and APLA (IgG) in the study group compared to control group. hs-CRP concentration in study and control group was same, peroxidase enzyme activity was elevated in the study group compared to the control group. There was a positive correlation between serum ACLA, peroxidase enzyme activity and periodontal parameters, and also a positive correlation between hs-CRP and PI, while reverse correlation between hs-CRP and PPD and BOP. **Conclusion:** Detection of high level of anticardiolipin and antiphospholipid in the serum of study group with significant difference compared with control group. High level of hs-CRP found in both study and control group without significant difference. Detection of significantly high level of peroxidase enzyme activity with the study group compared to control group.

Keywords: Chronic Periodontitis, Pregnancy, Anticardiolipin antibodies, Antiphospholipid antibodies.

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INTRODUCTION

Chronic periodontitis is the most common form of periodontitis, and is most

prevalent in adults, but can be observed in children. It is associated with the accumulation of plaque and calculus and has a

slow to moderate rate of disease progression, but periods of more rapid destruction may be observed.⁽¹⁾

It is hypothesized that the biological explanation for the association of periodontitis with adverse pregnancy outcomes can be chronic exposure to the oral bacterial pathogens; particularly gram negative bacteria, which stimulate systemic production of inflammatory mediators and antibodies that deleteriously affect the placenta. The increase of systemic markers of vascular endothelial inflammation occurs together with the increase in serum levels of autoantibody anticardiolipin (ACLA). Accordingly, the association between periodontitis and increased serum levels of ACLA has been taken into account. Cardiolipin is a phospholipids (diphosphatidyle-glycerol) found in the inner mitochondrial membrane primarily, but it is also a constituent of mammalian membranes in general, in diseases with mitochondrial damage cardiolipin can start an antibody response.

Anti-phospholipid antibodies comprise a class of autoantibodies found in 1-5% healthy population.⁽²⁾ Elevated levels of these antibodies can be found in several conditions, including a variety of infectious diseases, and are a hallmark of the anti-phospholipid syndrome (APS). The major clinical symptoms of APS include recurrent venous or arterial thrombosis and fetal loss. Patients with APS may demonstrate premature atherosclerosis, the pathogenesis of APS is related to the prothrombotic activity of some anti-phospholipid antibodies.⁽³⁾

MATERIALS AND METHODS

This study was carried out on a total number of (60) pregnant women. Their ages ranged between (17-40) years with mean of (27.9) years. The study was performed in the out patients clinic of Al-Khansaa Hospital and in Al-Quds Primary Health Care Center in Mosul. The control group consisted of (10) pregnant women, with no history of any abortion with healthy periodontal condition while The study group consisted of (50) pregnant women at different stages of pregnancy, with a history of one or more consecutive unexplained abortion and have chronic

periodontitis. Whole unstimulated saliva and serum samples were collected at same visit from each pregnant women. A complete periodontal evaluation including assessments of pocket depth according to Ramfjord Index,⁽⁴⁾ plaque index according to Silness and L oe,⁽⁵⁾ bleeding upon probing according to Greenstein *et al*,⁽⁶⁾ performed on each participant.

Detection of anticardiolipin IgG, antiphospholipid IgG and high sensitivity C-reactive protein in the serum of control and study groups was done using anticardiolipin antibodies ELISA test kit, antiphospholipid antibodies ELISA test kit (AESKU. Germany), and High Sensitivity C- Reactive Protein Enzyme ImmunoAssay Test Kit (BioCheck, Inc. USA) all these kits principles were based on the standard sandwich enzyme-linked immune sorbent assay technology. Optical density (OD) was read at 450 nm in a microplate ELISA reader (Prolong, China).

Peroxidase enzyme activity is measured in the saliva by colorimetric method (Kim and Yoo).⁽⁷⁾ This method depends on the formation of a color product with measurable photo absorption at a particular wave length by visible spectrophotometer. Statistical analysis data were analyzed using SPSS 13 version and the following methods were applied: Descriptive statistic, Student's t-test, Pearson correlation coefficient and ANOVA.

RESULTS

This study showed that the mean value of plaque index in the study group was (1.686), higher than the control group (0.668) and the difference was highly significant ($p \leq 0.001$), The mean value of bleeding on probing index in the study group was (0.975), higher than the control group (0.120), and the difference was highly significant ($p \leq 0.001$), the mean value of pocket depth index in the study group was (4.976), higher than the control group (2.440), and the difference was highly significant ($p \leq 0.001$), The mean value of anticardiolipin (IgG) antibody in the study group was (0.762 IU/ cm³), higher than the control group (0.436 IU/ cm³), and the difference was highly significant ($p \leq 0.001$), the mean value of antiphospholipid (IgG) antibody in the study

group was (1.062 IU/ cm³), higher than the control group (0.502 IU/ cm³), which is highly significant ($p \leq 0.001$),

The mean value of hs C-reactive protein in the study group was (10.476 mg/L), while the mean value of hsC-reactive protein in the control group was (11.499 mg/L). In comparison between these two groups, the difference was not significant

($p > 0.05$) and The mean value of peroxidase activity in the study group was (0.129 U/ ml), while the mean value of peroxidase activity in the control group was (0.041 U/ ml). In comparison between these two groups, the mean value was higher in the study group than in the control group and the difference was significant ($p \leq 0.05$) Table (1).

Table (1): Student's t-test Comparison between Study and Control Groups

Parameters	Group	No.	Mean	+ SD	t-value	df	p-value
Plaque Index	Study	50	1.686	0.490	6.114	58	0.000*
	Control	10	0.668	0.427			
Bleeding on Probing	Study	50	0.975	0.073	26.759	58	0.000*
	Control	10	0.120	0.162			
Periodontal Pocket Depth	Study	50	4.976	0.448	17.547	58	0.000*
	Control	10	2.440	0.178			
Anticardiolipin Value	Study	50	0.762	0.300	3.384	58	0.001*
	Control	10	0.436	0.076			
Antiphospholipid Value	Study	50	1.062	0.430	4.069	58	0.000*
	Control	10	0.502	0.110			
hs-CRP	Study	50	10.476	2.357	-1.335	58	0.187
	Control	10	11.499	1.161			
Peroxidase	Study	50	0.129	0.114	2.414	58	0.019*
	Control	10	0.041	0.013			

* Significant difference existed at $p < 0.05$.

Comparison between the study and control groups in relation to percentage of ACLA and APLA:

Table (2) show the prevalence of both ACLA and APLA in the control and study groups. The percentage of the positive anticardiolipin (IgG) in the study group, was

(32.0) and the negative was (68.0), while no positive anti-cardiolipin (IgG) in the control group. Whereas the percentage of the positive antiphospholipid (IgG) in the study group was (40.0) and the negative was (60.0), while no positive antiphospholipid in the control group.

Table (2): Comparison of the Percentages of ACLA and APLA in study and control group

	Group	Criteria	Frequency	Percentage
Anticardiolipin	Study	Positive	16	32.0
		Negative	34	68.0
	Control	Positive	0	0.0
		Negative	10	100.0
Antiphospholipid	Study	Positive	20	40.0
		Negative	30	60.0
	Control	Positive	0	0.0
		Negative	10	100.0

DISCUSSION

In the present study, the prevalence of anticardiolipin (ACLA) (IgG) and antiphospholipid (APLA) (IgG) in the study group found to be (32%),(40%)

respectively compared to the control group (0%). Different researchers reported wide range of discrepancies in the prevalence of ACLA in patients with Recurrent Spontaneous Abortion (RSA)

(11% 42%).⁽⁸⁾ Such controversy between the different studies could be explained on three bases, firstly, the difference in the cut-off value used in the studies which varied between (10-52 IU/ ml for IgG, and 10 to 28 IU/ ml for IgM)⁽⁹⁾. Secondly, previous studies used different sources of the kits and reagents for the estimation of the ACLA levels, finally, the selection of cases in some previous studies performed by exclusion of patients with hormonal, genetic, infections, metabolic diseases, or immunological disorders other than APS.⁽⁹⁾ Other reports found the incidence of ACLA in RSA is 8-51%.⁽¹⁰⁻¹¹⁾

There was a significant difference in ACLA titer between control and study groups ($p=0.001$). The same result found by Fughihi *etal*⁽¹²⁾ who used the same method for detection ACLA titer in serum of patients with chronic periodontitis. Also there was a significant difference in APLA titer between control and study groups ($p=0.001$).

In the present study there was a significant difference in plaque index, periodontal pocket depth, bleeding on probing between the study and control groups ($p<0.000$). All the clinical parameters in study group were higher than that of control group significantly, and this result was agreement with Faghihi *et al*⁽¹²⁾ who found also a significant difference in PI, BOP, PPD between the two groups.

In the present study, the hs-CRP showed no significant difference between the study and control groups, this may be explained on the fact that CRP plays many roles in the inflammatory process. It binds to the surface of pathogens and opsonizes them for uptake of phagocytes.

Apart from infections, inflammation, and trauma, factors associated with increased levels of CRP include obesity, cigarette smoking, hormone use, metabolic syndrome, and cardiovascular disease⁽¹³⁾.

Higher body mass index is associated with elevated CRP concentrations in adult men, non pregnant women,⁽¹⁴⁾ and pregnant women.⁽¹⁵⁾

Also, periodontitis is associated with increased CRP levels in early pregnancy⁽¹⁶⁾, and serum CRP increases pathologically in the pregnant women at second trimester only in case of recent high uri-

nary bacterial infections.⁽¹⁷⁾ Thus as the two groups are pregnant at different trimester of pregnancy, therefore the CRP elevated in the two groups.

The increase in the activity of peroxidase enzyme in saliva of pregnant with chronic periodontitis in the present study was highly significant compared to pregnant with healthy periodontium. Other studies demonstrated an elevated level of MPO in periodontitis, suggesting that MPO may serve as an inflammatory marker for periodontitis.⁽¹⁸⁻¹⁹⁾

Smith *et al*⁽²⁰⁾ reported increased peroxidase activity at the onset of gingival inflammation that declines after initiation of oral hygiene, more over they demonstrated increase MPO activity in patients with aggressive and chronic periodontitis, and they concluded that increase MPO activity was due to increased infiltration and degranulation of polymorph nuclear leukocyte⁽²¹⁾

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