The Effect of Oral Contraceptive Pills on Periodontal Health Statues Related to Saliva Interleukin IL-1β

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Abstract

Oral contraceptives are used by millions of women, however it is unknown how they affect oral and periodontal health. The goal of the study was to evaluate the impact of oral contraceptive pills on periodontal health status as related to saliva interleukin IL-1β since saliva biomarkers may offer a cutting-edge way for manually probing, precisely diagnosing periodontal health and illness. In Baghdad city, 88 married women between the ages of 25 and 45 were examined in a case-control research to determine their periodontal health) by using Basic Periodontal Examination and saliva interleukin IL-1β levels. Before the study began, official approval and consent were sought. There was a substantial rise in periodontal scores (bleeding on probing and periodontal pocket depth) among long-term oral contraceptive users, and there were a statistically significant positive correlation between mean of salivary interleukin IL-1β levels with each other in each group ($p< 0.05$).

The results show that women's usage of hormonal contraceptives has been thought to impact the development of periodontal and gingival disease. As a result, patients need to practice stringent dental hygiene.

***Keywords**: Oral contraceptive, disease, salivary interleukin-1β, public health, health risks, health system.*

تأثير حبوب منع الحمل على حاله صحة اللثة المتعلقة بالانترلوكين اللعابيIL-1β

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الخلاصة

تستخدم ملايين النساء وسائل منع الحمل عن طريق الفم، ولكن من غير المعروف مدى تأثيرها على صحة الفم واللثة. كان الهدف من الدراسة هو تقييم تأثير حبوب منع الحمل عن طريق الفم على حالة صحة اللثة فيما يتعلق بالإنترلوكين اللعابي IL-1β، حيث أن المؤشرات الحيوية للعاب قد توفر طريقة متطورة للفحص اليدوي، والتشخيص الدقيق لصحة وأمراض اللثة. في مدينة بغداد، تم فحص 88 امرأة متزوجة تتراوح أعمارهن بين 25 و 45 سنة في بحث الحالات والشواهد لتحديد صحة اللثة) باستخدام فحص اللثة الأساسي ومستويات الانترلوكين اللعابي IL-1β. قبل بدء الدراسة، تم الحصول على الموافقة والموافقة الرسمية.

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كان هناك ارتفاع كبير في درجات اللثة (النزيف عند المسبار وعمق جيب اللثة) بين مستخدمي وسائل منع الحمل عن طريق الفم على المدى الطويل، وكان هناك ارتباط إيجابي ذو دلالة إحصائية بين متوسط مستويات إنترلوكين اللعاب IL-1β مع بعضها البعض في كل مجموعة (ص). <0.05).

أظهرت النتائج أن استخدام النساء لوسائل منع الحمل الهرمونية يُعتقد أنه يؤثر على تطور أمراض اللثة واللثة. ونتيجة لذلك، يحتاج المرضى إلى ممارسة نظافة الأسنان الصارمة.

الكلمات المفتاحية: وسائل منع الحمل عن طريق الفم، المرض، الإنترلوكين اللعابي 1β، الصحة العامة، المخاطر الصحية، النظام الصحي.

Introduction

Advancements in medical sciences and increasing drug use emphasize the need for physical evaluation in comprehensive dental care, as contraception drugs can harm other body structures [1] an and also influence the course of periodontal disease [2]. Hormonal contraceptives are medications used for pregnancy prevention, reducing ovarian cysts, family planning, and menstrual cycles [3]. Within the range of hormonal contraceptive offer various birth control options, including intravaginal, intrauterine delivery, injections, implants, patches, and pills. Contraceptive drugs contain estrogens and progestin, selectively inhibiting pituitary function [3,4]. Hormonal contraceptives caused health systemic adverse effects, including cardiovascular and thromboembolic complications [5].

The oral cavity keeps track of health and guards against adverse drug responses [6]. The use of hormonal contraceptives by women might affect the development of periodontal disease [7,8]. Gingival tissues were initially impacted by periodontal disease, which progresses to periodontitis, which damages sustain tissues s [9]. Both innate and adaptive immune responses contribute to the pathogenesis of periodontal disease. According to Miossec [10], cytokines promote bone resorption and tissue damage. Neutrophils' antimicrobial peptides are replaced by Langerhans dendritic cells and T cells, which release pro-inflammatory cytokines including IL-1, IL-6, IL-17, TNF-, and IL-23 when gingivitis develops into an advanced periodontal lesion [11]. Interleukin-1B causes inflammatory reactions in periodontitis, affecting blood flow, leucocyte recruitment, and bone resorption [12]. Macrophages, dendritic cells, osteoblasts, periodontal ligament cells, and gingival fibroblasts secrete IL-1B [13]. Interestingly Talal [14] were founded the effect of zinc oxide nanoparticles on chronic periodontal inflammation which exhibited antibacterial properties.

The goal of the current study was to assess the periodontal health status and the diagnostic value of IL-1B as a marker for periodontal disease by estimating the impact of combination oral contraceptive pill usage on a particular salivary marker and comparing the results to those of healthy women.

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Subjects, Matherials and Methods

An observational case-control study was carried out among subjects taking combined (estrogen and progesterone) oral contraceptive pills at primary health centers in Baghdad city. A total of 88 female participants were married and apparently in good health (25–45 years old). Subjects were subdivided into 4 groups: G1 (22 subjects) did not use contraceptive pills as a control; G2 (22 subjects) used contraceptive pills for less than 1 year; G3 (22 subjects) used contraceptive pills for less than 3 years; and G4 (22 subjects) used contraceptive pills for more than 3 years (**Figure 1**).

An ethical approval was obtained from the ethical approval committee at the College of Dentistry / University of Baghdad to perform this study. Prior to data collection, official permission was obtained from the general direction of the College of Dentistry. The subjects were provided with an information sheet with a brief explanation of the present study and its significance to ensure voluntary participation. A specific consent form was also produced and given to subjects in order to acquire permission to participate in the study and their full cooperation.

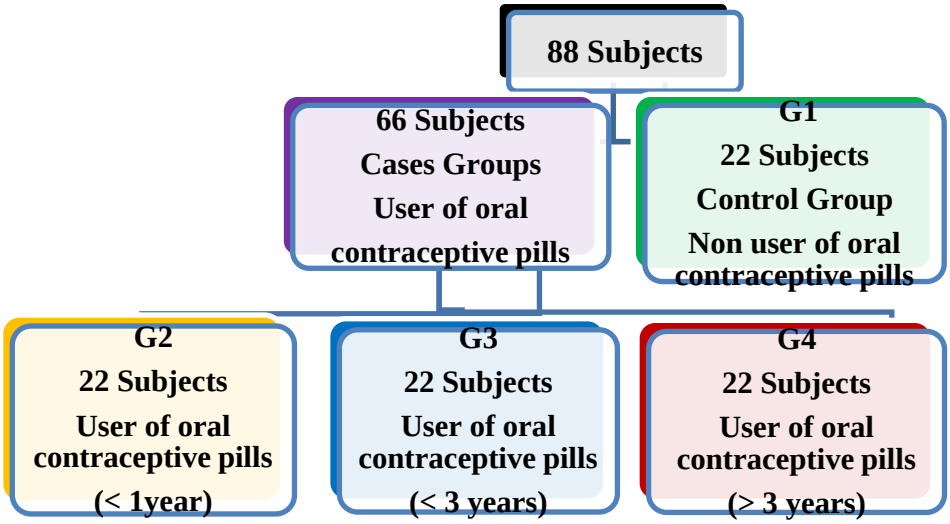

Fig. (1): Distribution of subjects among the studied groups.

Method

Collection of demographic information

The names, ages, and social stats were taken from subjects. In addition to that, this information was also requested from the participants in the informed consent sheet, as well as the duration of using oral contraceptive pills in the case sheets.

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Collection of a saliva sample

Unstimulated saliva samples were collected from each subject by the spitting method. The subjects' advice was to keep calm and relax. Then instruct them to minimize movement and accumulate the saliva on the floor of the mouth, then spit it out into the sterile disposable cap. The participants were expected to receive 4 ml of saliva once every 30 seconds for 5 minutes. The samples were placed on ice to minimize the bacterial degradation of saliva proteins. The saliva samples were centrifuged for 10 minutes at 3000 rpm, and the superannuate was subdivided into many Eppendrof tubs, and then stored at -80 °C.

Periodontal Assessments

The researcher recorded the periodontal health status of the participants using Basic Periodontal Examination.

Examinations were carried out while subjects were sitting on dental chair using examination kits, disposable Plane mouth mirror and WHO periodontal probe.

Statistical Analysis

Statistical Package for Social Science (SPSS) was adopted for data description, calculation, and presentation. One-way Analysis of Variance (One-way ANOVA): show the variance of significancy among K unrelated groups. Kruskal-Wallis test: test the difference in mean rank between k independent groups with multiple pairwise comparisons by the Dunn-Bonferroni method. Pearson correlation: test the monotonic relationship between two variables. P values ≤0.05 were considered significant differences with Spearman correlation (rsp) used.

Results

The statistical analysis of Basic Periodontal Examination among the studied groups is shown in (**Tables 1**). Findings from this table show that there were significant differences in scores, which increased significantly with the duration of contraceptive pill use.

Table (1): Descriptive and statistical test of periodontal scores among groups according to duration.

Groups	Statistics			
	Median	**Mean rank**	**Kruskal-Wallis**	**P value**
G1	0.5	19.14	50.882	0.000
G2	1	39.20		
G3	3	48.43		
G4	4	71.23		

*significant at p ≤0.05.

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* Group 1: Subject OCP non-user; Group 2: Subject OCP user 1<year; Group 3: Subject OCP user 3<years; Group 4: Subject OCP user 3<years.

Levels of IL-1β among studied groups

Results of IL-1β levels in (**Tables 2**) revealed significant elevations in each of the G2 group (215.5±22.24, P value = 0.002), G3 group (293.11±49.8, P value ≤ 0.001), and G4 group (220.44±38.09, P value ≤ 0.001) compared to G1 (181.8±23.6). Also, the G2 group showed a significant drop compared to the G3 and G4 groups. P values were <0.001 and 0.64, respectively. Furthermore, the G3 group showed significant elevation. The P value was 0.001 compared to the G4 group (**Figure 2**).

Table (2): Interleukin-1β levels in the saliva of the studied groups.

IL-1β		P value (sig≤0.05)		
Group	**M±SD (pg/ml)**	**G2**	**G3**	**G4**
G1	181.8±23.6	0.002	<0.001	<0.001
G2	215.5±22.24		<0.001	0.64
G3	293.11±49.8			<0.001
G4	220.44±38.09			

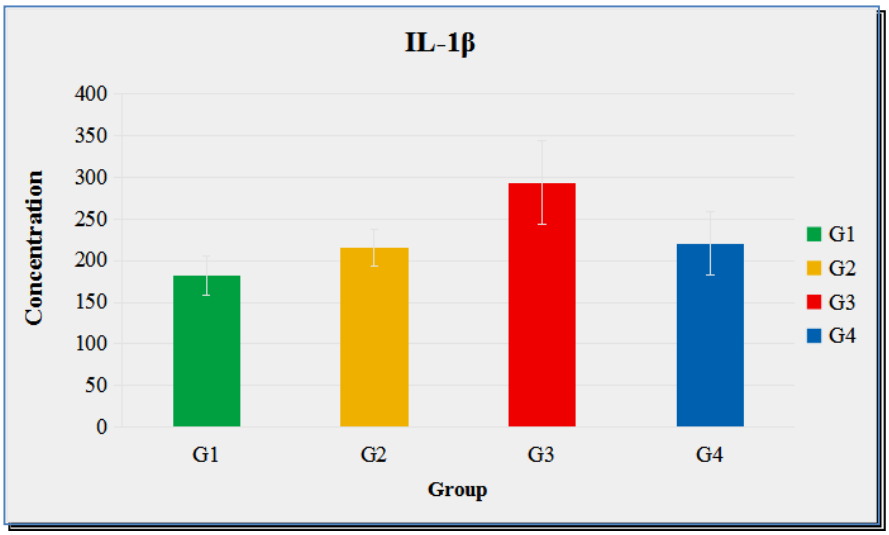

Fig. (2): Interleukin-1β levels in the saliva of the studied groups.

Relations between saliva interleukins in (**Table 3)** revealed that were significant positive correlations between each salivary interleukin with each other in each group.

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Table 3: Relationships between salivary interleukins in the studied groups.

Groups		IL1-β		IL1-β	
		rsp	P	Rsp	P
G1		0.956	0.000		
	IL1-β			0.852	0.000
G2		0.866	0.000		
	IL1-β			0.756	0.000
G3		0.871	0.000		
	IL1-β			0.762	0.000
G4		0.945	0.000		
	IL1-β			0.766	0.000

*Group 1: Subject OCP non-user; Group 2: Subject OCP user 1<year; Group 3: Subject OCP user 3<years; Group 4: Subject OCP user 3<years.

*Spearman correlation: rsp

Discussion

The present study investigated oral contraceptive pill impact on periodontal public health in relation to saliva IL-1β biomarker in primary health centers in Baghdad. In Iraq, this is the first study to look at the effect of saliva biomarker, such as IL-1β on periodontal diseases in saliva samples among OCP users. On the other hand, approximately similar studies found only a direct relationship between IL and periodontal diseases, regardless of OCP usage, in Iraq. Concerning IL levels, the results of the present study showed that the mean IL had significant elevations in each of the G2 group, G3 group, and G4 group compared to G1. According to the findings of the present investigation, there were strong positive associations between each salivary interleukin and periodontal etiology.The present findings were in accordance with other accurate research that associated with a significant rise in IL-1β levels during the inflammatory phase of periodontal disease [15-23]. In instance, individuals with deeper pockets and severe bleeding on probing BOP had greater amounts of IL-1β in their saliva and gingival reticular fluid, according to the results of the current study. This may be explained by the way estrogen and progesterone affect the inflammatory mediator IL-1β, which causes inflammation in females with a history of OCP consumption, compromising defense mechanisms, and bacterial growth. As a result, researchers have been able to use IL-1β as a biomarker found in oral fluids for periodontal disease prediction, diagnosis, and monitoring.

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Blocking interleukin IL-1β using receptor antagonists, anti-inflammatory drugs, and antioxidants like Vitamin E is used to lower IL-1β.

Basic Periodontal Examination Score

The present results show that periodontal scores increase significantly with the duration of contraceptive pill use. Concerning the present findings, the present study found that the subjects who were OCP users had bleeding on probing, deeper periodontal pocket depth, and calculus. The present study was in agreement with previous studies conducted that were linked OCP usage on periodontium with duration [24-28].

This study disagree with previous studies conducted that found no association between gingival diseases and OCP, but the present finding revealed duration correlates with increased periodontal diseases in female oral contraceptive pills OCP users [29,30]. This might be explained health risks with estrogen receptors were present on periosteal, lamina propria, and periodontal fibroblasts, Additionally, progesterone increases gum tissue swelling, influencing the immune system and tissue healing. Dispersed lamina propria fibroblasts. Periodontal ligament fibroblasts.

Additionally, stress alters the complicated network between the immunological, neurological, and endocrine systems that maintain homeostasis, which could worsen periodontitis and affected immune function.It's interesting to note that there are neurobiological connections between stress and periodontitis, including the stimulation of the adrenergic nerve signaling axis that influences immune response and reduces wound healing.

Conclusion

The study's findings showed a strong link between using oral contraceptives and periodontal disease, as measured by the presence of bleeding during probing, the depth of the periodontal pocket, the buildup of calculus, and elevated levels of the salivary interleukin IL-1β on the gingiva and tooth surfaces.

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