

THE EFFECT OF MENOPAUSE ON CHRONIC PERIODONTITIS

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Abstract

The aim of the present study is to investigate the severity of periodontal destruction among Malaysian women based on their menopausal status.

The study was conducted as a case-control study in which 50 systemically healthy women who were diagnosed with chronic periodontitis were included. Based on their menstruation history, they have been divided into two groups: control group includes 25 women undergoing normal menstrual cycle, while the test group includes 25 postmenopausal women. The clinical periodontal parameters were recorded, and the severity of the periodontal destruction was evaluated clinically according to the clinical attachment loss.

There were no significant differences between participants of the control and test groups in the percentages of sites with the presence of plaque and bleeding on probing ($p>0.05$). On the other hand, significant differences were found between both groups in their percentages of sites with clinical attachment loss of 4-6 mm ($p=0.13$) and number of missing teeth ($p=0.20$).

The findings of the present study suggest that postmenopausal women have more severe periodontal destruction compared to premenopausal females.

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Introduction

The woman is in her menopause after a 12 month cessation of natural menstrual cycle. This cessation of menstrual cycle usually occurs in women aged between 45 and 55 of age. During menopause, ovary ceases the production of sex hormone especially estrogen and progesterone causing the follicular stimulating hormone to be high¹. Periodontal disease is an inflammatory process that affects the periodontium (the supporting tissue around the

teeth). This disease is caused by specific type of bacteria or specific group of microorganisms that leads to continuous destruction of the periodontal tissue. It presents with a detectable clinical attachment loss, usually accompanied with pocket formation, gingival recession, and bone resorption².

Chronic periodontitis is the most common form of periodontitis and usually characterized by increased prevalence in adults, slow to moderate in progression, presence of sub gingival calculus, its severity is consistent with local factors, and usually associated with a different type of microbial pattern³. The reduction in estrogen production has been linked to increased alveolar bone loss and tooth loss⁴.

The aim of this study is to determine the effect of menopause on the severity of periodontal destruction. Such findings will help in the emphasis on the treatment or measures needed for females in their menopause regarding their periodontal status.

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Methodology

Study Design

A case-control study was conducted, between non menopausal and post menopausal females.

Ethical Considerations

Following protocol review and approval by Research committee of Kulliyyah of Dentistry and ethical approval by International Islamic University Malaysia research ethics committee (ethical approval number 249), subjects were recruited from patients who were referred to the periodontics clinic, Faculty of Dentistry for periodontal treatment between March and December 2014. All patients were informed verbally about the purpose of the study and were asked to sign a written consent form prior to participation

Inclusion and Exclusion Criteria

Only female participants who have been diagnosed with chronic periodontitis⁵ and haven't received periodontal treatment for the past six months were involved in this study. Females were excluded from the study according to the following exclusion criteria

- a. Age < 30 and >65-year-old.
- b. Known systemic diseases.
- c. History and/or presence of other infections.
- d. Any concomitant medical therapy.
- e. Regularly taken any of the following drugs in the previous three months: Anti-depressant, and anti-inflammatory, Steroids. Immunosuppressant, Statins, and lipid-lowering drugs, Anticoagulants, Hormone replacement therapy
- f. Pregnancy or lactation.
- g. Smoking

In order to avoid the confounding effects of these important factors

Study Sample

Fifty participants had been chosen for full periodontal charting and were asked to fill in a written questionnaire regarding their medical and menstruation history. Two sets of age group were compared for this study; control group (non menopausal) range from 30-45 while test group (menopausal) range from 50-65.

The questionnaire involved the patients' demographic data, menstruation history; followed by questions included the patients' detailed medical history.

Periodontal Clinical Examination and Indices

All clinical parameters were measured with a Goldman/Fox Williams probe calibrated in millimeters by calibrated examiners. Clinical measurements (Pocket depth, gingival recession, clinical attachment level, presence/absence of plaque and bleeding on probing) were taken at six sites per tooth (mesio-buccal, mid-buccal, disto-buccal, mesio-palatal, midpalatal and disto-palatal) from the test sites (third molar excluded). Clinical attachment loss (in millimeters) is a measure of the severity of destruction of tooth-supporting connective tissue and alveolar bone².

1. Bleeding on Probing (BOP)⁶

It is the bleeding from the sulcus/pocket that occurs following probing. If bleeding occurs within 10 seconds in response to periodontal probe that is inserted and run along the gingival sulcus/pocket, the site was given a score (1), whereas a negative score (0) for non-bleeding site.

2. Pocket Depth (PD)

The distance of the free gingival margin to the base of the probable pocket, recorded to the nearest mm. For better indication for the degree of periodontal probing depths, the probing depths measurement in (mm) was grouped into two groups: (1 to 3 mm) and (4 to 6mm) and recorded as percentages.

3. Gingival Recession (REC)

It is the distance of the free gingival margin in relation to the cemento-enamel junction (CEJ)

4. Clinical Attachment Level (CAL)

Clinical attachment loss is measured with a periodontal probe and is the distance from the cemento-enamel junction to the base of the probable crevice⁷ When the gingival margin is on the anatomic crown, CAL is determined by subtracting from the depth of the pocket the distance from the gingival margin to the CEJ, when the gingival margin coincides with the CEJ, the loss of attachment equals the pocket depth. When the gingival margin is located apical to the CEJ, the distance between the CEJ and the gingival margin should be added to the probing depth.

The average whole-mouth CAL was calculated for each periodontitis patients even with 1 mm attachment loss.

Statistical Analysis

Data analysis was performed using the computer software Statistical Package for the Social Sciences (SPSS)[®] version 22 for windows. All data were analyzed for distribution, Kolmogorov-Smirnov test were used to determine the normality of the data's distribution.

Data that did not pass normality test analyzed by non-parametric statistics, and expressed as median and range. Man-Whitney test applied for the comparison between two groups. On the other hand, the normal distribution data analyzed by parametric tests and expressed as mean \pm standard deviation (SD), using independent *t*-test between groups. Differences were considered significant when $p < 0.05$ for all statistical tests.

Results

Out of 80 patients screened and clinically assessed, 50 patients were included in this study. These patients were divided in two groups; control (non menopausal) and test (post menopausal), 25 subjects in each group. Table 1 shows the mean age for control group is 40.08 \pm 3.77 meanwhile the mean age for test group is 55.32 \pm 4.31.

Women's Age	Mean (\pm SD)	P-value
Non-menopausal (n=25)	40.08 (\pm 3.77)	<0.001*
Menopausal (n=25)	55.32 (\pm 4.31)	

*Independent t-test

Table 1. Mean (\pm SD) of patients' age

Variables	Control (\pm SD)	Test (\pm SD)
% PS	75.24 (\pm 19.14)	66.98 (\pm 18.50)
% BOP	62.58 (\pm 24.62)	55.03 (\pm 18.70)
% PD 1-3	84.18 (\pm 18.88)	92.17 (\pm 15.62)
% PD 4-6	11.88 (\pm 10.67)	7.80 (\pm 11.49)
% CAL 1-3	16.10 (\pm 14.37)	20.29 (\pm 11.45)
% CAL 4-6	11.29 (\pm 10.37)	17.87 (\pm 11.82)
No Missing Teeth	7.48 (\pm 6.60)	11.64 (\pm 6.34)

Table 2. Mean (\pm SD) of patients' clinical periodontal parameters

In Table 2, percentage of plaque scores in control group is 75.24% \pm 19.14. The test group shows 66.98% \pm 18.50. Percentage in bleeding on probing in control group is 62.58% \pm 24.62, compared to test group showing 55.03% \pm 18.70.

The percentage of pocket depth 1-3 mm in control group is 84.18% \pm 18.88 meanwhile test group is 92.17% \pm 15.62. Moreover, percentage of pocket depth 4-6 mm in control group is 11.88 % \pm 10.67. The test group shows 7.80% \pm 11.49. Percentage of clinical attachment loss of 1-3 mm for control group is 16.10% \pm 14.37, meanwhile in test group is 20.29% \pm 11.45. Plus, percentage of clinical attachment loss of 4-6 mm for control group is 11.29% with 10.37, compared to test group showing 17.87% \pm 11.82. Lastly, percentage for number of missing teeth in control group is 7.48% \pm 6.60; meanwhile test group shows 11.36% \pm 6.34. Table 3 shows the *p*-value for the comparison between the groups in respect to their clinical periodontal parameters.

Variables	Control	Test	P-value
	Median (IQR)	Median (IQR)	
% PS	78.6 (26.5)	71.4 (26.6)	0.127
% BOP	59 (50)	45.2 (24.3)	0.560
% PD 1-3	90.80 (22.27)	96.12 (6.37)	0.105
% PD 4-6	9.20 (16.88)	3.33 (6.37)	0.076
% CAL 1-3	12.64 (18.77)	18.18 (6.75)	0.143
% CAL 4-6	9.10 (7.07)	14.67 (14.29)	0.013 [§]
No. of missing teeth	6 (8)	10 (6)	0.028 [¶]

IQR: Interquartile range, §: Mann-Whitney test, ¶: *Independent t-test

Table 3. Comparison between the different periodontal parameters in the studied groups

No statistical significances were found between groups in their plaque score (0.127), bleeding on probing (0.560), pocket depth 1-3mm (0.105), pocket depth 4-6mm (0.076) and the clinical attachment loss 1-3mm (0.143). On the other hand, there was statistical significance between non-menopause and postmenopausal women in the clinical attachment loss 4-6mm (0.013) and number of missing teeth (0.020).

Discussion

Periodontitis is an inflammation of the supporting tissues of the teeth, including the gingiva, alveolar bone, and periodontal ligament. This chronic inflammatory process occurs in response to a predominantly Gram-negative bacterial infection originating in dental plaque⁸

The absence of estrogen and progesterone hormones in menopause

contributes to changes in the periodontal tissues⁹. Significant effects of female sex hormone on connective tissue were found and cessation of these hormones in post menopausal women leads to several deterioration of periodontal health.¹⁰ Periodontal infections can increase the systemic release of inflammatory cytokines, which accelerate systemic bone resorption¹¹. Studies have stated that sex hormones have long been considered to affect periodontal tissues and periodontal disease progression. They reported that during menopause, women may experience, periodontitis and an osteoporotic jawbone unsuitable for conventional dental devices and implants.^{12, 13, 14}

Although the mean age of our postmenopausal females is significantly different ($p < 0.001$) from the non menopausal females, we expect that this will not affect the periodontal status as previous studies did not find a significant risk of age on increased loss of periodontal.^{15,16,17}

Moreover, the recent genetic studies that addressed the susceptibility to advanced periodontitis indicated the overriding importance of plaque, smoking, and susceptibility in explaining most of the periodontitis severity variation between individuals.^{18,19}

Our participants in both groups showed presence of clinical attachment loss up to 6 mm indicating moderate to severe chronic periodontitis, % CAL 4-6 mm were 11.29 (± 10.37) and 17.87 (± 11.82) in control and test groups respectively.

Our findings are in agreement with the results of the above-mentioned studies that reported increase in alveolar bone destruction as an effect of menopause since there is a significant difference between the two groups in respect to the %CAL 4-6 mm ($p = 0.013$).

This study also demonstrated significant difference in number of missing teeth between the menopause and non-menopause women ($p = 0.028$). Although we must put in consideration that not all teeth were lost due to periodontal disease, because some of the participated patient might lose their teeth due to caries, periapical changes, trauma or other factors. The importance of having larger number of missing teeth in postmenopausal women seems to be related to their history of menopause and this result agrees with previous study which concluded that periodontal disease is a strong

and independent predictor for tooth loss in postmenopausal women.²⁰

Conclusion

This study showed that women in their menopause have an increase in the severity of chronic periodontitis and tooth loss and this require close dental follow up of these patients to avoid further progression of the disease

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Declaration of Interest

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