

Periodontal Status in Patients with Coronary Artery Disease

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Article information	Abstract
Article history: Received: 18 Oct 2011 Accepted: 22 Dec 2011 Available online: 9 Apr 2012 ZJRMS 2013; 15(1): 34-37 Keywords: Periodontal diseases Coronary artery disease Periodontal parameters *Corresponding author at: Department of Oral Medicine, Faculty of Dentistry, Zahedan University of Medical Sciences, Zahedan, Iran. E-mail: lm_farhad@yahoo.com	Background: Regarding the negative effects of inflammatory disease including periodontal infections on cardiovascular diseases, this study was carried out in order to investigate the periodontal status of patients with coronary artery disease (CAD) referring to two hospitals in Zahedan. Materials and Methods: In this study, 100 patients with CAD who referred to Khatam-al-Anbia and Imam Ali Hospitals in Zahedan were examined. After clinical examination, periodontal parameters PD (probing depth), AL (attachment level), PI (plaque index), and GR (gingival recession) were determined. Preparing the radiography, the average percentage of bone resorption overall the mouth was measured and registered. The results were analyzed using SPSS-17. Results: Plaque accumulation in 92% of the subjects of study was more than 10%. Pocket depth in the patients was as follows: 18% of the patients had less than 2 mm PD; 13% of them 2-2.99 mm; 43% with 3-4.99 mm PD and 26% of them had deep pocket (> 5 mm). In relation to attachment loss, the results were as follows: in 9% of the patients 1-2 mm; 41% of them 3-4 mm, and for 50% of the patients AL was more than 5 mm. the average of gingival recession in the subjects was 3.31±1.9. Considering bone resorption, 6.7% of the people had less than 20% resorption, 46.7% had 20-39% resorption and in 46.7% of them, resorption was 40-60%. Conclusion: In this study, affliction to periodontal diseases was said to be the cause of Coronary Artery Disease. Copyright © 2013 Zahedan University of Medical Sciences. All rights reserved.

Introduction

Coronary Artery Diseases (CAD) are regarded as one of the most common medical problems and the leading cause of death around the world [1, 2]. Atherosclerosis is the major underlying cause of cardiovascular diseases [1, 3, 4]. Despite planning programs for prevention and treatment of atherosclerosis, the number of deaths associated with these events has remained constant in many countries. Identifying etiologic factors and risk factors associated with these diseases is of great importance [2, 5]. Scientific evidences support the important role of immune system in initiation and progression of atherosclerosis. Progression of atherosclerosis and high risk of cardiovascular diseases is associated with high level of acute-phase inflammatory proteins such as C-reactive protein, fibrinogen and Serum amyloid A [2, 6].

According to Focal Infection Theory (FIT), "foci" of sepsis at distant sites were responsible for the initiation and progression of a variety of inflammatory diseases. Such a relationship between periodontitis and cardiovascular diseases has been taken into consideration, recently. Periodontitis is an infectious disease which leads to gingivitis, periodontal tissues and progressive alveolar bone loss and is considered as a major focus of infection,

so that the total gingival surface of all the teeth (28 teeth) which can allow the ingress of microorganisms equals the two palms (the inner surface of the hands) [7].

Evidences indicate that certain mouth infections play an important role in the initiation of atherosclerosis. Many periodontal pathogens such as porphyromonas gingivalis, Prevotella Intermedia, Treponema denticola and actinomycetemcomitans have been identified in carotid atheroma and atherosclerosis plaques [1, 2, 9-11]. Porphyromonas gingivalis will result in the incidence of Toll-like receptor (TLR-2 and TLR-4) on the endothelial cell surface (ECS) and stimulation of interleukin-6 (IL-6) and IL-8 and monocyte chemoattractant protein (MCP-1) [2, 12]. Moreover, increased level of acute-phase inflammatory proteins in periodontitis patients is observed the same as cardiovascular patients [2, 13, 14]. In other words, secondary autoimmune mechanisms to periodontal infections may play an important role in initiation and progression of atherosclerosis [15].

Several studies are conducted concerning the relationship between periodontal and cardiovascular diseases. In some studies, periodontitis has been introduced as a risk factor for cardiovascular diseases, while the result of some studies doesn't support this fact

[16, 17]. In a meta-analysis, Janket et al. examined 9 cohort study conducted in this regard. According to the results of these studies, the risk of such events in periodontitis patients will increase 19% [18]. Arbes et al. in their study put emphasis on the direct relationship between CAD and the severity of periodontitis [19]. In a large prospective study, Beck et al. studied 921 men with no coronary artery disease for 18 years and in this period they followed the periodontal status and the probability of the incidence of CAD. The results indicated that the incidence of this disease in periodontitis patients is 2.8 as much [16]. Due to the inconsistent results of different studies and the prevalence of periodontal and coronary artery diseases in the general population, the present study has been done in this regard.

Materials and Methods

The present study was conducted in 2007 and the subjects of the study were patients with coronary artery disease who referred to Khatam-al-Anbia and Imam Ali Hospitals in Zahedan. Using Cochran formula, the sample size was obtained as 100. After the patients were examined by a cardiologist and heart condition (disease) was diagnosed, they were introduced to the Zahedan Faculty (School) of Dentistry for complete periodontal examination (Check-up). All the periodontal examinations were done by a trained examiner (a senior intern) under the supervision of advisor.

Clinical examination was done for all the patients and clinical parameters like Gingival Recession (GR), Plaque Index (PI), Attachment Loss (AL) and Probing Depth (PD) were measured and recorded for each person in the relevant chart. Then, the patient was directed to the Radiology Department for doing panoramic radiography. Panoramic radiography will give an overview of the jawbones and teeth and is commonly requested for patients with periodontal problems in routine treatments. In this study, after the explanations were provided and the letters of consent were gathered, we prepared radiography of the patient. The radiographies were analyzed by a radiologist in respect of the percentage of bone resorption and it was recorded for each person. Those who needed periodontal treatments or had any tooth problem were directed for treatment. The obtained information was analyzed by descriptive statistical tests (frequency and percentage) using SPSS-17 and the obtained results were tabulated and displayed in the form of tables and charts.

Results

In respect of age and gender, 73 of the subjects were males and 27 were females; 49 of them (49%) were in the age group 40-59 years and 51 (51%) were in the age group 60-85. Investigating the plaque index rate indicated that 8% of the people had plaque index less than 10% and 92% of them had plaque index more than 10%. The average PD of all the subjects of study was 3.94 and the

standard deviation was 1.5. The frequency distribution of patients according to pocket depth is shown in table 1.

Mean and standard deviation of PD in age group of 40-59 year was 3.7 ± 1.6 and in the age group 60-85 years was 4.1 ± 1.4 . Bone resorption in 60 out of 100 patients who were in need of radiography and were ready for it is as follows: 6.7% (4) of the study population had less than 20% bone loss and 46.7% (28) of the patients had bone loss (resorption) between 20 to 39%. The frequency of those who had 40-60% bone loss was 46.7% (28). The average bone loss in the group was 39%.

According to figure 3, mean and standard deviation of bone loss in the age group (40-59) years was 0.34 ± 0.12 and in the range of 60-85 years was 0.47 ± 0.15 . As it can be observed in table 3, mean and standard deviation of gingivitis in the age groups of 40-59 and 60-85 years was 2.8 ± 1.58 and 3.81 ± 2.1 , respectively.

Table 1. Frequency distribution of patients according to PD

Depth of pocket (mm)	N (%)	Mean $\pm$ SD
< 2 mm	18(18)	1.7 $\pm$ 0.23
2-2.99 mm	13(13)	2.8 $\pm$ 0.29
3-4.99 mm	43(43)	4.10 $\pm$ 0.55
$\geq$ 5 mm	26(26)	5.9 $\pm$ 0.66
Total	100(100)	3.94 $\pm$ 1.05

Table 2. Frequency distribution of the patients according to the AL

The level loss of adherence	N (%)	Mean $\pm$ SD
1-2 mm	9(9)	1.7 $\pm$ 0.36
3-4 mm	41(41)	3.7 $\pm$ 0.92
$\geq$ 5 mm	50(50)	7.5 $\pm$ 1.4
Total	100(100)	5.5 $\pm$ 2.5

Table 3. The average of gingivitis in the two studied age groups according to mm

Age (year)	Mean $\pm$ SD	Number
40-59	2.80 $\pm$ 1.58	49
60-85	3.81 $\pm$ 2.10	51
Total	3.31 $\pm$ 1.9	100

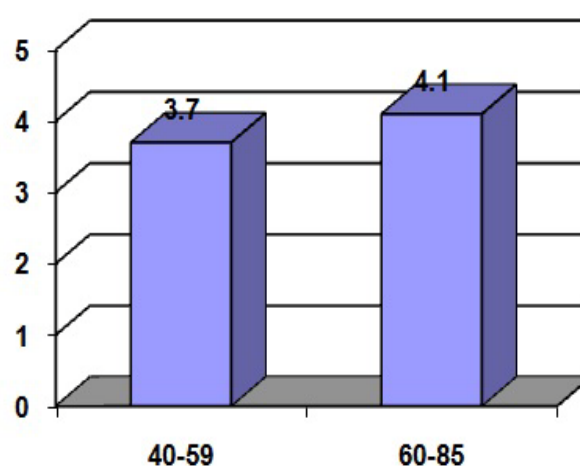


Figure 1. Figure of PD considering the age group

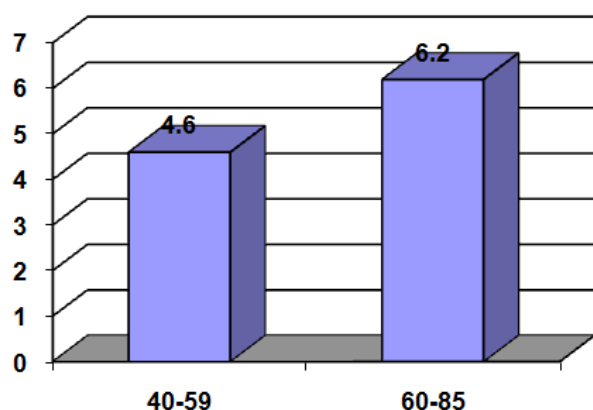


Figure 2. Figure of AL in the study group according to the age groups

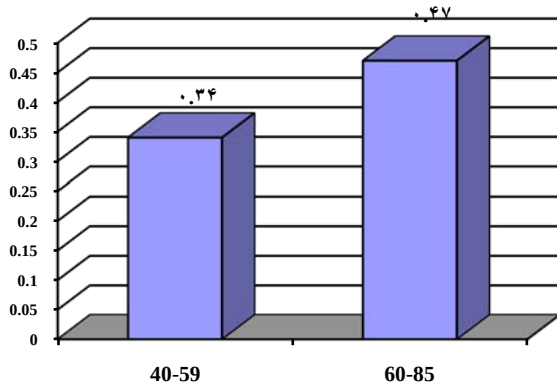


Figure 3. The average of bone loss in the two studied age groups

Discussion

In this study, 92% of the subjects had more than 10% plaque accumulation and were mostly in upper age groups. High plaque accumulation in these people can be the result of poor oral hygiene due to their limited ability as a result of disease especially in upper age groups. Syrjanen et al. obtained results similar to our study. Patients with poor oral hygiene and high amount of plaque and debris were exposed to cardiovascular diseases twice as much [20].

In the present study, patients with CAD were classified into 4 groups according to PD; the frequency of those with pocket was 3.43-4.99 mm. Also, deep pockets of more than 4mm with loosening and tooth loss were seen in 26% of the patients which is a high amount. According to previous studies in normal people of the society, the frequency of people with average PD (3-5 mm) is more at upper age groups. The high amount of PD in the subjects with high plaque accumulation justifies the relationship with their CAD. According to the study of Destefano et al., the incidence of CAD in people with more than 3mm PD in all their teeth was threefold [21].

In the present research, AL > 5 mm was found in 50% of the patients indicating that attachment loss is severe in patients with CAD which may be the direct result of disease or improper and horizontal brushing as a result of

disease weakness. Also, attachment loss in the upper age group was more which may be due to high plaque accumulation in this group.

According to the study of Nakib, the probability of coronary artery calcification (CAC) in those with average or severe periodontitis was 100% more than those with no or poor periodontitis [22]. The amount of bone resorption or bone loss in half of the subjects of the study was 20-39% and in another half was 40-60% (regarding the 6.7% who had less than 20% resorption). 40-60% resorption is indicative of significant alveolar bone loss, and this is while bone resorption is calculated in the remained teeth and so the average bone resorption of all the teeth in case of calculating the bone resorption of the extracted and lost teeth, would be a more significant amount.

The lower amount of bone loss in relation to attachment loss but proximity to it, confirms the fact that bone loss is a delayed representative of attachment loss. Slight bone resorption cannot be observed in panoramic radiography; therefore, any slight change of periodontal tissues in the radiography cliché means that destruction has passed its early stages [23]. According to the study of Beck et al., those who had more than 20% bone resorption were exposed to CAD 50% more than those who had between 0-20% resorption [16]. Likewise, more bone loss was obtained in the upper age group. The result can be due to the fact that periodontitis is a disease related to age and in fact the long confrontation period of periodontal tissues with chronic plaque accumulation will increase the prevalence of the disease [24].

In our study, the average of GR (gingival resorption) in the age group of 60-85 years old was more than the age group of 40-59 years. Although this increase of resorption can be associated with the increase of gum resorption as a result of aging but attachment loss is not always observed with aging rather, the increase of keratinized gingival sometimes can sometimes be observed with the increase of age and this point should not also be neglected. Therefore, due to the significant increase of GR which is observed in the age group of 60-85 years, probably part of GR in these patients is associated with CAD or poor plaque control of the patients which is the indirect effect of the disease.

The results of the present study indicated the relationship between CAD and high periodontal index, but we cannot claim that the observed change in the indices is only due to coronary artery diseases. Other factors such as systemic diseases, high blood pressure and cholesterol, economic and social factors, diet and physical activities are also important. Therefore, understanding the main role of coronary artery diseases and periodontitis in relation to each other requires more studies.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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