International Journal of Medical and Health Research
ISSN: 2454-9142; Impact Factor: RJIF 5.54
www.medicalsciencejournal.com
Volume 2; Issue 4; April 2016; Page No. 27-31

Evaluation of periodontal indexs in chronic obstructive pulmonary disease patients

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Abstract
Regard to incidence of chronic obstructive pulmonary disease and because of high prevalence of periodontal disease in this patient, and complication to human's health we decided to carry out the study.
The aim of this study was to evaluate the periodontal state in patient with COPD admitted to pulmonary center of Bu'Alisina hospital in Qazvin.
Method & Material: The study was descriptive cross-sectional and conducted in 106 patient with COPD with the mean age of 52.33 years, who had at least eight natural teeth. After entering the study the demographic data including age, sex, job, education, medical history, smoking, drinking and… Were recorded and an undergraduate dental student under supervision of periodontist performed clinical examination such as plaque Index (PI), Bleeding Index (BI), pocket depth (PD)and clinical attachment loss (CAL) using a periodontal probe and a dental mirror. Finally, the data analyzed by using SPSS descriptive statistic.
Result: The result indicated the mean periodontal index PI, BI and max PD was 82.58%, 83.36% and 5.9mm respectively. All 106 patients had gingivitis, however 101 (95.3%) of them had some degrees of periodontitis, additionally. Our data show that periodontal indexs increased with age and systemic disease and decreased by having higher education and brushing.
Conclusion: In conclusion, Periodontal Indexes increased in patients with COPD and chronic periodontal disease were common to them. By fact that periodontal disease is multifactorial and in this patients so many factors such as high age, Poor oral hygine&… interfered the, association between COPD and periodontal disease, to be confirmed by further research. By recognition of the importance of preventive dentistry, it is recommended to offer special dental cure for these patients.

Keywords: Chronic obstructive pulmonary disease- periodontal disease- periodontal indexes.

Introduction

The lung disease has specific mortality rate in human populations. These diseases are widely prevalent and serious effects on human health and impose demanding high treatment costs.
Chronic obstructive pulmonary disease (COPD), also known as chronic obstructive lung disease (COLD), and chronic obstructive airway disease (COAD), among others, is a type of obstructive lung disease characterized by chronically poor airflow. It typically worsens over time. The main symptoms include shortness of breath, cough, and sputum production [1]. Most people with chronic bronchitis have COPD [2]. Worldwide, COPD affects 329 million people or nearly 5% of the population. In 2012, it ranked as the third-leading cause of death, killing over 3 million people [3]. The number of deaths is projected to increase due to higher smoking rates and an aging population in many countries [4]. It resulted in an estimated economic cost of $2.1 trillion in 2010 [5]. COPD includes different sub-groups, such as emphysema, chronic bronchitis, or a combination of them in one patient [6]. And most patients are with chronic bronchitis and emphysema [7]. COPD can due to infection, exposure, sensitivity of the airways, smoking and lack of factor XI antitrypsin [8]. It is also seen in men than women, and more common in people who are born with low weight [9].
Periodontal diseases are common and make up 90% of the world population [9]. Periodontal disease is a degenerative disease of the tissues supporting the teeth. It is a progressive disease and the imbalance between subgingival plaque - especially Gram negative bacteria - and the host defense against this disease. Moderate and severe periodontal disease with a prevalence of approximately 10-15% of the adult population in which the prevalence increases with age. Smoking and diabetes mellitus as a risk factor for periodontal diseases are considered. Many of periodontal disease with systemic inflammatory disease and decreased levels of C-reactive protein (CRP) are associated [10].
Recently, evidence of the development of respiratory infections in the mouth are presented. Several potential mechanisms to explain the role of oral bacteria in the pathogenesis of respiratory infections have been proposed:

1. Oral pathogens like Porphyromonas gingivalis and Aggregati bacteractino mycetem comitansas piration into the lungs can cause infections.
2. Periodontal diseases are associated with enzymes in saliva that may alter the mucosal surface adhesion and colonization of respiratory pathogens hasten.
3. Enzymes that may be associated with periodontal disease, may destroyed salivary pellicle which prevents bacteria on the mucosal surface.
4. Cytokines which were emanating from the periodontal tissues may alter the respiratory epithelium, and it is prone to infection by pathogens breathe [7].

Gingivitis is the mildest form of periodontal disease is caused by plaque to build up on the teeth and adjacent gums.

However, gingivitis has reversible effect and has no effect on supportive underlying tooth structure. Periodontitis as a result of the loss of connective tissue and bone support and is the major cause of tooth loss in the elderly [9].

Except for pathogens that are present in dental plaque, genetics, environmental factors, especially smoking, systemic diseases and conditions, including pregnancy, cardiovascular disease, osteoporosis, respiratory diseases and diabetes increase the risk of periodontal disease [9]. but the reason for this relationship is unknown [9]. However, recent attention has been paid to the relationship between periodontal disease and COPD [11]. In patients with periodontal disease, bacteria in the sulcus or periodontal bacteria in periodontal pockets simply enter the blood stream. These microorganisms may be associated with inhaled into the lungs, but the most important way for transmission of infection is through oropharyngeal secretions; Resulting in the transfer of the microorganism to the lungs and respiratory system, infection can cause COPD [9]. Azarpazhooh and colleagues in 2006 in a systematic study on the relationship between respiratory disease and oral hygiene revealed a correlation between pneumonia and oral hygiene; So that daily oral health care, will reduce the incidence and progression of lung disease. In fact, some studies of the oral cavity as a source of primary pulmonary pathogens known mechanisms have been proposed for it. The results of similar studies show that the flora of the mouth and lungs have similar infectious microorganisms. Oral bacteria enter through saliva, plaque and eventually result in aspiration into the upper respiratory tract and then inserted into the lower respiratory tract, where they will replicate and cause infection [12]. Many epidemiologists study have found a positive association between periodontal disease (PD) and risk of chronic obstructive pulmonary disease (COPD), but this association is varied and even contradictory among studies [13]. This study aimed to assist the periodontal status of patients with chronic obstructive pulmonary disease.

Materials and Methods

This cross-sectional study was done the Bou Ali hospital in Qazvin (2012-2013) on 106 COPD patients... Inclusion criteria was COPD disease, between 30-70 years of age, have at least 8 teeth and fill out the questionnaire (was design with respect to variables).

A total of 198 COPD patients admitted, 72 of edentulous, 15 Because of its natural teeth less than 8 and 5 patients were excluded due to a lack of willingness to examinations and the results of the remaining 106 patients were enrolled. The periodontal diseases as measured by the plaque index (PI), bleeding index (BI), pocket depth (PD), clinical attachment loss (CAL) were assessed by a dental intern under the supervision of periodontist.. Such informations as age, sex, occupation, education, visit the dentist, brushing several times a day, history of systemic disease, alcohol consumption, smoking history were collected by questionnaires. Periodontal parameters such as plaque index (PI), pocket depth (PD), bleeding index (BI) and clinical attachment loss (CAL) was recorded as follow:

PI: surfaces of the teeth including buccal, lingual, mesial and distal surfaces of each tooth after chewing disclosing tablets are colored.

BI: percentage of buccal, lingual, mesial and distal surfaces of each tooth have bleeding which are faces up to 30 seconds after probing, with Williams probe.

PD: the distance between the crest of the free gingival pocket depth for each tooth in the buccal, lingual, mesiobuccal, disto buccal, mesiolingual and distolingual measured with milimeter by Williams probe and the most depth of pocket for any person (maxPD) were reported [13].

CAL: the distance between the CEJ to pocket depth in both buccal and lingual surfaces of each tooth measured with millimeter by Williams probe and severity of periodontal disease were categorized according to the CAL for each patient [13].

- 1-2 mm = mild
- 3-4 mm = moderate
- more than 5 mm =severe [13]

Finally, the data were compared and analyzed by Kruskal Wallis, Chi square and t-tests.

Findings

This study included 106 patients with COPD, with a minimum age of 33 years and maximum 70 years with average age of 33-52 years, standard deviation was 9.17 and with a mean number of teeth 14.6 with standard deviation 6.1 was done. (Table 1)

□	In this study found that the majority of patients (85.8%), did not go to the dentist or, rarely visited the dentist. 9.4% of them visited the dentist just one time a year and 1.9% visited a dentist 2 times per year and 2.8% go to the dentist more than 2 times per year.
□	17.9 % of the patients 1 time, 8.5 percent 2 times and 3.8 percent more than 2 times per day brushed their teeth, and unfortunately most of people (69.8%) rarely or never brushed their teeth.
□	90.6 percent of the patients did not used other devices than brush for oral hygiene. 4.7 percent are rarely used and 4.7 percent are used regular flossing and mouthwash.
□	A total of 106 patients, all of whom were diagnosed with COPD, some of them had history of cardiovascular disease, and history of diabetes in addition to COPD. (Table 2)
□	Out of the patients studied, 10 patients (9.4%) who were farmer, had a history of contact with agricultural fertilizers (Organophosphates).
□	In the history of alcohol consumption, 7 people responded positive that3 of them (2.8%) for 5 years, 1 person (0.9%) for 8 years, 2 patients (1.9%) for 10 years and 1 patient (0.9%) over 16 years had a history of alcohol consumption.
□	14 patients (13.2%) were smoking between 1-10 Pack year, 31 people (29.2%) between 20-11 Pack year, 28 patients (26.4%) between 21-30 Pack year and 16 (15.1%) more than 30 Pack year had a history of smoking. 9 patients (8.5%) use tobacco (hookah) and 8 patients (7.5%) had no history of smoking. The total amount of smoking in men were more than in women.
□	The majority of subjects had oral habits. Oral habits such as mouth breathing and bruxism was observed.
□	Patients with COPD had taken one or more of these drugs such as salbutamol, theophylline, hydrocortisone, prednisone, beclomethasone, atronet, cefixime, ceftriaxone, ciprofloxacin and azithromycin. In case of COPD patiets who are ingage cardiovascular disease, theme decine used in treatment is included: Lazyks, digoxin, aspirin, propranolol, nife dipine and TNG which is these patients had used some of these drugs; and also COPD patients who had diabetes, the medications used are: Glibenclamide, metformin and insulin.
□	The minimum amount of plaque index (PI) was 23% and a maximum was 82.58% with an average standard deviation was 18.85. None of the subjects had ideal plaque index 0-20%. 12 persons (11.3%) had plaque index between 20-50 %, and according to periodontal tissue, 94 patients

	(87.7%) had inappropriate plaque index (more than 50%).(Table3)
□	The higher amount of plaque index of these patients due to poor oral hygiene and lack of oral hygiene procedures during hospitalization of patients was justified.
□	The maximum amount of each individual pocket depth (mm) was reported that minimum 3 mm and maximum 9 mm with the mean 5.93 mm standard diviation was 1.48. 22 patients (20.8%) had less than 5 mm in highest rate of poket depth and 84 patients (79.2%) had more than 5 mm in highest rate of poket depth (Table 4).
□	The minimum amount of bleeding index (BI) was 25% and a maximum 100%, wi th an average of 83.36% and the standard deviation was 15.05, which was matched with the percentage of plaque index (Table 5).
□	All 106 patients showed some degree of gingivitis and in addition to gingivitis, all of 101 subjects had also various degrees of periodontitis. This study reported that 40 patients (37.7%) had generalized severe chronic periodontitis, 40 patients (37.7%) had generalized moderate and moderate to severe chronic periodontitis, 13 patients (12.2%) had generalized mild and mild to modera te chronic periodontitis. 6 persons (5.6%) due to the fact that less than 30% of the areas affected by periodontal disease

Were diagnosed with locolized chronic periodontitis. 2 persons (1.8%) with the age of less than 35 years and no proportional to the m ass of the plaques and periodontal disease were diagnosed with aggressive periodontitis. 5 patients(4.7%) had only gingivitis without loss of clinical attachment were diagnosed with gingivitis.

Discussion

This Cross-sectional research studied to assess periodontal indixes (PI, BI, PD, CAL) in COPD patients.

□	The results obtained in this study indicate that the periodontal parameters were observed in COPD patients with a lower age and with increasing the age, the average of periodontal index and severity of periodontal disease were increased. This results corresponded with the results of Mr. Hayes and colleagues studies in 1998 [14].
□	Periodontal parameters in patients with primary education and literacy levels were higher than in those patients with univer sity education were minimal. But because only a small percentage of the total sample were in educated group and those with a college education were less than age, as a result of the relationship between periodontal status and educational level will require more samples. Although it is possible that individuals with higher levels of education, income levels and economic situation improved and thus improve the quantity and quality of health care.
□	The high percentage of PI and BI in most cases, Due to the poor oral hygiene and tooth brushing and the use of other methods for care of the oral hygiene, the annual visit to the dentist and this condition is justified due to this fact that these people were admitted to hospital and despite of unfavorable conditions f or plaque control methods that they were not able to do. These results are consistent with the results of the investigation, Mr. Scannapieco FA and Russell SL and colleagues [16, 17].
□	Results show that the presence of systemic diseases (cardiovascular dise ase and diabetes) make worse periodontal condition and these findings correspond with the results of some dental authorities [18].
□	Use of medications with effects on the immune system, decrease or alter the normal flora of the mouth saliva and periodontal health status. Considering the fact that most patients with COPD had a history of long-term inhaled or intravenous use of corticosteroids. The high levels of plaque accumulation and inflammation and periodontal disease can be linked to use of steroid, but these results with the results of similar research in 2005 by Komerik N, *et al* does not conform [19].
□	Smoking is the main risk factor for COPD disease, but in this study, there are some patients with COPD (20.7%) with non-use or limited use of tobacco. In this condition we can be link COPD disease to genetic factors (lack Alpha1antitrypsin). This result are consistent with the results of COX DW *et al* in 1976 [15]. and corresponded to some medical authorities. [7]. Moreover, the periodontal conditions in thes e people (who had a history of nonuse or limited use of tobacco), were more favorable. So we can conclude that Alpha1- antitrypsin deficiency in the pathogenesis of periodontal disease is match the result of interference with Scott DA in 2002. [20]. From the above, it can be concluded that smoking is a joint ring (risk sharing) between COPD and periodontal disease.
□	Prevalence of reducing the number of teeth and edentulous patients with COPD in the study are consistent with the results of the investigation by Kowalski M, *et al* (2005).

The cause of this matter probably due to share risk factors between COPD and periodontal diseases [21].

□ High incidence of periodontal disease in subjectsis consistent with the results of most studies [22, 23, 24]. however, due to the fact that periodontal disease is multi-factorial and the patients in addition to COPD had various risk factors (such as age, poor oral hygiene, lack of regular visits to the dentist annually, low education, poor economic conditions, a systemic disease, medication, oral habits, etc.). So we can say that chronic obstructive pulmonary disease alone cannot cause periodontal disease and periodontal disease alone cannot cause of developing COPD. Even if proof of COPD as a risk factor or aggravating factor for periodontal disease, this disease without others factors has no obvious and significant factor between many factors affecting the incidence of periodontal disease. To prove the relationship between COPD and periodontal disease requires a much broader epidemiological studies as well as studies on the effects of confounding factors as much as possible to reduce them.

Table 1: Demograghic Analysis

Demographic Variable	Frequency	Percentage (%)
Gender		
Male	87	82.1
Female	19	17.9
Age		
30-39	15	14.2
40-49	27	25.5
50-60	44	41.5
60 and above	20	18.8
degree		
Primer and secondary	85	80.1
Diploma	14	13.2
University degree	6	5.6
Islamic courses degree	1	0.9
Employment		
Farmer	41	38.7
Worker	31	29.2
House wife	15	14.2
Unemployedand others	5	4.7

Table 2: Frequency distribution of systemic disease in COPD patients accepted byQazvin's hospital

Type of disease	frequency	percentage
Heart disease+ COPD	22	20.8
COPD + Diabetic	10	9.4
COPDonly	74	69.8
Sum	106	100

Table 3: Frequency of plaque index (PI) in COPD patients accepted Qazvin's hospital

PI	frequency	percentage
0-20	0	0
21-40	5	4.8
41-60	11	10.4
61-80	11	17.9
81-100	11	66.9
Sum	101	100

Table 4: Distribution of the maximum amount of pocket depth (maxPD) in COPD patients accepted byQazvin's hospital

PD(mm)	frequency	percentage
3-4	1	*5.7*
4-5	11	*15.1*
5-6	00	*28.3*
6-7	30	*21.7*
7-8	15	*14.1*
8-9	11	*15.1*
Sum	101	*100*

Table 5: Distribution of periodontal disease in COPD patients accepted by Qazvin's hospital

BI	frequency	percentage
Less than	7	6.6
50	2	1.8
51-60	8	7.5
61-70	16	15.1
71-80	36	34.1
81-90	37	34.9
91-100 Sum	101	100

Conclusion

Since the information on the relationship between periodontal disease and systemic factors is not enough but this relationship should never be ignored. Such these information provided for students and practitioners in this field and they can use in their examination, diagnosis, treatment and prevention. Nowadays, the principle of prevention is more better than treatment and dental treatment is more costly and also COPD patients require special considerations; therefore prevention of periodontal disease in these cases are necessery.

The periodontal indexes increased in COPD patients with chronic periodontal disease is also common in these patients. Due to this fact that periodontal diseases are multi-factorial and in patients with COPD are many factors such as older age, poor oral hygiene and etc. that involve between COPD and periodontal disease so we need more studies in this field. With consideration to importance of preventive dentistry, we recommend to creation of specific dental care facilities for these kinds of patients.

Dentists are playing their critical and important roles to prevent or stop the progression of periodontal disease in people who have COPD.

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