

Periodontal Health Status of Patients with Broncho-Pulmonary Diseases at the University National Hospital Center of Fann (Senegal)

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Original Research Article

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Article History

Received: 12.02.2018

Accepted: 19.02.2018

Published: 28.02.2018

DOI:

10.21276/sjds.2018.5.2.10



Abstract: Periodontal disease is an infectious disease associated with various systemic diseases. The objective of this study was to evaluate the periodontal status of subjects with broncho-pulmonary infections in hospital environment. This was a cross-sectional descriptive study based on recruitment of hospitalized or consulting patients to the Pneumology Department of Fann Hospital. Patients with tuberculosis were not included. The level of hygiene was evaluated by the Silness and Løe plaque index; inflammation by the gingival index of Løe and Silness. A sample of 70 patients including 25 women and 45 men was selected for this study. The prevalence of bacterial pneumonia was 54.3% that of chronic obstructive pulmonary disease (COPD) was 22.9%. The average plaque index was 1.7 ± 0.2 . Plaque index scores were higher in patients with COPD (2.1 ± 0.3). Mean gingival inflammation (1.5 ± 0.2) was recorded in 83% of patients. Collaboration between pulmonologist and periodontologist is necessary to limit the deleterious effects of a bad oral condition on general health.

Keywords: Periodontal health, respiratory diseases, hospital.

INTRODUCTION

Periodontal health is a delicate balance between the aggressiveness of the oral microbiota and the response of the host. Any disturbance of this equilibrium will lead to the appearance of infectious and inflammatory clinical manifestations such as gingivitis or periodontitis [1]. Respiratory diseases include acute conditions such as pneumonia and bronchitis, or chronic conditions such as asthma and chronic obstructive pulmonary disease (COPD). Periodontal diseases and chronic respiratory diseases share several risk factors, including smoking and alcohol [2].

There are also epidemiological data showing an increased risk of COPD in patients with periodontitis. Odds ratios (OR) range from 1.8 to 4.5, [3, 4].

Bacterial biofilm is a source of oral pathogens such as *Porphyromonas gingivalis* (Pg), *Aggregatibacter actinomycetemcomitans* (Aa), and may increase the risk of respiratory disease [5]. These oral bacteria from the biofilm can be aspirated into the airways and influence the initiation and progression of systemic infectious diseases such as pneumonia [6]. However other factors are necessarily present to cause the disease like the decrease of the pulmonary immune defenses.

Prospective cohort studies have shown beneficial effects in the prevention of respiratory complications of infectious origin. The benefits include not only the reduced use of emergency services, hospitalization and admission to intensive care, but also the reduction of mortality [7]. A good level of evidence has also been established from intervention studies indicating the positive effects of oral hygiene on the prevention of nosocomial pneumonia with a longer effect when 2% chlorhexidine is used [8].

During periodontal Inflammation due to Bacterial Challenge, periodontal pathogens and virulence factors associate with blood circulation through transient bacteremia. Thus cytokines produced by periodontal bacteria promote the cytokine chain production by respiratory epithelial cells to recruit

inflammatory cells producing hydrolytic cytokines that damage the epithelium.

Periodontal medicine corresponds to a double relationship in which, on the one hand, periodontal diseases have a deleterious influence on certain systemic diseases and on the other hand, general pathologies such as respiratory diseases aggravate the evolution and severity of periodontitis [1].

The onset of periodontal diseases is therefore dependent on the accumulation of bacterial biofilm resulting from poor plaque control and resulting in inflammation of the superficial periodontium.

Thus, the objective of this work was to evaluate the health of the superficial periodontium by measuring the hygiene and inflammation index in patients with bronchopulmonary diseases at the department of pneumology at the National University Hospital Center Fan.

MATERIALS AND METHODS

This was a descriptive cross-sectional study that lasted four months at the Pneumology Department of the National University Hospital Center in Fann. It involved 70 patients recruited from among patients who had been hospitalized or had come for consultation with a diagnosis of bronchopulmonary disease. This one was based on the clinic, the chest X-ray, the biology and was confirmed by the pulmonologist. All adult hospitalized or outpatients with bronchopulmonary disease and at least 50% of their dentition were included in the study.

Patients with tuberculosis and those who received periodontal therapy in the 6 months preceding the study were not included. Clinical observation was performed by a single trained periodontal examiner and calibrated to periodontal charting and periodontal index measurements.

Patient interview data and periodontal examination data were recorded in a survey form for this purpose. Medical data (chest x-ray, blood culture, NFS, etc.) were obtained from the medical file.

The equipment used for the examination of each patient consisted of an examination tray comprising a mirror, a cabinet sheath, a probe 6, a Williams's periodontal probe graduated for the measurement of pocket depth and clinical attachment level.

For each subject included in the study, periodontal examination was performed after the medical consultation. The parameters studied were the socio-demographic characteristics (age, sex, ethnicity, occupation and level of schooling) and the measurement of periodontal indices. The plaque index of

Silness and Loe [9] allowed appreciating the level of plaque control. The evaluation of which was made according to the classification scale suggested by Wilkins [10].

The gingival index of Loë and Silness (GI) [11] evaluated inflammation of the gingiva as well as the tendency to bleed during periodontal probing. The interpretation of the gingival index was also made according to the evaluation scale suggested by Wilkins [10].

The data was analyzed from the sphinx program. SPSS 20.0 software was used to calculate frequencies, averages, standard deviations and percentages. The threshold of significance was set at 5%.

The study was carried out in accordance with the legal and ethical aspects in line with the Declaration of Helsinki on the protection of persons who are suitable for biomedical research and with the agreement of the medical authorities of the hospital.

RESULTS

Sociodemographic characteristics

The sample consisted of 70 patients, 25 women (35.7%) and 45 men (64.3%), a sex ratio of 1.8. The mean age of the study population was 42 ± 4.2 , with extreme ages ranging from 16 to 80 years. The most representative age group was between the ages of 15 and 24 (Figure 1).

Nosological profile

Bacterial neuropathies were the most frequent (54.3%) against 22.9% for COPD. The study of the distribution of risk factors according to bronchopulmonary disease shows that in the majority of cases, tobacco was the most frequent risk factor (41.7% in COPD, 41.7% in pleurisy) (Table I).

Periodontal index

Plate Index (PI)

The average plaque index was 1.7 ± 0.2 . A plaque check average was recorded in 48.6% of patients (Figure 2).

The study of the distribution of plaque index according to the type of bronchopulmonary disease showed that patients with COPD had a higher mean plaque index. No statistically significant difference was found between mean PI scores in the different groups ($p = 0.173$) (Table II).

Gingival inflammation index (GI)

The mean score of the gingival inflammation index was 1.5 ± 0.2 . Severe gingival inflammation was present in 32.9% of the subjects (Figure 3).

The distribution of the gingival index as a function of the bronchopulmonary disease revealed that the average inflammation index was substantially

identical in the 4 groups and no statistically significant difference was noted ($p = 0.471$) (Table III).

ILLUSTRATIONS

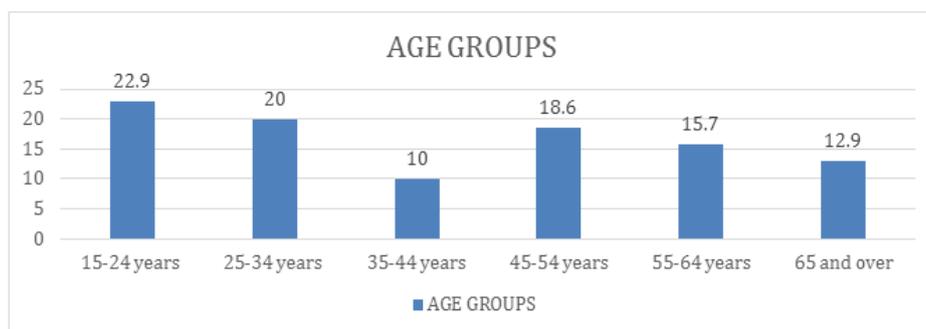


Fig-1: Distribution of the sample by age

Table-I: Distribution of risk factors according to bronchopulmonary disease

RISK FACTORS	PNEUMOPATHIE %	COPD %	PURULENT PLEURESIS %	PULMONARY ABSCESS %
Tobacco	41,7	41,7	16,6	0,0
Alcohol	25,0	50,0	25,0	0,0
Diabetes	50,0	25,0	25,0	0,0
Asthma	71,4	28,6	0,0	0,0



Fig-2: Distribution of the sample according to the plate index

Table-II: Plaque index according to the type of respiratory disease

nosological type	n	average plate index m	p-value (test ANOVA)
Bacterial Pneumonitis	38	1,7 ± 0,3	P=0,173
COPD	16	2,1 ± 0,3	
Purulent Pleurisy	11	1,5 ± 0,4	
Pulmonary Abscess	5	1,5 ± 0,4	
Total	70	1,7 ± 0,2	

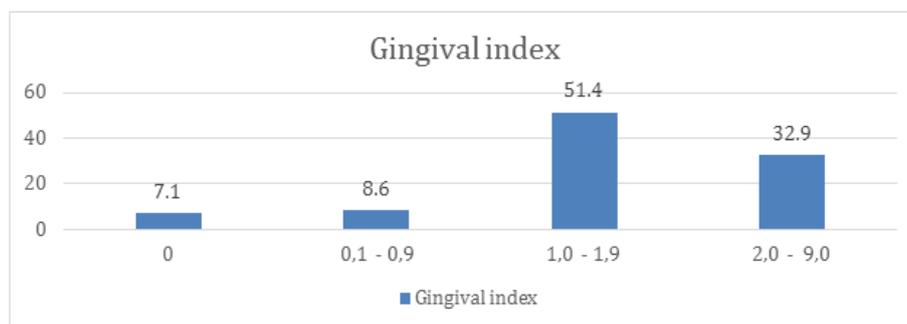


Fig-3: Distribution of the sample according to the gingival inflammation index

Table-III: Gingival index depending on the type of respiratory condition

nosological type	n	Average gingival index m	p-value (test ANOVA)
Bacterial Pneumonitis	38	1,5 ± 0,2	P=0,471
COPD	16	1,7 ± 0,2	
Purulent Pleurisy	11	1,4 ± 0,5	
Pulmonary Abscess	5	1,2 ± 0,6	
Total	70	1,5 ± 0,2	

DISCUSSION

The present descriptive and cross-sectional study made it possible to evaluate the periodontal status of patients with bronchopulmonary disorders in the pneumology department of the National University Hospital Center of Fann (Senegal).

Limitations of the study and methodological considerations

This work has limitations related to the level of evidence of cross-sectional descriptive studies in general. The size of the sample is not representative of patients with bronchopulmonary diseases who come to the Pneumology Department of Fann hospital in Dakar. Indeed, not all patients with tuberculosis because of the risk of transmission of the infection were included while they constitute more than 50% of the consultation.

A control group would also have made it possible to verify the existence or not of an association between periodontal diseases and respiratory affections.

However, this work on evaluating the periodontal status of patients with respiratory conditions will facilitate further studies with stronger evidence in terms of level of evidence.

Socioprofessional characteristics

The sex ratio (1.1) is marked by a slight male predominance. This trend is not far from that found by PRASANNA J *et al.* in 2013 in a similar study conducted in Indian hospitals that was 1, 8 [12]. This may be because men are more exposed to smoking and alcohol.

The average age of our sample (42 years old) is slightly lower than that found by Scannapieco *et al.* who had observed an average age of 44.4 years in a retrospective study (1988 to 1994) carried out on a US population [13]. But the average age found in our sample is similar to that found in India by PRASANNA J [12].

Nosological profile

Of our study population of 70 patients, bacterial pneumopathies were the most frequent (54.3%) against 22.9% for COPD. Pulmonary abscess and purulent, non-tuberculous pleurisy account for less than one-third of conditions (22.8%).

The distribution of nosological groups is different from that found by the World Health Organization (WHO) in 2006, which reported a predominance of COPD [14].

Oral plaque control

The dental biofilm is a reservoir of oral pathogens creating an environment conducive to secondary colonization by respiratory pathogens (pneumococci). These will break off into oral secretions and be sucked into the lungs to contaminate the lower respiratory tract. The periodontium can also serve as a reservoir for respiratory infections [15-17]. However other factors are necessarily present to cause the disease like the decrease of the pulmonary immune defenses.

Dental brushing and scaling represent the individual and professional means of mechanical disruption of the bacterial biofilm.

This work revealed in relation to plaque control that 48.6% of the patients examined had average

oral hygiene that could have deleterious effects on their oral health. Patients aged > 65 years had an average plaque index of 61.09%. This observation is related to a bad mechanical disorganization of the biofilm. The lack of manual dexterity at this age could explain this faulty plaque control.

COPD patients had a higher mean plaque index. No statistically significant difference was found between mean PI scores in the different groups ($p = 0.173$). Our results are in line with the meta-analysis published by Scannapieco *et al.* concluding that periodontitis and poor hygiene are associated with nosocomial pneumonia following oral colonization of respiratory pathogens and that COPD are associated with periodontitis [4].

Gingival inflammation

Gingival inflammation represents the primary response of periodontal tissues to bacterial aggression. This inflammation can be appreciated by the GI bleeding index (Gingival Index of Loe and Silness) [9].

During prolonged periodontal inflammation, oral bacteria aspirated with respiratory pathogens influence their adhesion by stimulating the production of cytokines inducing cellular changes in the respiratory epithelium.

In this study, the mean score of the gingival inflammation index was $1.5 \pm 0, 2$. Severe gingival inflammation was present in 32.9% of the subjects. These results are consistent with epidemiological data obtained in Canada showing a prevalence of over 80% for gingivitis [18]. In contrast to the plaque index, the distribution of gingival index as a function of bronchopulmonary infection revealed that the mean inflammation index was approximately identical in the 4 groups and no statistically significant difference was noted. ($p = 0.471$).

Since the biofilm is an irritant for the gingiva, this high value of gingival bleeding index (GI) in the study population may be related to the importance of local factors (bacterial biofilm).

CONCLUSION

This work suggests that patients with bronchopulmonary disease have poor plaque control associated with moderate to severe gingival inflammation that may trigger periodontal disease in permissive hosts.

In hospitals, dental problems can often be considered secondary to a general pathological situation. However, pulmonologists must collaborate with dental surgeons for a multidisciplinary approach to the management of patients with respiratory conditions in hospitals.

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