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Original Research

Evaluation of prevalence of periodontitis in patients with pulmonary disease

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ABSTRACT:
Background: Systemic illness may often impact dental health. Indeed, several studies have associated periodontitis with other systemic diseases such as type 2 diabetes mellitus, cardiovascular and pulmonary diseases. Hence, it can be hypothesized that oral health may be an important indicator of systemic status, including respiratory diseases such as chronic obstructive pulmonary disease (COPD). An irritation to a limit is acceptable by the immune response of our body, but when this crosses normal protective response, it leads to COPD causing lung injury. **Aim of the study:** To evaluate prevalence of periodontitis in patients with pulmonary disease. **Materials and methods:** The present study was conducted in the Department of Periodontics of the dental institutions. The ethical clearance for the study was approved from the ethical committee of the hospital. A total of 120 patients between age group of 12-70 years were selected from the outpatient department of pulmonary diseases. The data were collected by a single investigator using a questionnaire, and clinical examination was done to record the periodontal disease index (PDI) and periodontal index for risk of infectiousness (PIRI). **Results:** In our study group, 59 male patients and 41 female patients were included. We observed that most common pulmonary disease in males was COPD. On the contrary, most common pulmonary disorder in females was TB. Among the whole study group, the highest number of patients had tuberculosis, followed by COPD. The periodontal infectiousness score was high for 51 patients, moderate for 31 patients and low for 18 patients. The highest number of high risk patients had TB (n=21) and COPD (n=17). **Conclusion**: Within the limitations of the present study, it can be concluded that patients with pulmonary disorders are under high-risk category for periodontal diseases.
Keywords: periodontitis, pulmonary disease, COPD, dental plaque

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Introduction:
Systemic illness may often impact dental health. Indeed, several studies have associated periodontitis with other systemic diseases such as type 2 diabetes mellitus, cardiovascular and pulmonary diseases. [1, 2] Hence, it can be hypothesized that oral health may be an important indicator of systemic status, including respiratory diseases such as chronic obstructive pulmonary disease (COPD).[3] The pathogens present in gingival sulcus or periodontal pockets in periodontal disease have direct access into the systemic blood; moreover, they also shed in the saliva and are further carried down into the respiratory tract where they cause irritation of the respiratory mucosa increasing the risk of COPD.[4] An irritation to a limit is acceptable by the immune response of our body, but when this crosses normal protective response, it leads to COPD causing lung injury.[5] Past literature has assessed the association between COPD and periodontal status.[6] Hence, the

present study was conducted to evaluate prevalence of periodontitis in patients with pulmonary disease.

Materials and methods:

The present study was conducted in the Department of Periodontics of the dental institutions. The ethical clearance for the study was approved from the ethical committee of the hospital. A total of 120 patients between age group of 12-70 years were selected from the outpatient department of pulmonary diseases. An informed written consent was obtained from the participants after verbally explaining them the protocol of the study. A detailed Questionnaire/case-history was taken including the various clinical signs and symptoms, history, diagnosis, and periodontal status of each patient. The data were collected by a single investigator using a questionnaire, and clinical examination was done to record the periodontal disease index (PDI) and periodontal index for risk of infectiousness (PIRI). PDI includes the plaque, calculus, and gingival/periodontal components each with a scoring range of 0-3 that are recorded on index teeth, i.e., 16, 21, 24, 36, 41, and 44. PIRI includes two components, (1) Pocket lesions based on the number of pockets with a certain depth with scoring range of 1–6, and (2) Furcation involvement based on the number and degree of furcation involvements with scoring of 1–4. The PIRI scores were put together, and the patients were then classified into three categories of risk of metastatic injury from the periodontal niches; low-risk group: PIRI = 0; moderate risk group: $1 \leq PIRI \geq 5$; and high-risk group: $6 \leq PIRI \leq 10$. The data obtained from both the indices was subjected to statistical analysis.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

Results:

Table 1 shows distribution of study population according to sex and pulmonary diseases. In our study group, 59 male patients and 41 female patients were included. We observed that most common pulmonary disease in males was COPD. On the contrary, most common pulmonary disorder in females was TB. Among the whole study group, the highest number of patients had tuberculosis, followed by COPD. [Fig 1] Table 2 shows the risk calculation for periodontal infectiousness score in study population. We observed that patients with respiratory disease has high probability of periodontal infections. The periodontal infectiousness score was high for 51 patients, moderate for 31 patients and low for 18 patients. The highest number of high risk patients had TB (n=21) and COPD (n=17). The results on comparing were found to be statistically significant. [Fig 2]

Table 1: DISTRIBUTION OF STUDY POPULATION ACCORDING TO SEX AND PULMONARY DISEASE

Sex	COPD	Pneumonia	TB	Total
Male	24	18	17	59
Female	8	11	22	41
Total	32	29	39	100

Fig 1:

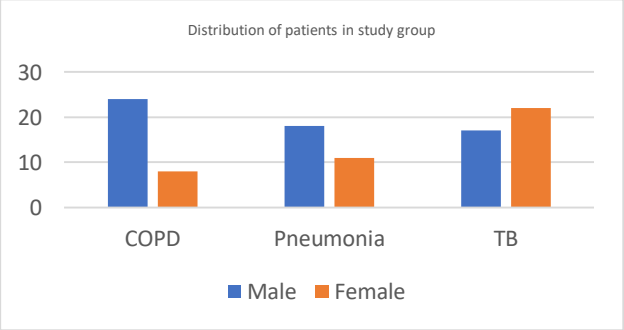
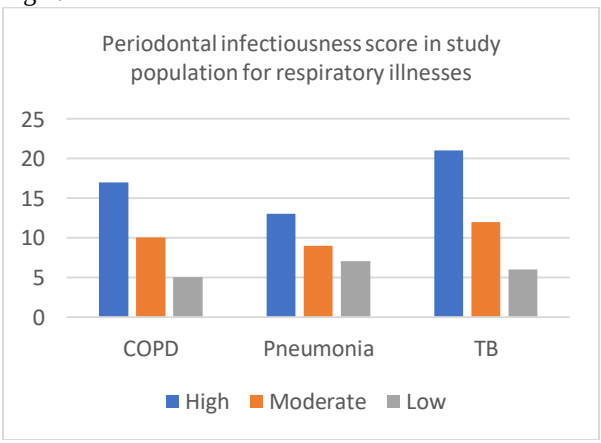


Table 2: Risk calculation for periodontal infectiousness score in study population

Risk category	COPD	Pneumonia	TB	Total
High	17	13	21	51
Moderate	10	9	12	31
Low	5	7	6	18

Fig 2:



Discussion:

In the present study, we determined the prevalence of periodontitis and evaluated the risk of infectiousness for periodontal diseases in patients suffering from pulmonary diseases such as TB, COPD, and PN. The overall sex ratio was 1.44:1 (male:female). Also, highest proportion of the study population was

categorized as high-risk category, followed by medium risk category, and the least as low-risk category. Rastogi T et al determined the prevalence of periodontitis among patients affected with various pulmonary diseases in Moradabad District, Uttar Pradesh, India. A total of 700 patients suffering from pulmonary diseases including tuberculosis (TB), chronic obstructive pulmonary disease, or pneumonia within the age group of 12–70 years were selected for the study. A detailed case-history for both pulmonary and periodontal status was taken. Periodontal Disease Index and Periodontal Index for Risk of Infectiousness were recorded for all patients. The scores were calculated and subjected to statistical analysis. Individuals with pulmonary diseases showed a statistically significant prevalence of periodontal disease with higher values of periodontal disease index (31%) and periodontal index for risk of infectiousness (55%) at $P < 0.05$. Patients suffering from TB within the age group of 51–60 (42%) showed the highest prevalence of periodontitis with a more number of males (43%) being affected as compared to females at $P < 0.01$. In conclusion, most of the study population was diagnosed with periodontitis with a higher proportion categorized under high-risk category as per PIRI scores. Bomble N et al compared the oral hygiene status and periodontal status of age and gender-matched participants with and without COPD and to correlate oral hygiene status and periodontal status with lung function status among them. This hospital-based study included a study population of 117 participants (39 patients of COPD and 78 participants without COPD) 35–75 years of age with at least 20 natural teeth. Participant's demographic details and history of smoking were recorded. Lung function was recorded using a spirometer. Periodontal health was assessed by measuring Probing Pocket Depth (PPD), Clinical Attachment Loss (CAL), and Oral Hygiene Index (OHI) by a trained and calibrated examiner. Higher mean of PPD, CAL, and OHI is being reported in the present study with 4.07 versus 3.50, 0.58 versus 0.24, and 5.24 versus 3.60, respectively, among patients with and without COPD which was statistically significant. The risk of having COPD was 0.4 times more in participants having poor oral hygiene and 0.07 times more in patients smoking. Smoking and oral hygiene, as independent variables, have a significant influence on COPD which is a dependent variable. A weak correlation was found of poor oral hygiene and loss of attachment among participants with COPD. They concluded that periodontitis and respiratory disease share a common risk factor, i.e., smoking. Smoking has a definite relation with periodontitis and COPD. Oral hygiene is significantly associated with increased risk for COPD when age and gender effects have been matched and when adjusted for smoking. However, no association was found of PPD with COPD. [7, 8]

Sakai H et al examined the prevalence of dental diseases in patients treated for digestive system cancers. The medical and dental records of patients treated for digestive system cancers were retrospectively reviewed, and the results obtained (decayed/filled/missing teeth [DMFT] indices and community periodontal index [CPI] codes) were compared with data from the national survey of dental diseases in order to investigate the relationship between oral health and digestive system cancers. DMFT, D, and F indices were significantly lower, while the M index was slightly higher in digestive system cancer patients than in the national survey. The proportions of individuals with more than 20 residual teeth and denture wearers were significantly lower in cancer patients than in the national survey. The prevalence of periodontitis (CPI codes 3 and 4) and severe periodontitis (CPI code 4) were significantly higher in cancer patients than in the national survey. The results showed that digestive system cancers were closely associated with multi-tooth loss and/or a low denture-wearing rate. The prevalence of severe periodontitis was also found to be higher in cancer patients. These results suggest that periodontitis and associated multi-tooth loss play a potential role in digestive system cancers. Shen TC et al evaluated the risk of periodontal diseases in patients with COPD in a nationwide population. From the National Health Insurance claims data of Taiwan, we identified 22,332 patients with COPD who were newly diagnosed during 2000 to 2010. For each case, two individuals without COPD were randomly selected and frequency matched by age, sex, and diagnosis year. Both groups were followed up till the end of 2011. The overall incidence of periodontal diseases was 1.19-fold greater in the COPD group than in the comparison group (32.2 vs 26.4 per 1000 person-years; 95% confidence interval [CI] 1.15–1.24). Compared with non-COPD patients, the adjusted hazard ratios of patients with COPD increased with the number of emergency room visits (from 1.14 [95% CI 1.10–1.19] to 5.09 [95% CI 4.53–5.72]) and admissions (from 1.15 [95% CI 1.10–1.20] to 3.17 [95% CI 2.81–3.57]). In addition, the adjusted hazard ratios of patients with COPD treated with inhaled corticosteroids (1.22, 95% CI 1.11–1.34) and systemic corticosteroids (1.15, 95% CI 1.07–1.23) were significantly higher than those of patients not treated with corticosteroids. They concluded that patient with COPD are at a higher risk of developing periodontal diseases than the general population. Their results also support that the risk of periodontal diseases is proportional to COPD control. In addition, patients who receive corticosteroid treatment are at a higher risk of developing periodontal diseases. [9, 10]

Conclusion:

Within the limitations of the present study, it can be concluded that patients with pulmonary disorders are under high-risk category for periodontal diseases.

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