

Received: 16 January, 2025
Accepted: 03 February, 2025
Published: 04 February, 2025

***Corresponding author:** A Vlase, Surgery Department II, Faculty of Medicine, UMF Iasi, Romania, E-mail: alexandru.vlase@umfiiasi.ro

Keywords: Stomatitis; COPD; Bronchial asthma; Angular cheilitis

Copyright License: © 2025 Munteanu D, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

<https://www.clinsurggroup.us>



Research Article

Clinical-Biological Correlations of Chronic Respiratory Diseases and Oro-Dental System

D Munteanu¹, LI Perte², A Vlase^{3*}, R Ciorap⁴, MI Ungureanu⁵ and CT Oniciuc⁶

¹Medicine I Department, Faculty of Medicine, UMF Iasi, Romania

²Department of Maternal and Child Medicine, Faculty of Medicine, UMF Iasi, Romania

³Surgery Department II, Faculty of Medicine, UMF Iasi, Romania

⁴Biomedical Sciences Department, Faculty of Medical Bioengineering, UMF Iasi, Romania

⁵Department of Preventive Medicine and Interdisciplinarity, Faculty of Medicine, UMF Iasi, Romania

⁶Department of Implantology, Removable Restorations and Technology, Faculty of Dental Medicine, UMF Iasi, Romania

Abstract

One of the most common chronic respiratory diseases, incapacitating the development and quality of life of patients and directly correlated with the oro-dental cavity is represented by asthma or Chronic Obstructive Pulmonary Disease (COPD), a chronic inflammatory disease affecting the airways, in which mast cells, eosinophils, and T lymphocytes, play an important role. A better understanding of the diagnosis and treatment of asthma became possible by accepting that the existence of chronic inflammation, with its variations, is reflected in the clinical condition of the patient, with implications on the dental status.

Scope of the study: Determination of the prevalence and severity of oro-dental pathology in patients with chronic respiratory diseases, respectively clinical and biological correlations, namely of individualized regimens, according to associated comorbidities that would contribute to improving the quality of life.

Materials and method: A study was conducted on a group of 167 patients hospitalized in the Internal Medicine Clinic, for one year (2021-2022) and also on 53 patients consulted in a dental ambulatory unit.

Results and discussion: The investigations showed an increased prevalence of gingivitis, chronic marginal superficial periodontitis, and coated tongue, possibly caused by insufficient ventilation in the nose or pulmonary obstructive diseases and mouth breathing predominance. Angular cheilitis and stomatitis have been also had in view, as diseases of the oral cavity, in patients with asthma and Chronically Obstructive Pulmonary Diseases (COPD). Such cases were more frequent in male than in female patients, a possible explanation being the higher prevalence of smoking and increased exposure to professional allergens for males, as well as a higher incidence of viral and / or bacterial superinfections.

Conclusion: The study carried out highlighted over 41.1% of the patients with chronic respiratory diseases and COPD/bronchial asthma (AB) presented angular cheilitis (11.6% cases), stomatitis (22.3% cases) and candidiasis (11.2% cases). In the experimental group, the level of oral hygiene is more satisfactory in women than in men, the same proportion being preserved in smoking and nonsmoking patients. Also, caries occurs more frequently in men than in women, the causes being, once again, health education, oral hygiene status and smoking.

Introduction

Respiratory pathology is more frequently present in susceptible patients, in such cases infection/inflammation causes recurrent episodes of wheezing, dyspnea (shortness of

air) in varying degrees, chest tightness and cough, especially at night and in the morning. These symptoms are associated with sliding and with the variable but relatively and frequently generalized air flow, which is partially reversible, either spontaneously or under treatment [1-4].



Therefore, asthma appears as caused by pathological changes in the airways and by their functional consequences. A better understanding of the diagnosis and treatment of asthma was made possible by accepting that the existence of chronic inflammation, with its variations, is reflected in the clinical condition of the patient [5-7]. Due to the existence of still non-invasive, well-validated methods for measuring bronchial inflammation, both clinicians and epidemiologists should rely on “surrogate” indices.

Inflammation causes increased airway responsiveness to stimuli such as allergens, irritants, chemicals, cigarette smoke, cold air, exercise, etc. Exposure to these stimuli causes airway mucosal edema, bronchoconstriction, mucus plugs, and airway responsiveness to various stimuli [8,9]. The result of respiratory flow limitation is reversible (but not always complete), either spontaneously or as a result of treatment.

Systemic inflammation correlates frequently with numerous other sites, including oro-dental diseases - the main causes of the stomatognathic system, modifying swallowing and reducing the quality of life [10,11].

By improving our understanding of this association with the potential of reducing COPD incidence through treatment of the periodontal diseases, known as having important public health and clinical implications, the present study analyzes the effects of periodontal diseases and systemic biomarkers of inflammation on the occurrence of serious fatal and non-fatal respiratory-related events among subjects with COPD [12,13].

Commonly, periodontitis is considered a constant potential source of infection and a serious risk factor for some cardiovascular, respiratory, endocrine, musculoskeletal, and reproductive system-related abnormalities [14-16]. Oral health impacts general well-being and, if comprehensive health care is ever to be achieved, oral health should not be seen as a separate, distant, and less important area of interest, totally unrelated to lifespan and its quality.

The tendency of both medical and dental specialists is to approach patient management from regional rather than systemic points of view. In light of the ever-increasing available role of oral infections, such as periodontitis on multifarious systemic disorders, a literature review on the topic becomes necessary [17], for providing comprehensive, easily available information, for drawing the attention of health practitioners on the impact of oral health and general well-being of patients and, for emphasizing the need for a closer interaction between medical and dental trainings [13,18].

Materials and method

To highlight the opportunity, precocity and chronic respiratory effects of oral pathology concerning asthma and Chronic Obstructive Pulmonary Diseases (COPD), a prospective study was conducted on a group of 167 patients hospitalized in the Internal Medicine Clinic, between 2021 and 2022, and also on 53 patients consulted in a dental office. The demographic characteristics of the patients in the study were highlighted

as follows: 63.7% male, and 36.3% female. From the point of view of age, the studied group was divided into 3 categories: age 36-49 years in the percentage of 65.8%, between 50 and 67 years 28.7%, the rest being patients over 75 years old. The statistical analysis of the study groups used various statistical tests, one of them being ANOVA and the second chi-square of significance.

Two aspects have been mainly considered, namely:

- Frequency of dental/oral cavities in patients with chronic respiratory diseases, focusing on the impact of asthma and COPD, since - potentially - all of them will be undergoing dental treatment that can pose risks.
- Frequency of acute respiratory accidents in dental offices, their consequences, and establishment of treatment principles specific to each patient.

Results and discussion

Oral diseases are the most common disease in the world; if left untreated, they can develop into damaging chronic infections [1,2]. The oral microbiome is the second most diverse microbiome in the human body [19]. The oral microbiome is the cumulative genome of the bacteria that inhabit the oral cavity. Microbes can colonize on two surfaces in the buccal cavity: the oral mucosa and the hard and soft tissues of teeth [6,8,19]. Microorganisms can flourish and thrive in a nutrient-rich environment with teeth, tongue, cheeks, gingival sulcus, tonsils, and hard and soft palates.

In recent times, oral bacteria, particularly periodontal pathogens, have been identified as significant contributors to the development of many diseases, such as respiratory diseases [4,20,21]. Maintaining good oral health is closely linked to maintaining good respiratory health, and the reverse is also true. Various factors such as dietary habits, smoking, inadequate oral hygiene, certain diseases, and medications can disrupt the balance of oral microbiota. This disruption increases the presence of harmful and inflammatory microbes, which can penetrate the respiratory tract and lungs, leading to respiratory diseases such as influenza, asthma, COPD, and pneumonia.

Distribution by sex and age of patients in both groups showed a slightly higher prevalence of males (M/W ratio = 1.3/1) but with a more uniform distribution in age groups (Figure 1 and Table 1).

Approximately 40% of the patients (67 cases) were discovered accidentally by family doctors or during examination in the ambulatory, being sent to the clinic for investigation and specialized treatment. Statistically, distribution by sex and condition of the control group in outpatients with chronic respiratory diseases was relatively uniform.

Other issues investigated in the study were the risk factors for chronic respiratory diseases, first of all smoking (Figure 2), exposure to allergens, the most common being criminalized domestic and digestive, followed by atmospheric

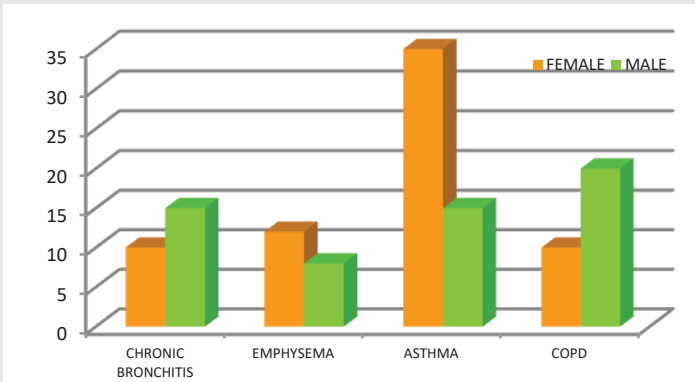


Figure 1: Distribution of patients by age, sex, and disease.

Table 1: Distribution of patients by age and disease.

Age (years)	Chronic bronchitis	Emphysema	Asthma	COPD
< 40 years	2 patients	11 patients	6 patients	6 patients
40-50 years	6 patients	3 patients	17 patients	12 patients
50-65 years	15 patients	6 patients	38 patients	34 patients
> 65 years	3 patients	1 patient	9 patients	8 patients

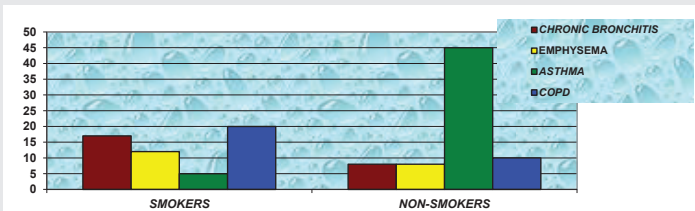


Figure 2: Distribution of smokers and non-smokers in the experimental group.

Note: Confidence about the study group *p < 0.001.

III. Community Periodontal Index of Treatment Needs (CPITN), assessing

- Presence or absence of gingival bleeding;
- Presence or absence of the subgingival or supragingival plaque;
- Presence or absence of periodontal pockets [27].

The investigations, conducted in the Medical Clinic, respectively in the Ambulatory Dental Polyclinic, showed an increased prevalence of gingivitis, periodontitis, and chronic marginal superficial, coated tongue, possibly caused by insufficient ventilation in the nose and mouth breathing predominance [28]. Angular cheilitis and stomatitis have been also considered as diseases of the oral cavity in patients with asthma and COPD (Figure 3). A higher frequency of such cases was recorded in males, comparatively with females, a possible explanation being the increased prevalence of smoking and higher professional exposure to allergens of males, respectively, along with an increased incidence of viral and/or bacterial superinfecting.

In these cases, 56.4% (124 patients) of the subjects with chronic respiratory diseases were diagnosed with superficial chronic periodontitis, respectively chronic bronchitis - 18 cases (14.2%); asthma - 66 cases (53.4%); emphysema - 6 cases (5.1%); COPD - 34 cases (27.3%), the degree of impairment of periodontitis being determined more by the severity of the respiratory disease than by its duration (Table 2). Another frequent dental pathology is gingivitis, present in 36.5% (80 patients) of the cases of chronic respiratory disease, respectively - chronic bronchitis 14 cases (17.1%); - asthma 39 cases (49.1%); - emphysema 8 cases (9.4%); - COPD 20 cases (24.4%).

and professional conditions, as well as a relatively high ratio of respiratory viral and/or bacterial infections, gastrointestinal reflux - the esophagus diseases being frequently involved in a population segment over 60-65 years - and use of anti-inflammatory drugs (NSAID) for osteo-articular inflammatory suffering.

The following investigations referred to diseases of the oral cavity in patients with chronic respiratory pathology, considering the indications of oral hygiene, mainly:

I. Gingival indicators

- Simplified gingival index (Lindhe, 1983) corresponding to the gingival bleeding index/SBI - Bleeding sulcular index (Ainamo and Bay, 1975) [22,23];
- Gingival Index (Loe and Silness, 1963);
- Papillary bleeding index (PBI) - Papillary Bleeding Index (Saxer and Mühlemann, 1975) [24,25].

II. Indicators of periodontal inflammation

- Periodontal Index (PDI) Ramfjord: - the research of the gum; - the research of the periodontium.
- Tooth mobility index [26].

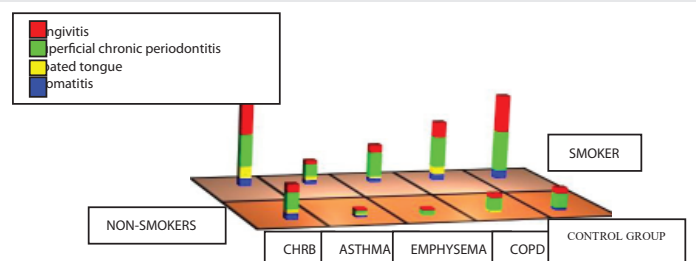


Figure 3: Incidence of dental pathology in the study and control group.

Note: Confidence about the study group *p < 0.001.

Table 2: Incidence of oral pathology in patients with asthma and COPD.

ORO-DENTAL LESIONS	No of patients	Prevalence	Female	Male
CHRONIC GINGIVITIS	22 p	20%	9 p 30%	13 p 70%
SUPERFICIAL CHRONIC PERIODONTITIS	37 p	40%	25 p 40%	12 p 60%
COATED TONGUE	23 p	12%	9 p 33.3%	14 p 66.7%
ANGULAR CHEILITIS	7 p	10%	2 p 40%	5 p 60%
STOMATITIS	5 p	12%	2 p 33.3%	3 p 66.7%
ORAL CANDIDOSIS	3 p	6%	1 p 33.3%	2 p 66.7%

Note: Confidence about the study group *p < 0.001.



Also compared in patients with asthma and COPD was the incidence of caries lesions of periodontal type, a growing prevalence (49.3% cases) of these disorders being registered in women, the most common being asthma patients, while in those with chronic obstructive pulmonary diseases, untreated odonto-periodontal suffering prevails in males (53.5% cases).

Asthma and chronic respiratory pathology are generally an inflammatory disease with multiple implications in dental pathology, thus requiring a precise diagnostic and well-established therapeutic protocol. Asthma therapy involves a series of features: • specific; • adapted to every patient; • subordinated to the pathogenic factors (bronchial inflammation = physiopathological therapy).

The first line therapy to be applied involves inhalation of glucocorticosteroids - see <http://www.ginasthma.org> (2022, 2024). The therapeutical consequences are reflected first in the oro-dental condition, inducing pathological transformations of various types and, consequently, improved quality of the primary digestive function and metabolic alterations.

Statistical analysis shows that over 60% (176 patients) of the subjects with chronic respiratory diseases were diagnosed with superficial chronic periodontitis: • Chronic Bronchitis - 25 cases (14.2%); • Asthma - 94 cases (53.4%); • Emphysema - 9 cases (5.1%); • COPD - 48 cases (27.3%), the degree of periodontitis impairment being caused by the severity of the respiratory disease rather than by age.

Also, 6.5% (117 patients) of the subjects with chronic respiratory diseases had chronic gingivitis: • Chronic Bronchitis - 20 cases (17.1%); • Asthma - 61 cases (57.3%); • Emphysema - 11 cases (9.4%); • COPD - 25 cases (24.4%). 7.1% of the patients (19 subjects) with chronic respiratory disease, COPD, and asthma present angular cheilitis (3.6% cases), stomatitis (2.3% cases), and candidiasis (1.2% cases).

The level of oral hygiene in the experimental group is more satisfactory in women than in men, the same proportion being preserved in smoking and nonsmoking patients.

Dental caries occurs more frequently in men than in women, evidencing the extent of damage caused by their education, oral hygiene, and smoking habits [29-35].

Conclusion

In conclusion, in chronic respiratory diseases, often in asthma (58.3%) and COPD (39.2%) cases, patients have frequently inhaled corticosteroids, which increase the aggressiveness of oral microbial flora and decrease local and systemic immunity, favoring the periodontal disease and vicious and reduced digestive functionality, with important consequences on the quality of life.

Dental professionals should be familiar with the manifestation of these diseases, to provide effective and specialized treatments, and to prevent any possible oral-dental manifestations.

References

- GOLD - The Global Initiative for Chronic Obstructive Lung Disease. Available from: <https://goldcopd.org/>
- Institute for Clinical Systems Improvement. Diagnosis and Management of Chronic Obstructive Pulmonary Disease (COPD). 11th Edition. March 2023.
- Kis-György R, Körtési T, Anicka A, Nagy-Grócz G. The connection between the oral microbiota and the kynurenine pathway: Insights into oral and certain systemic disorders. *Curr Issues Mol Biol.* 2024;46:12641-12657. Available from: <https://doi.org/10.3390/cimb46110750>
- Garmendia J, Cebollero-Rivas P. Environmental exposures, the oral-lung axis and respiratory health: The airway microbiome goes on stage for the personalized management of human lung function. *Microb Biotechnol.* 2024;17:e14506. Available from: <https://doi.org/10.1111/1751-7915.14506>
- Abiodun O, Arigbede B, Osagbemi Babatope, Kolude Bamidele. Periodontitis and systemic disease: A literature review. *J Indian Soc Periodontol.* 2012;16(4):487-491. Available from: <https://doi.org/10.4103/0972-124X.106878>
- Deo V, Bhongade ML, Ansari S, Chavan RS. Periodontitis as a potential risk factor for chronic obstructive pulmonary disease: A retrospective study. *Indian J Dent Res.* 2019;20(4):466-470. Available from: <https://doi.org/10.4103/0970-9290.59456>
- Oberoi SS, Harish Y, Hiremath S, Puranik M. A cross-sectional survey to study the relationship of periodontal disease with cardiovascular disease, respiratory disease, and diabetes mellitus. *J Indian Soc Periodontol.* 2016;20:446-452. Available from: <https://doi.org/10.4103/0972-124X.186946>
- Bansal M, Khatri M, Taneja V. Potential role of periodontal infection in respiratory diseases: A review. *J Med Life.* 2013;6(3):244-248. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC3786481/>
- Moghadam SA, Shirzaiy M, Risbaf S. The associations between periodontitis and respiratory disease. *J Nepal Health Res Counc.* 2017;15:1-6. Available from: <https://doi.org/10.3126/jnhrc.v15i1.18023>
- Mojon P, Bourbeau J. Respiratory infection: How important is oral health? *Curr Opin Pulm Med.* 2003;9:166-170. Available from: <https://doi.org/10.1097/00063198-200305000-00002>
- Global Initiative for Chronic Obstructive Lung Disease. [Accessed 24 Apr 2023]. Available from: <https://goldcopd.org/2023-gold-report-2/>
- Terpenning MS. The relationship between dental infections and chronic respiratory diseases: An overview. *Ann Periodontol.* 2021;6:66-70. Available from: <https://doi.org/10.1902/annals.2001.6.1.66>
- Vanden Abbeele A, de Meel H, Ahariz M, Perraudin JP, Beyer I, et al. Denture contamination by yeasts in the elderly. *Gerontology.* 2008;25:222-228. Available from: <https://doi.org/10.1111/j.1741-2358.2007.00247.x>
- Calverley PMA, Tetzlaff K, Vogelmeier C, Fabbri LM, Magnussen H, Wouters EFM, et al. Eosinophilia, frequent exacerbations, and steroid response in chronic obstructive pulmonary disease. *Am J Respir Crit Care Med.* 2017;196(9):1219-1221. Available from: <https://doi.org/10.1164/rccm.201612-2525le>
- Barros SP, Suruki R, Loewy ZG, Beck JD, Offenbacher S. A cohort study of the impact of tooth loss and periodontal disease on respiratory events among COPD subjects: Modulatory role of systemic biomarkers of inflammation. *PLoS One.* 2013;8(8):e68592. Available from: <https://doi.org/10.1371/journal.pone.0068592>
- Munteanu D. *IOP Conf. Ser: Mater. Sci. Eng.* 2022. Available from: <https://iopscience.iop.org/journal/1757-899X>
- Scannapieco FA, Rethman MP. The relationship between periodontal diseases and respiratory diseases. *Dent Today.* 2021;22(8):79-83. Available from: <https://pubmed.ncbi.nlm.nih.gov/14515580/>



18. Chapman KR, Hurst JR, Frent SM, Larbig M, Fogel R, Guerin T, et al. Long-term triple therapy de-escalation to indacaterol/glycopyrronium in patients with chronic obstructive pulmonary disease (SUNSET): A randomized, double-blind, triple-dummy clinical trial. *Am J Respir Crit Care Med.* 2018;198(3):329–339. Available from: <https://doi.org/10.1164/rccm.201803-0405oc>
19. Lin P, Liu A, Tsuchiya Y, Noritake K, Ohsugi Y, Toyoshima K, et al. Association between periodontal disease and chronic obstructive pulmonary disease. *J Dent Sci.* 2023;59:389–402. Available from: <https://doi.org/10.1016/j.jdsr.2023.10.004>
20. Paquette DW J. The periodontal infection-systemic disease link: A review of the truth or myth. *Int Acad Periodontol.* 2022;4(3):101–109. Available from: <https://pubmed.ncbi.nlm.nih.gov/12670089/>
21. Gupta A, Saleena LM, Kannan P, Shivachandran A. The impact of oral diseases on respiratory health and the influence of respiratory infections on the oral microbiome. *J Dent.* 2024;148:105213. Available from: <https://doi.org/10.1016/j.jdent.2024.105213>
22. Otomo-Corgel J, Pucher JJ, Rethman MP, Reynolds MA. State of the science: Chronic periodontitis and systemic health. *J Evid Based Dent Pract.* 2012;12(3 Suppl):20-28. Available from: [https://doi.org/10.1016/s1532-3382\(12\)70006-4](https://doi.org/10.1016/s1532-3382(12)70006-4)
23. Paju S, Scannapieco FA. Oral biofilms, periodontitis, and pulmonary infections. *Oral Dis.* 2017;13(6):508-512. Available from: <https://doi.org/10.1111/j.1601-0825.2007.01410a.x>
24. Manjunath BC, Praveen K, Chandrashekar BR, Rani RM, Bhalla A. Periodontal infections: A risk factor for various systemic diseases. *Natl Med J India.* 2011;24(4):214-219. Available from: <https://pubmed.ncbi.nlm.nih.gov/22208140/>
25. Scannapieco FA, Dasanayake AP, Chhun N. Does periodontal therapy reduce the risk for systemic diseases? *Dent Clin North Am.* 2010;54(1):163-181. Available from: <http://dx.doi.org/10.1016/j.cden.2009.10.002>
26. Dumitrescu AL. Occurrence of self-reported systemic medical conditions in patients with periodontal disease. *Rom J Intern Med.* 2006;44(1):35-48. Available from: <https://pubmed.ncbi.nlm.nih.gov/17236286/>
27. Pizzo G, Guiglia R, Lo Russo L, Campisi G. Dentistry and internal medicine: From the focal infection theory to the periodontal medicine concept. *Eur J Intern Med.* 2020;21(6):496-502. Available from: <https://doi.org/10.1016/j.ejim.2010.07.011>
28. Burlui V, Morarasu C. *Ergonomie stomatologică, Apollonia edit, Iasi.* 2012. Available from: https://www.univapollonia.ro/wp-content/uploads/cv_md/Burlui%20Vasile.pdf
29. Shangase SL, Mohangi GU, Hassam-Essa S, Wood NH. The association between periodontitis and systemic health: An overview. *SADJ.* 2013;68(1):8, 10-12. Available from: <https://pubmed.ncbi.nlm.nih.gov/23951755/>
30. Global Initiative for Asthma. 2022 GINA Report, Global Strategy for Asthma Management and Prevention. Available from: http://www.ginasthma.org/local/uploads/files/GINA_Pocket2022_May15.pdf
31. Bansal M, Khatri M, Taneja V. Potential role of periodontal infection in respiratory diseases: A review. *J Med Life.* 2013;6(3):244-248. Available from: <https://pubmed.ncbi.nlm.nih.gov/24155782/>
32. Gomes-Filho IS, Passos JS, Seixas da Cruz S. Respiratory disease and the role of oral bacteria. *J Oral Microbiol.* 2010;2. Available from: <https://doi.org/10.3402/jom.v2i0.5811>
33. Lalla E, Papapanou PN. Diabetes mellitus and periodontitis: A tale of two common interrelated diseases. *Nat Rev Endocrinol.* 2011;7(12):738-748. Available from: <https://doi.org/10.1038/nrendo.2011.106>
34. Tonetti MS, Jepsen S, Jin L, Otomo-Corgel J. Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: A call for global action. *J Clin Periodontol.* 2017;44:456-462. Available from: <https://doi.org/10.1111/jcpe.12732>
35. Zhou X, Han J, Liu Z, Song Y, Wang Z, Sun Z, et al. Effects of periodontal treatment on lung function and exacerbation frequency in patients with chronic obstructive pulmonary disease and chronic periodontitis: A 2-year pilot randomized controlled trial. *J Clin Periodontol.* 2014;41:564-572. Available from: <https://doi.org/10.1111/jcpe.12247>

Discover a bigger Impact and Visibility of your article publication with Peertechz Publications

Highlights

- ❖ Signatory publisher of ORCID
- ❖ Signatory Publisher of DORA (San Francisco Declaration on Research Assessment)
- ❖ Articles archived in worlds' renowned service providers such as Portico, CNKI, AGRIS, TDNet, Base (Bielefeld University Library), CrossRef, Scilit, J-Gate etc.
- ❖ Journals indexed in ICMJE, SHERPA/ROME0, Google Scholar etc.
- ❖ OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting)
- ❖ Dedicated Editorial Board for every journal
- ❖ Accurate and rapid peer-review process
- ❖ Increased citations of published articles through promotions
- ❖ Reduced timeline for article publication

Submit your articles and experience a new surge in publication services

<https://www.peertechzpublications.org/submitmission>

Peertechz journals wishes everlasting success in your every endeavours.