



Assessing the effect of non-surgical periodontal therapy on asthmatic patients: A randomized controlled trial

1. **Dr. Sukirat kaur**, Assistant professor, Department of Public health dentistry, Genesis dental college and research centre , ferozpur .
Email : sukiratkor24@gmail.com
2. **Dr. Parmeika Rawat**, Senior lecturer, Department of Public health dentistry, Uttaranchal dental and medical research institute, Uttarakhand.
3. **Dr. Arushi Goyal**, Senior lecturer, Department of periodontics, Genesis institute of dental sciences and research.
4. **Dr. Ruchi Sharma**, Private practitioner, Prosthodontist.
5. **Dr. Jaskaran Singh**, Senior lecturer, Department of Conservative dentistry and Endodontics, Desh Bhagat dental college, Mandi gobindgarh, Punjab.
6. **Dr. Gagandeep Singh**, Department of Conservative dentistry and Endodontics , Genesis Institute of Dental Sciences and Research

Corresponding authors: Dr. Sukirat kaur, Assistant professor, Department of Public health dentistry, Genesis dental college and research centre, ferozpur, Email: sukiratkor24@gmail.com

Abstract

Objective: To evaluate the effect of periodontal therapy on frequency of drug and to assess the effect of interventions on periodontal pocket depth, loss of attachment, gingival status and plaque accumulation of asthmatic patients.

Materials and methods: A sample of 45 asthmatic patients aged 30-60 year and fulfilled the eligibility criteria was randomly selected from the OPD of Kothiwal Dental College and Research centre. All of the 45 patients will be randomly divided into 3 equal groups. Group A (n=15): patients was undergo scaling, was advised to regularly use 0.12% mouthwash (once daily) and brush (twice daily). Group B (n=15): patients was advised to regularly use 0.12% mouthwash (once daily) and brush (twice daily). Group C (n=15): patients was advised to brush (twice daily).

Results All of the 45 participants completed the study. Statistically significant difference was found between GI, PI and PPD scores before and after intervention in group I ($p < 0.001$), and group II ($p < 0.05$) only and the differences among the groups were found to be statistically significant for FOD and ND after 1 and 3 months of intervention. On further analysis (post-hoc Turkey for multiple comparisons), group I was found statistically significant with group III after 1 month of intervention whereas group I was found statistically significant with group II and group III after 3 months of intervention.

Conclusion : The present study concludes that nonsurgical periodontal therapy can effectively decrease severity of asthma in asthmatic patients . Preventive periodontal regimens for asthmatic patients should be sufficiently intense and sustained so as to eliminate periodontal inflammation. Future more randomized controlled trials should be conducted to better test the hypothesis of this important association, thereby increasing knowledge in this area and also further clarifying the association between the two diseases.

Keywords: Asthma, periodontitis, gingiva, plaque

Introduction

From many last decades, the influence of periodontal infection on systemic conditions like respiratory tract diseases, cardiovascular diseases, and insulin resistance, as well as has been widely explored. Recently, has been investigated the bidirectional relationship between periodontitis and asthma. Asthma is a appalling respiratory disease that remains an significant cause of morbidity and mortality world-wide.(1,2) It is estimated that around 300 million people are currently suffering from the asthma and that around 100 million more will be diagnosed with disease by the year 2025.(3) Many factors are associated with its natural history, like environment allergens, genetics and presence of chronic infections, such as periodontitis, characterized by limitation of airflows, wheezing, coughing, nightmaire disruptions and short episodes of breathlessness.(3) The biologic reasonable linking between asthma and periodontal infection seems to be related to immunologic components common to both disease that affect epithelial integrity, periodontal and respiratory tissue. The evidence that supports this linking is action of matrix metalloproteinases, group of enzymes (MMPs), accountable for the degradation of the extracellular matrix and basement membranes. The presence of elevated levels of MMPs in individuals with asthma, due to periodontal infection via hematogenous route, could contribute to increasing the ability to cleave structural proteins in the respiratory tissue, culminating in bronchial remodeling, aggravation of symptoms, and increase in disease morbidity. Few studies have reported an association between chronic periodontitis and asthma (2). As there are limited studies on this topic, the present study was carried out to assess the effect of non-surgical periodontal therapy on severity of asthma on asthmatic patients.

Material and methods

Based on a pilot study, a sample size of 15 patients in each group was estimated considering ($\alpha=0.05$ [95% confidence interval] and $\beta=0.2$ [80% power]). The necessary sample size was

estimated using sample size and power calculations developed by William D. Dupont and licensed under a Creative Commons Attribution-Non Commercial-No Derivs 3.0 United States License for a 5% type I error and 20% type II error, and it was found to be 15 subjects. A sample of 45 asthmatic (mild to severe) patients aged between 45-60 years with chronic periodontitis were selected from the OPD of Kothiwal Dental College and Research centre with their written informed consent. The inclusion criteria were as follows: patient suffering from moderate to severe asthma acc to NHLBI (2007) and on inhaler device since 1 year, mild to moderate periodontitis (pocket depth of 4-5mm) acc. to (CDC/AAP), presence of minimum 20 teeth, and no periodontal treatment in last six months. The exclusion criteria were the following: patients with systemic diseases other than asthma, patients having the habit of smoking, pregnant women and patient undergone any antibiotic regimen within last 6 months. Before starting the study, the examiner was calibrated so as to achieve a minimum kappa value of 0.80. In order to ensure intra examiner consistency, a randomly selected group of 5 patients was examined and re-examined for the plaque index (PI) score, gingival index (GI) score, and probing pocket depth (PPD) in mm. The scores were assessed for reliability by applying the kappa statistic. The kappa value for intra examiner reliability ranged from 0.89 to 0.92. A total of 45 patients aged 45-60 years who fulfilled the eligibility criteria and signed the informed consent were recruited to the study. The study protocol was reviewed and approved by the Institutional Ethics Review Committee, Moradabad.

All of the 45 patients were randomly divided into 3 equal groups:

- Group A (n=15): patients, who had undergone scaling, were advised to regularly use 0.12% mouthwash (once daily) and brush (twice daily).
- Group B (n=15): patients who were advised to regularly use 0.12% chlorhexidine mouthwash (once daily) and brush (twice daily).
- Group C (control) (n=15): patients who were advised to brush (twice daily).

The oral examination was conducted by the examiner in the Department of Public health dentistry. The examination included assessing periodontal pocket depth in mm with a UNC-15, gingival status by the GI of Loe and Silness and plaque accumulation by PI of Silness and Loe., of each individual patient at baseline and after 3 months of the intervention. The participants were interviewed for demographic data, the duration and frequency of drug usage (through inhalers) and nightmare disruptions by asthmatic attacks, which was later cross-verified with their hospital records. Statistical analysis was carried out using SPSS version

19. A comparison of the mean differences of the PPD, Dental plaque, and gingival status was analyzed by a paired *t*-test and the frequency of drug and night time disruptions was assessed by one-way ANOVA. Inter group comparison was assessed using Post hoc-tukey test. Statistical significance was considered to be when $P \leq 0.05$ (95% confidence interval).

Results

Table 1: Comparison of mean PI, GI and PPD before and after intervention in each group

Variables		Group I	Group II	Group III
GI	Baseline	2.36±0.25	2.37±0.24	2.33±0.25
	After 3 months	1.47±0.09	2.09±0.36	2.36±0.38
	p- value	0.000	0.001	0.747
PI	Baseline	2.51±0.16	2.53±0.04	2.63±0.01
	After 3 months	1.38±0.41	2.03±0.53	2.54±0.17
	p-value	0.000	0.001	0.074
PPD	Baseline	4.91±0.56	4.69±0.43	4.51±0.15
	After 3 months	2.61±0.41	4.26±0.61	4.57±0.17
	p- value	0.000	0.009	0.06

Paired student t-test (significant at $p < 0.05$)

GI: Gingival index; PI: Plaque index; PPD: Periodontal pocket index

All of the 45 participants completed the study. Statistically significant difference was found between GI, PI and PPD scores before and after intervention in group I ($p < 0.001$), and group II ($p < 0.05$) only.

Table 2: Comparison of mean FOD and ND before and after intervention in each group

Variables		Group I	Group II	Group III	F value	p-value	Significant pairs (Groups)
FOD	Baseline	3.21±0.41	3.33±0.48	3.24±0.45	0.32	0.725	-
	After 1	2.32±0.48	2.71±0.45	3.17±0.51	10.08		I & III

	month					0.000*	
	After 3 month	1.42±0.51	2.65±0.51	3.02±0.53	35.16	0.000*	I &II, I&III
ND	Baseline	3.66±0.72	4.13±0.64	3.76±0.61	2.24	0.119	-
	After 1 month	2.53±0.51	3.40±0.73	3.46±0.51	11.33	0.000*	I & III
	After 3 month	1.33±0.48	3.01±0.75	3.46±0.91	34.35	0.000*	I &II, I&III

One way Anova (significant at $p < 0.05$), *Inter group comparisons (post-hoc Tukey for multiple comparisons), FOD: Frequency of drug; ND: Night time disruptions.

The differences among the groups were found to be statistically significant for FOD and ND after 1 and 3 months of intervention. On further analysis (post-hoc Turkey for multiple comparisons), group I was found statistically significant with group III after 1 month of intervention whereas group I was found statistically significant with group II and group III after 3 months of intervention.

Discussion

There is an important gap in the literature, evaluating whether a periodontitis is capable of influencing the development of a disease. In addition, if the suppression of the infectious agent of the periodontium, it is able to influence the inflammatory parameters of asthma. (3). From previous studies, many evidence proved that poor periodontal condition as a potential risk factor for systemic diseases, strongly indicating the two-way interrelationship between periodontitis and asthma. The potential reservoir of respiratory pathogens shares same anatomical route between the lungs and oral cavity. Respiratory infections such as Asthma are manifested by oral and extra oral foci. There are mechanism which can leads to respiratory diseases manifested by oral bacteria, into the lungs that can lead to further colonization of respiratory pathogens and the enzymes associated with periodontal diseases destroy salivary pellicle on respiratory bacteria. During periodontal diseases, cytokines are released that may leads to respiratory diseases by altering respiratory epithelium.(2) Respiratory infections such as Asthma shares same anatomical route between the lungs and oral cavity, that can further manifested by oral bacteria and leads to colonization of respiratory pathogens. Cytokines released during periodontal diseases may leads to

respiratory diseases by altering respiratory epithelium. In our present study, positive association was found between periodontal status and severity of asthma in asthmatic patients. An association between asthma and periodontitis seems to be related to inflammatory and immunological responses common to both diseases. Activation of inflammatory and immune responses triggered by dental plaque biofilms often result in a periodontal breakdown. Similarly, complex interactions among inflammatory cells, chemical mediators in bronchial tissues can lead to the signs and symptoms of asthma. As uncontrolled periodontal infection, characterized by the growth of dental plaque biofilms in periodontal tissues, may act as a constant source of chronic inflammation, similar results were found by many other studies as well (4).

Asthmatic patients have more tendencies towards mouth breathing, leading to dehydration of alveolar mucosa and an increase in gingival inflammation.(1) In our study , we also found asthmatic patients with gingival inflammation. These findings can be supported by various studies (2). Whereas on contrast, study conducted by Shulman et al. found that there was statistically insignificant differences in GI of asthmatic patients. Periodontal destruction is seen in asthmatic patients due to changes in immune functioning. As IgA plays an important role in maintaining periodontal health, and its level decreases in asthmatic patients ultimately leading to destruction of periodontium. In our present study, we found asthmatic patients with gingival inflammation, it may be due to the reason that they have more tendencies towards mouth breathing leading to dehydration of alveolar mucosa and increase in gingival inflammation. This concept have been supported by various other studies. Whereas on contrast, study conducted by Shulman et al. found that there was statistically insignificant differences in GI of asthmatic patients. Periodontal destruction is commonly seen in asthmatic patients because the level of IgA decreases ultimately leading to destruction of periodontium. Asthmatic patients were found with higher gingivitis and plaque score, may be due to the reason that they give more importance to the disease as compared to oral cavity. In present study, we found that if periodontal pockets have reduced it ultimately reduced the severity of asthma. It may be due to the reason that development of respiratory diseases, anaerobic bacteria play a major role and while periodontal pockets provide a shield for growing of bacteria, this concept may be the reason that explains the link between periodontal diseases and inflammatory diseases of respiratory system. Nightmare disruptions is a common symptom seen in asthmatic patients, mostly seen in patients with serious airflow restriction. One of the previous study results revealed that even in normal people there is 8% overnight fall in the peak flow rate, while it is around 50% in asthmatic patients (lappy 5).

Repeated upper obstruction contributes to inflammatory process of respiratory system. Patients with poor asthma controlled more commonly leads to nightmare disruptions (phone). In present study, inflammation was reduced with the help of periodontal therapy that was assessed by recording the variables after a interval of 1 month and 3 months after the baseline, and reduced inflammation leads to less nightmare disruptions and that ultimately reduced the frequency of drug. The present study concludes that nonsurgical periodontal therapy can effectively decrease severity of asthma in asthmatic patients . Preventive periodontal regimens for asthmatic patients should be sufficiently intense and sustained so as to eliminate periodontal inflammation. Future more randomized controlled trials should be conducted to better test the hypothesis of this important association, thereby increasing knowledge in this area and also further clarifying the association between the two diseases.

References

1. Vinay kumar bhardwaj, Shaille Fotedar. Association between Asthma and chronic periodontitis . A case control study in Shimla, Himachal Pradesh. 2017,35(4):319-322
2. Tahir F, Hafuz F. Oral Health in Asthmatics: A Review. 2018: 4(1):1-5
3. Larissa Carbonia canedo, Nicole Cristine Rigonato oliveria. Effects of periodontitis on the development of Asthma: the role of photodynamic therapy. 2017
4. Seok-woo Lee, Hoi-jeong lim. Association between Asthma and Periodontitis: Results from Korean National Health and Nutrition Examination Survey.2017:1-9
5. Ramakant Dixit, Satyadeep Verma. Obstructive sleep Apnea in Bronchial Asthma Patients: Assessment of Prevalence and risk factors.2018;66:45-48
6. Abhishek Mehta, Peter. S.S, Ramesh Chandra, Gurkiran kaur. Is bronchial asthma a risk factor for gingival diseases? NYSDJ January 2009.
7. Isaac suzart gomes-filho et al. Does periodontal infection have an effect on severe asthma in adults? Journal of Periodontology November 2013.
8. Yaghobee S et al. Association between asthma and periodontal diseases. Journal of Dentistry ,TUMS 2008; 5(2):47-51.
9. Carranza`s clinical periodontology, 9th edition p.no. 229-44.
10. Thanabalan D et al. Association between periodontitis and respiratory diseases- a review. Journal of Dental and Medical Sciences 2014; 13(5): 5-8.
11. Scannapieco FA et al. Colonization of dental plaque by respiratory pathogens in medical intensive care patients. Crit Care Med 1992; 20:740-45.
12. Frank A et al. Relationships between periodontal disease and bacterial pneumonia. J. Periodontol 1996;67 :1114-22.