

Is Bronchial Asthma a Risk Factor for Gingival Diseases?

A CONTROL STUDY

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Abstract

Asthma is a serious global health problem. People of all ages in countries throughout the world are affected by this chronic airway disorder, which can be severe and sometimes fatal. The prevalence of asthma is increasing everywhere, especially among children. Several oral health conditions are documented among asthmatic patients, such as an increased rate of caries development and reduced salivary flow; an increased prevalence of oral mucosal changes, like oropharyngeal candidiasis and gingivitis; and orofacial abnormalities. The study presented here was conducted to find a relationship between increased levels of plaque and gingivitis and bronchial asthma. Around 80 asthmatic patients were examined for their plaque and gingival status. Their scores were compared with a control group matched for age, sex and socioeconomic status. Results showed a significant increase in plaque and gingival scores among asthmatics as compared to the control group. Hence, there is a need to educate this group of patients about their increased risk of gingival disease and the importance of proper plaque control.

ASTHMA IS A CHRONIC INFLAMMATORY DISORDER of the airways. According to the latest GINA (Global Initiative for Asthma) report, it is estimated that as many as 300 million people of all ages and all ethnic backgrounds suffer from asthma. In India, the prevalence of asthma is 3% of the total population.¹

Individuals suffering from bronchial asthma were found to have more caries and gingivitis as compared to the general population. They also have an increased prevalence of oral mucosal changes, like oropharyngeal candidiasis, and orofacial abnormalities.

Few studies have been conducted to find out the plaque and gingival status of asthmatic patients compared to a non-asthmatic control group. Results of these studies were conflicting, as some studies have shown an increase in plaque and gingivitis in asthmatic patients, while others failed to show any such association. Most of these studies were conducted in Scandinavian countries.

The study presented here was conducted to assess the plaque and gingival status of asthmatic patients 11 to 25 years of age, and to examine the possible association of these conditions to various aspects of bronchial asthma and its management.

Material and Methods

Our study was conducted on 160 subjects 11 to 25 years old. They were divided into two equal groups of asthmatics and controls. The asthmatic group comprised 80 patients who were suffering from bronchial asthma and were receiving treatment at the Department of Chest Medicine and Allergy, KMC Hospital, Attavar (Mangalore). These patients were on asthmatic medication (both β_2 -agonists and corticosteroids) for at least six months and were using an inhaler device for delivery of at least one type of asthmatic medication.

The control group consisted of individuals who were matched to the asthmatics by age, sex and socioeconomic status. The socioeconomic status of the subjects was obtained from Kumar's modification of Prasad's social classification for Indian families, which is a widely used socioeconomic scale in research studies in India.^{2,3}

Training and calibration of the examiner for different indices to be used in the study was done before starting the study. A pilot study was done on 20 asthmatic patients to check for feasibility of the study. The pilot study was also used to select the particular social class for both of the groups.

Examination of subjects was done using a dental chair under standard illumination. Data was collected by means of a proforma, which was designed to collect information on the patients' age and sex and their oral hygiene practices. Turesky S, Gilmore ND and Glickman F modification of Quigley -Hein plaque index⁴ and Modified Gingival Index⁵ was used to record plaque and gingival status, respectively. Information regarding duration of asthma, type of medication and frequency of intake, and severity of asthma was collected from the medical records of the patients. Asthmatics were categorized into moderate and severe categories according to the classification given by the National Heart, Lung and Blood Institute, USA, in 1997.⁶

The results were analyzed using a statistical package for social sciences (SPSS - version 11).

Results

In this study, 80 asthmatic patients were examined for their plaque and gingival status and compared with the same number of control group subjects. The mean age was 17.4 (± 4.3) years for asthmatics and 17.2 (± 4.23) years for controls. There was no statistically significant difference in the age for the two groups or in any age group (Table 1). Neither was there a significant difference between their oral hygiene habits. Most of the subjects were using toothbrush and toothpaste for cleaning their teeth.

When comparison was done between asthmatics and controls for mean Modified Quigley-Hein Plaque Index (MQHPI) scores, the mean MQHPI score for asthmatics was 1.94 (± 0.73), as compared to 1.51 (± 0.37) for controls. The difference was statistically significant: independent sample t test, $p < 0.001$ (Table 2).

Table 3 describes the comparison between asthmatics and controls for mean Modified Gingival Index (MGI) scores. The mean MGI score for asthmatics was 1.42 (± 0.31), as compared to 0.90 (± 0.21) for controls. There was significant difference between the mean MGI score of the two groups: independent sample t test, $p < 0.001$.

Discussion

The study presented here is a case-control study conducted on asthmatic patients to assess their plaque

and gingival status and to examine the possible association of these conditions to various aspects of bronchial asthma and its management. The results were compared with a control group that was matched for age, sex and socioeconomic status.

In our study, the asthmatic group had significantly more severe gingivitis as compared to the control group ($p < 0.001$). This result is similar to the findings in studies conducted by Hyyppa TM et al⁷ and McDerra EJC et al.⁸

The possible reasons for increased prevalence of gingivitis in asthmatic patients are related to immunological factors and mouth breathing habits. In periodontal disease, the host response via the immune defense system is considered important. Although the role of allergy is not clear, IgE-mediated mechanisms are supposed to be involved in the pathogenesis of gingival and periodontal diseases. In patients having birch pollen allergy, an increased amount of gingivitis was observed during the pollen season when compared with the off season. Platelet-activating factor, one of the mediators of allergic inflammatory reactions, is also present in inflamed gingival tissues.

TABLE 1

Distribution of Subjects According to Age Groups

	Asthmatics	Mean Age (SD)	Controls	Mean Age (SD)
Total	80	17.4 (4.3)	80	17.2 (4.23)

t-test $p > 0.05$ Not significant

TABLE 2

Comparison of Mean Modified Quigley-Hein Plaque Index (MQHPI) Scores Between Asthmatics and Controls

	Mean MQHPI Score	Standard Deviation (SD)	Standard Error (SE)	Confidence Interval		Significance [P]
				Lower	Upper	
Asthmatics	1.94	0.73	0.08	0.24	0.60	0.001*
Controls	1.51	0.37	0.04			

Independent sample t test

* p value is statistically significant

TABLE 3

Comparison of Mean Modified Gingival Index (MGI) Scores Between Asthmatics and Controls

	Mean MGI Score	SD	SE	Confidence Interval		Significance [P]
				Lower	Upper	
Asthmatics	1.42	0.31	0.03	0.43	0.60	0.001*
Controls	0.90	0.21	0.02			

Independent sample t test

* p value is statistically significant

Interestingly, some of the cytokines, which mediate inflammatory processes in the mucous membranes of airways, are also found in inflamed periodontal tissues. Gingival mononuclear cells obtained from adult patients with chronic periodontitis can produce increased amounts of interleukin IL-5 and IL-6. Recently, it has been reported that there is a general defect in the mucosal permeability of asthmatics, independently of atopic status. Taken together, it seems that inflammatory processes in both asthma and periodontal diseases share partly similar pathophysiologic features, a fact that may to some degree explain the increased prevalence of periodontal inflammation in asthmatics.⁹

Asthmatics have more tendencies toward mouth breathing because of various dentofacial abnormalities associated with asthma. Studies have described increased upper anterior and total anterior facial height, high palatal vault, greater overjets and high prevalence of crossbites in children with chronic rhinitis. All these factors favor mouthbreathing, leading to dehydration of alveolar mucosa and an increase in gingival inflammation, especially in the maxillary anterior region.⁶

In the study presented here, asthmatics had significantly higher mean plaque scores as compared to controls. McDerra EJC et al.⁸ observed similar results, but Hyyppa TM et al.⁷ found asthmatics had lower plaque scores than controls. Ryberg M et al.⁹ reported no difference in plaque scores between asthmatics and controls. Higher plaque score can partially explain more gingivitis among asthmatic patients. It may be that the parents of asthmatic children are less likely to view teeth to be of great importance when compared to the asthma itself.⁸

Hence, there is an urgent need to educate asthmatic patients regarding their risk for various dental diseases. Also, dental professionals should regard these patients as a high-risk group and make them aware of their predisposition towards dental diseases. ■

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