ASSOCIATION BETWEEN ASTHMA AND CHRONIC PERIODONTITIS:
A CLINICAL STUDY

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ABSTRACT

The aim of this study was to assess periodontal status of asthmatic patients and to find out association between asthma and chronic periodontitis. A total of 100 subjects were recruited for the study. The control group (n=50) included non-asthmatic subjects and patients suffering from asthma were included in test group (n=50). The test group was further divided in to Group T1 (Mild asthmatic subjects) and Group T2 (Moderate to severe asthmatic subjects). Clinical parameters i.e plaque index, calculus index, gingival index, clinical attachment level and papillary bleeding index of all the selected subjects were recorded. Unpaired t test and one sample t test were performed for group comparisons. Comparison of test group and control group yielded statistically significant differences (P=0.0001). Mean difference of 0.417±0.122, 0.602±0.249 and 0.926±0.195 was recorded in PI, CI and GI respectively. Statistically significant difference of 2.096±0.486mm in CAL among two groups was recorded. Mean difference of 0.660±0.117 was observed in PBI. It was observed that with increase in severity of asthma, periodontal destruction also increased. From the results it can be concluded that asthma and chronic periodontitis are associated with each other. But future studies with larger sample size, confounder analysis and longitudinal follow ups will be necessary to explore the link between these two diseases.

Key Words: Asthma, Chronic periodontitis, Oral foci, Systemic diseases.

INTRODUCTION

Asthma is a chronic respiratory disease that remains an important cause of morbidity and mortality worldwide. It is characterized by being hyper-responsive and episodic, reversible symptoms of air flow obstruction. It is an inflammatory and complex disease with many etiological mechanisms and its natural history is poorly understood. The prevalence of asthma has been increasing since the 1980s across all ages, gender and racial groups. Asthma is a fairly benign disorder; the mortality rate for this disease has almost tripled during last 2 decades. Periodontitis is inflammation of the periodontium that is accompanied by apical migration of junctional epithelium, leading to destruction of connective tissue attachment and alveolar bone loss. Chronic periodontitis is the most common form of destructive periodontal disease. In recent years, evidence has come forth supporting the notion that localized infectious diseases such as periodontal disease may indeed influence a number of systemic diseases. Associations between various systemic conditions and chronic periodontitis have been reported in the past.

The anatomical continuity between the lungs and the oral cavity makes the latter a potential reservoir of respiratory pathogens. Dentogen and other oral and extraoral foci may play a part in causing respiratory infections that are manifested as sinusitis, tonsillitis, pneumonias, bronchial asthma, lung abscess etc. Possible mechanisms by which oral bacteria can cause respiratory infection are as follows: a) Aspiration of oral pathogens into lungs, b) Adhesion and colonization of respiratory pathogens under influence of salivary enzymes, c) Periodontal disease associated enzymes may destroy salivary pellicle on respiratory bacteria, d) Cytokines released during periodontal disease may alter respiratory epithelium and promote respiratory diseases.

Few studies have reported an association between chronic periodontitis and asthma. As there are
limited studies on this topic, the present study was carried out to assess periodontal status of asthmatic patients and an attempt was made to explore association between asthma and chronic periodontitis.

**METHODOLOGY**

This descriptive case control study was carried out on 100 subjects from February 2013 to December 2014 at Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India. The study was conducted in accordance with guidelines of Consort 2010 statement. Study protocol was approved by institutional research and ethics committee. Selected subjects were informed about the study methodology and a written informed consent was obtained from them. Subjects included 52 males and 48 females with average age of 40.18 years and 39.8 years respectively. The test group (n=50) was constituted by individuals suffering from mild to severe asthma, without any other systemic diseases, not on any medication or therapy and non-smokers. The control group (n=50) included subjects who were non asthmatic and were not suffering from any systemic disease. For comparisons of clinical attachment level of subjects suffering from asthma, test group was further categorized into two groups on the basis of severity of asthma, as described by Halterman et al.¹⁴ i.e.

1) Group T1: Subjects suffering from mild asthma (n=27)
2) Group T2: Subjects suffering from moderate to severe asthma (n=23)

Evaluation of clinical parameters i.e. Plaque index (PI), Calculus index (CI), Gingival index (GI), Clinical attachment level (CAL), Papillary bleeding index (PBI) of each subject was performed by a single investigator. CAL was measured as the distance from the cemento-enamel junction to the base of periodontal pocket using William’s calibrated periodontal probe. Data thus collected was put to statistical analysis.

**STATISTICAL ANALYSIS**

Statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 16.0 for Windows). All quantitative variables were estimated using measures of central location (mean) and measures of dispersion (standard deviation and standard error). For comparison of group 1 and group 2 unpaired t test was applied. One sample t test was performed for comparing quantitative variables among control group, group T1 and group T2. The level of significance was set at p<0.05.

**RESULTS**

Data of the subjects in control group and test group is summarized in Table 1. Mean PI scores of 0.735±0.423 was recorded for control group in comparison to 1.152±0.545 of test group. The difference was statistically significant. A statistically significant difference among two groups was obtained on comparison of GI score. Comparison of CI scores for control group

<table>
<thead>
<tr>
<th>Indices</th>
<th>Group 1 (Mean ± SD)</th>
<th>Group 2 (Mean ± SD)</th>
<th>Mean difference</th>
<th>P-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI</td>
<td>0.735 ± 0.423</td>
<td>1.152 ± 0.545</td>
<td>0.417±0.122</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>CI</td>
<td>0.596 ± 0.442</td>
<td>1.198 ± 0.691</td>
<td>0.602±0.249</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>GI</td>
<td>0.602 ± 0.390</td>
<td>1.528±0.585</td>
<td>0.926±0.195</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>CAL (in mm)</td>
<td>3.040 ± 0.913</td>
<td>5.136 ± 1.399</td>
<td>2.096±0.486</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>PBI</td>
<td>1.300 ± 0.762</td>
<td>1.96 ± 0.879</td>
<td>0.660±0.117</td>
<td>0.0001</td>
<td>HS</td>
</tr>
</tbody>
</table>

HS- Highly significant

TABLE 1: CLINICAL PARAMETER MEASUREMENTS OF CONTROL GROUP (GROUP 1) AND TEST GROUP (GROUP 2)

<table>
<thead>
<tr>
<th>Indices</th>
<th>Group T1 (Mean ± SD)</th>
<th>Group T2 (Mean ± SD)</th>
<th>Mean difference</th>
<th>P-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI</td>
<td>0.833 ± 0.294</td>
<td>1.526 ± 0.538</td>
<td>0.693 ± 0.244</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>CI</td>
<td>0.707 ± 0.455</td>
<td>1.708 ± 0.486</td>
<td>1.001 ± 0.031</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>GI</td>
<td>1.156 ± 0.420</td>
<td>1.844 ± 0.520</td>
<td>0.688 ± 0.100</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>CAL (in mm)</td>
<td>4.214 ± 1.016</td>
<td>6.156 ± 1.045</td>
<td>1.942 ± 0.029</td>
<td>0.0001</td>
<td>HS</td>
</tr>
<tr>
<td>PBI</td>
<td>1.481 ± 0.700</td>
<td>2.521 ± 0.730</td>
<td>1.040 ± 0.030</td>
<td>0.0001</td>
<td>HS</td>
</tr>
</tbody>
</table>

(unpaired t-test was applied for comparison of test and control group) HS- Highly significant
Association between asthma and chronic periodontitis

Results of the study revealed that periodontal destruction was greater in asthmatic group as compared to non-asthmatic group as indicated by CAL values. These findings are in agreement with previous studies.2,17 Hyppa et al.18 and McDeera et al.19 have also reported that asthmatics have poor periodontal health than control population. A few reports did not find any significant differences in periodontal status of asthmatic and non-asthmatic subjects.20 The greater destruction of periodontal apparatus in asthmatic group may be attributed to increased levels of IgE in gingival tissue21,22, which may result in hypersensitivity reaction and decrease in IgA levels.23

PBI and GI indicated that prevalence of gingivitis was higher among asthmatic group. These findings can be supported by various previous reports.2,17,18,19 Increased gingivitis in asthmatic group may be because of an altered immune response. Dehydration of gingiva due to mouth breathing during asthmatic attack may also be a contributing factor causing gingivitis. A study by Shulman et al.20 is in contrast to our results, which reported that there was statistically insignificant differences in GI, PBI of asthmatic and non-asthmatic subjects.

In the present study, CI was significantly higher in test group as compared to control group and this is similar to results of previous studies.2,17,16,19 This may be because of the increased levels of calcium and phosphorus in submaxillary and parotid saliva of asthmatic subjects.24

CAL is a hallmark of chronic periodontal disease. So comparison of CAL values of Group T1 with Group T2 and control group was made and it yielded statistically significant results. This suggested that periodontal destruction was greater in Group T2 as compared to Group T1 and control group. It was observed that CAL values continuously increased with increase in severity of asthma indicating an association between severity of asthma and periodontal destruction. Well known contribution of periodontal disease in systemic diseases also supports this association. This may be explained by the fact that there is continuity between oral cavity and respiratory tract. Oral foci may play a role in causing respiratory diseases.

In Asthma, the immune response is the mechanism involved in pathogenesis and progression of the disease. Changes in immune functioning in asthma may lead to periodontal destruction. A decrease in IgA levels has been reported in asthmatic patients.25 As IgA acts as a first line defense for mucosa and play an important role in restricting periodontal disease, its reduced levels in asthmatic patients may be associated with periodontal destruction. As explained earlier IgE levels are increased in gingival tissue of asthmatic patients.
and this may also results in periodontal destruction. Furthermore, the drugs used for management of asthma may affect inflammation and immune response thereby adversely affecting gingival and periodontal status. These drugs may also effect salivary secretion and synthesis of salivary proteins.

CONCLUSION

From the results of this study, it can be concluded that chronic periodontitis and asthma are associated to each other. However, further studies with larger sample size, confounder analysis, and longitudinal follow ups in different geographic areas are warranted to explore the link between these two diseases.

REFERENCES


CONTRIBUTION BY AUTHORS

1 Ranjit Singh Uppal: Title selection, article writer.
2 Rajandeep Brar: Helped in data selection/discussion and proof reading.
3 Asim Goel: Helped in results cimpilation & also in proof reading.