Original Article

# CORONARY HEART DISEASE AND PERIODONTITIS; A CASE CONTROL STUDY

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*ABSTRACT*

***Objective:*** *To find out relationship between periodontitis and coronary heart disease*

***Methods and materials:*** *In this case-control study the sample size was 300 which comprised of 150 cases and 150 exactly matched controls. The cases were selected from the Department of Cardiology, Hayatabad Medical Complex, Peshawar and controls were selected from other wards and units of Hayatabad Medical Complex and Khyber College of Dentistry, Peshawar. Community Periodontal Index for Treatment Needs and Gingival Index were the study variables.*

***Results:*** *All the results were analyzed on SPSS version 16. Odds ratio was calculated as 2.68, meaning a positive association between Periodontitis and Coronary Heart Disease. Pearson chi square test was applied to the variables of inflammation of gums in cases and controls and it also supported the alternate Hypothesis of association of Coronary Heart Disease and gum disease (9.62, P-002).*

***Conclusion:*** *It can be concluded from this study that periodontitis is associated with an increased risk of Coronary heart disease.*

***Key words:*** *Periodontitis, gingivitis, Community Periodontal Index for Treatment Needs, Gingival Index, Coronary heart disease.*

## INTRODUCTION

Cardiovascular diseases (CVD) are common in adults[1,2] and there are several risk factors including elevated low-density lipoprotein (LDL), hypertension, smoking, male gender and low socioeconomic status (SES).[3,4] A link between infection and atherosclerotic diseases has been suggested. Several bacteria and viruses have been identified as potential etiological factors in CVD.[5-8]

Periodontitis is defined as inflammation of the periodontium caused by microorganisms that adhere to and grow on tooth's surface with an overlying immune response against it [9, 10]. If left untreated, it leads to loosening and subsequent loss of the tooth. Periodontitis and dental procedures can be potential factors in transient bacteremia.[9, 10] Schwartzman reactions have been reported following full mouth debridement.[11] Thus, gentle mastication can release bacterial endotoxins into the bloodstream in patients with periodontitis. In addition, oral microorganisms can spread from an infected root canal into the blood stream during and after endodontic therapy.[12]

Approximately 35% of adults between ages 30 and 90 in the United States have significant evidence of chronic periodontitis.[13] Infections of the periodontium are the primary etiology to chronic periodontitis (CP). Other factors such as genetics, smoking habits, stress, socioeconomic status, gender, and ethnicity are contributory factors.[14-16]

The purpose of the present study is to find out relationship between Coronary Heart Disease (CHD) and periodontal diseases.

## NULL HYPOTHESIS

There exists no association between CHD and periodontitis.

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## METHODS AND MATERIALS

This case control study was conducted in the Department of Cardiology, Hayatabad Medical Complex, Peshawar and Department of Periodontics, Khyber College of Dentistry, Peshawar from October, 15th 2011 to January, 15th 2012. Approval of the ethical committees of both institutions was obtained. A total of 300 patients were recruited in this study comprised of 150 cases and 150 controls.

All clinically stable coronary heart patients who visited Out Patient Departments of Hayatabad Medical Complex (HMC) and Khyber College of Dentistry (KCD), patients of both sexes and of all ages were included. All those who refuse to give consent, edentulous patients, Patients who had done periodontal treatment during last 6 months, pregnant and psychiatric patients were excluded from this study.

Cases were defined as clinically stable Coronary Heart Disease patients with the signs and symptoms of angina or previous or current detection of 50% narrowing of a main artery through angiography or any other procedure. Controls were selected randomly from other wards and units of HMC and KCD and were matched for age, sex, SES, education, geographical area and for confounding factors like tobacco and Diabetes mellitus.

In each of the subjects, CPITN was calculated at 6 different sites of each tooth. Oral cavity was divided into sextants and for each sextant the highest index found was recorded, applying the following scores: 0 indicates periodontal health; 1, gingival bleeding; 2, calculus and/or overhanging restorations; 3, pocket depth of 4 to 5 mm; and 4, pocket depth of 6 mm or greater. Finally, the mean CPITN score of each subject (i.e., mean index score of all sextants) was calculated.

To measure gingival inflammation, Gingival index (GI) was used. The probe was used to press the gingiva to see the degree of firmness. The degree of bleeding was also determined when the probe was introduced in the sulcus. Scoring was done according to the formula; "0" score for normal gingival, "1" for mild inflammation, "2" for moderate inflammation (bleeding on probing), "3" severe inflammation (spontaneous bleeding). By totaling scores for all the teeth examined, that was then divided by total number of teeth examined. GI was then recorded.

## RESULTS

This case control study included 150 consecutive CHD patients and 150 exactly matched controls. Of these 55% were male while 45% were female. The mean age of respondents was 51 ±12.4 years. Details of age distribution are given in Table-1.

Among the cases, Community Periodontal Index Score of 3 was recorded in 29.33% patients followed by a score of 1 in 18.67% patients. Similarly among the control group, a score of 2 was recorded in 22.67% of the subjects. The details of CIPTN scores are given in Table-2.

Among the CHD patients (cases), 40% were having gingival inflammation using GI scale, while among the controls 23.33% had the same problem. Details are given in Table-3. Chi square test showed a value of 9.62 with a confidence level of 95% and a P-value of 0.002, thus rejecting the Null Hypothesis.

**Table 1: Age distribution of cases and controls**

| Age group in years | n | % |
|---|---|---|
| 20-30 | 13 | 4.3 |
| 31-40 | 61 | 20.3 |
| 41-50 | 87 | 29 |
| 51-60 | 40 | 13.3 |
| 61-70 | 99 | 33.1 |
| Total | 300 | 100 |

**Table 2: CPITN scores for cases and controls**

| Community periodontal index | Cases | | Control | | Total |
|---|---|---|---|---|---|
| | n | % | n | % | |
| 0 | 26 | 17.33 | 63 | 42 | 89 |
| 1 | 28 | 18.67 | 20 | 13.33 | 48 |
| 2 | 36 | 24 | 34 | 22.67 | 70 |
| 3 | 44 | 29.33 | 27 | 18 | 71 |
| 4 | 16 | 10.67 | 6 | 4 | 22 |
| Total | 150 | 100 | 150 | 100 | 300 |

**Table 3: Gingival Inflammation on GI Scale**

| Gingival Inflammation | Cases | | Control | | Total |
|---|---|---|---|---|---|
| | n | % | n | % | |
| Yes | 60 | 40 | 35 | 23.33 | 95 |
| No | 90 | 60 | 115 | 76.67 | 205 |
| Total | 150 | 100 | 150 | 100 | 300 |

**Table 4: Matched pairs analysis**

| | Disease + | Disease - |
|---|---|---|
| Exposure + | 20 (EE) | 43 (EN) |
| Exposure - | 16 (NE) | 71 (NN) |

Odds ratio (matched pairs analysis) was also found out both for gingival inflammation and CPITN, value of 2.68 was achieved. Matched pair's analysis for CPITN score of 3 and 4 were considered as positive. The details of analysis are given in Table 4.

The results of the present study also showed a positive association between periodontal disease and coronary heart disease.

## DISCUSSION

The results of the present study are in accordance with those established by previous studies in as much that periodontal diseases and coronary diseases have, at least, a tendency to appear together, in such a way that individuals with cardiovascular problems have a greater tendency to have a worse periodontal status and vice versa, as happened in the present study.

In our study, 55% of patients were males. The age group of 61-70 years was involved in 33.1% cases. This corresponds to the studies of Morgaix et al[17] and Buhlin et al[18]. Some investigators like Bullon et al[19] reported female predilection while others showed an age range of 51-60 years for patients who had simultaneous periodontal diseases contributing to coronary heart diseases. This difference in age and gender prevalence may be due to different socio demographic conditions as well as different sample sizes.

In the present study, Community Periodontal Index Score of 3 was recorded in 29.33% patients followed by a score of 1 in 18.67% patients. Similarly among the CHD patients, 40% patients were having gingival inflammation using GI scale. In summary, the results of the present study also show a positive association between periodontal disease and coronary heart disease.

Mattila et al[20] in 1989, had reported an association of poor dental health and myocardial infarction in a case control study. Chronic inflammation from any source is associated with increased cardiovascular risk. Periodontitis is a possible trigger of chronic inflammation[4,6].

In a further analysis in 1993, some American analysts in National health survey of 1970's showed that people having periodontitis were 25% more likely to have coronary heart disease as compared to those with lesser periodontal disease. This association underwent through further studies in many case control, cross sectional and cohort studies, many of them supporting while others contradicting the association[21].

In Pakistan in a previous such study Bukhari [22] in a case control study came up with an Odds Ratio of 4.5, while in India, Pradeep [23] had values of 8.5, contradicting the odd ratio in the present study although our study is in accordance with most of other studies conducted elsewhere [5,6,7]. On the basis of these findings the results of the present study showed a possible association between periodontitis and coronary heart disease (CHD). Odds Ratio of 2.68 for CPITN scores and *P* value of 0.002 clearly support our findings.

## CONCLUSION

Our study has reported a significant association between periodontal diseases and coronary heart disease. To our knowledge, it is the first such study conducted in Khyber Pakhtunkhwa. We are sure that it will create new trends in the coming days and weeks for the research in this regard.

## STUDY LIMITATIONS

External validity of our study can be questioned, as the study findings could not be generalized as it has been conducted in one city alone. Also, the identification of the periodontal pathogen burden and the spread of these pathogens and their toxins to other parts of the body for causing diseases such as CHD was beyond the scope of our study, but nevertheless, this should be kept in mind and definitely be looked into in future studies as has been reported in several other studies in many countries.

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