Determining the Prevalence of Systemic Diseases in Patients with Periodontal Disease: a Case Control Study

Divya Kumari[1], Pranav Prakash[2]

[1]Assistant Professor, Department of Dentistry, Lord Buddha Kosi Medical College & Hospital Saharsa, Bihar, India

[2]Assistant Professor, Department of Dentistry, Lord Buddha Kosi Medical College & Hospital, Saharsa, Bihar, India

Abstract

Aim: The aim of the present study was to determine whether there is a significant difference in the prevalence of systemic diseases in patients with periodontal disease and patients without periodontal disease.

Methods: This case-control, epidemiological study was carried out in the Department of Dentistry. The study was conducted for period of one year. Among these patients, 200 patients with periodontal disease (cases) and 100 patients without periodontal disease (controls) were included in the study.

Results: Prevalence of systemic diseases in cases was 51% i.e. 102 patients have systemic disease among 200. In periodontal patients, highest prevalence is in 50- 59 age group (78.57%) and other age groups in decreasing order was; >60 (55.88%), 40- 49 (548.14%), 30- 39 (40%) and 18- 29 (20%). In controls, prevalence was 18% i.e. 18 patients have systemic diseases among 100, which is considerably less than cases group. Highest prevalence is in 50- 59 age group (33.33%) and other age groups in decreasing order is; 40- 49 (30%), 18- 29 (17.39%), 30- 39 (13.15%) and >60 (0%). Among cases, 65 patients are beginning destructive periodontal disease, 60 patients are Established destructive periodontal disease, and 75 patients are in Terminal disease. Patients with periodontal diseases (cases) had higher prevalence of hypertension, diabetes, CVS disorders. There were 10 males and 8 females in controls.

Conclusion: Due to the high frequency of medical conditions, thorough evaluation of patients medical history should be a mandatory first step in the diagnosis and management of dental diseases. Dental practitioners may also contribute their expertise in assessing risk for several systemic conditions. The fact that the oral diagnostic samples (saliva, crevicular blood) can be readily obtained non-invasively, and at potentially lower costs, may offer important advantages to some traditional medical testing.

Keywords: Systemic diseases, Periodontal disease, Self-reported health questionnaire.

Introduction

Periodontal disease is a chronic inflammatory disease of periodontium and its advanced form is characterized by periodontal ligament loss and destruction of surrounding alveolar bone. [1] It is the main cause of tooth loss and is considered one of the two biggest threats to the oral health. [1,2] There are approximately 800 species of bacteria identified in the oral cavity [3] and it is hypothesized that complex interaction of bacterial infection and host response, modified by behavioral factors such as smoking, can result in periodontal disease. [4]

Periodontal disease is the most common oral condition of human population. [5] The prevalence and incidence statistics of periodontal diseases vary because of bias, case misclassification, and the number of teeth and the sites examined. [6] According to the Canadian Health Measures Survey 2007-2009, the measurement of loss of periodontal ligament attachment is considered the gold standard in reporting the prevalence of periodontal disease. [7] National Health and Nutrition Examination Survey (NHANES) determined the attachment loss (AL) and probing depth (PD) at six sites of all teeth (excluding third molars) for the estimation of periodontal disease in the U.S. [8] The world Health Organization (WHO) has maintained global oral health data bank using community periodontal index (CPI). [9]

Smoking is one of the most important risk factors for periodontitis, and the reduction in periodontal disease prevalence is related to the drop in smoking

rates. [10] Negative effects of smoking cigarette, cigar, cannabis, and pipe on periodontal tissues are similar. [11] Poor oral hygiene is linked with periodontal disease, and lack of proper tooth brushing and other measures of oral hygiene can encourage bacterial deposition and build-up of dental plaque on teeth and gums which can set a stage for inflammatory changes in periodontal tissues. [12] There is pronounced relationship between poor oral hygiene and increased accumulation of dental plaque, high prevalence and increased severity of periodontal disease. [13] Axelsson et al. conducted a prospective study of 15 years duration and found no further deterioration of periodontal structure among the subjects who maintained proper oral hygiene and took routine professional dental care. [14]

The aim of the present study was to determine whether there is a significant difference in the prevalence of systemic diseases in patients with periodontal disease and patients without periodontal disease.

Materials and Methods

This case-control, epidemiological study was carried out in the Department of Dentistry, Lord Buddha Kosi Medical College & Hospital Saharsa, Bihar, India. The study was conducted for period of one year. Among these patients, 200 patients with periodontal disease (cases) and 100 patients without periodontal disease (controls) were included in the study. A detailed case history of each patient was recorded on a pro forma. Prior to commencement of this study, ethical clearance was obtained from the institute.

The medical history like Diabetes, Respiratory diseases, Epilepsy, Hypertension, Cardiovascular disorders, Liver Diseases, Blood disorders, Kidney disorders, Cancer and Radiotherapy, Psychiatric problems, AIDS/HIV, Bone disorders, Gastro-intestinal problems and allergies was enquired through a health questionnaire and recorded.

The patients were divided into five groups according to age groups: 18-29, 30-39, 40-49, 50-59 and above 60 years. Inclusion criteria

1. Patient who had history of systemic disease and diagnosed by the physician with relevant investigation reports.

2. Those who present suggestive signs or symptoms of systemic disorder were referred to appropriate medical clinics for evaluation.

3. Minimum of 20 teeth present.

For 200 patients with periodontal disease, the Russell periodontal index (Russell. A.I 1956)15 was chosen as the guideline for assessment of periodontal status.

All of the gingival and periodontal tissue circumscribing each tooth (i.e. all of the tissue circumscribing a tooth is considered a scoring) is assessed for gingival inflammation and periodontal involvement.

Scoring Criteria

Russell chose the scoring values (0, 1, 2, 6, and 8) in order to relate the stages of the disease in an epidemiological survey to the clinical conditions observed. The Russells rule state that when in doubt assign the lower score.

Calculation of the Index

The periodontal index score (PI Score) per individual is obtained by adding all of the individual scores and divided by the number of teeth present or examined.

PI Score per person = Sum of Individual Score

Number of Teeth Present

The data was collected and analyzed statistically using Statistical Package for Social Sciences (SPSS version 11.0) with following procedure:

1.   Independent t-test was used to find out significance difference between cases and controls. One way analysis was used to find out significant difference between more than two independent groups.

2.   Newman- Keuls multiple post hoc for pair wise significance between different age groups. Yates corrected Chi- Square test and Odds ratio was used to assess the risk of occurrence of diseases in cases and controls

Results

Table 1: Prevalence of systemic diseases by age group (Cases and Controls)

Cases				Controls			
Age Group	Total number of patient	Patients with systemic diseases	Percentage	Total number of patient	Patients with systemic diseases	Percentage
18- 29	20	4	20	46	8	17.39
30- 39	50	20	40	38	5	13.15
40- 49	54	26	48.14	10	3	30

50- 59	42	33	78.57		6	2	33.33
60+	34	19	55.88	0	0	0	
Total	200	102	51		100	18	18

Prevalence of systemic diseases in cases was 51% i.e. 102 patients have systemic disease among 200. In periodontal patients, highest prevalence is in 50-59 age group (78.57%) and other age groups in decreasing order was; >60 (55.88%), 40- 49 (548.14%), 30- 39 (40%) and 18- 29 (20%). In controls, prevalence was 18% i.e. 18 patients have systemic diseases among 100, which is considerably less than cases group. Highest prevalence is in 50- 59 age group (33.33%) and other age groups in decreasing order is; 40- 49 (30%), 18- 29 (17.39%), 30- 39 (13.15%) and >60 (0%).

Table 2: Distribution of study samples according to study groups with periodontitis (according to Russell's PI score)

Age group	Beginning destructive periodontal disease	Established destructive periodontal disease	Terminal disease	Total
18-29	16	4	0	20
30-39	20	26	4	50
40-49	19	14	19	54
50-59	10	14	20	42
60+	0	2	32	34
Total	65	60	75	200

Among cases, 65 patients are beginning destructive periodontal disease, 60 patients are Established destructive periodontal disease, and 75 patients are in Terminal disease.

Table 3: Number of patients reporting various types of systemic diseases in cases

Type of systemic diseases	Males	Female	Total
Hypertension	15	5	20
Diabetes Mellitus	13	6	19
Drug Allergies	8	6	14
CVS disorders	8	2	10
CA and RT	8	2	10
GIT disorders	3	4	7
Bone disorders	3	4	7
Respiratory disorders	4	1	5
Epilepsy	1	3	4
Blood disorders	1	2	3
Liver disorders	1	0	1
Psychological disorders	0	1	1
AIDS/ HIV	0	1	1
Totals	65	37	102

Patients with periodontal diseases (cases) had higher prevalence of hypertension, diabetes, CVS disorders.

Table 4: Number of patients reporting various types of systemic diseases in controls

Type of systemic diseases	Males	Female	Total
Hypertension	1	1	2
Diabetes Mellitus	1	2	3
Drug Allergies	3	1	4
CVS disorders	0	0	0
CA and RT	1	0	1
GIT disorders	1	1	2
Bone disorders	0	1	1
Respiratory disorders	1	0	1
Epilepsy	1	0	1
Blood disorders	0	1	1

Liver disorders	0	0	0
Psychological disorders	0	1	1
AIDS/ HIV	1	0	1
Totals	10	8	18

There were 10 males and 8 females in controls.

Discussion

Oral microbiological infections may also affect ones general health status. Indeed, animal and population-based studies now suggest that periodontal diseases may be linked with systemic diseases and conditions including cardiovascular diseases, diabetes, respiratory diseases, adverse pregnancy outcomes, and osteoporosis. Better understanding of this correlation will help both dental and medical professionals to determine the best approach to patient. [15] Page proposed that periodontitis may affect the hosts susceptibility to systemic disease in three ways: by shared risk factors, by subgingival biofilms acting as reservoirs of gram-negative bacteria, and through the periodontium acting as a reservoir of inflammatory mediators. [16] New investigations have definitely acknowledged a clinically relevant two-way relationship between periodontitis and certain systemic diseases and conditions which are significant for the dentist in daily practice, and for a physician as well. [17]

Recent studies have indicated that periodontitis may produce any number of alterations in systemic health. Investigators have demonstrated significant association between periodontitis and acute cerebral infarction/ stroke [18], failure of joint/organ replacement and kidney dialysis [16], coronary heart diseases [19,20] preterm low birth weight, aspiration pneumonia [21] and diabetes. [22] Hippocrates and others throughout the centuries speculated that oral diseases might influence the morbidity and mortality of systemic diseases. [23] Walter D. Miller, [24] an American dentist, published in 1981 a classic article in Dental Cosmos entitled The Human Mouth as a Focus of Infection. He reported that microorganism or their waste products obtain entrance to parts of the body adjacent to or remote from the mouth. He listed several systemic diseases that he thought to originate from an oral focus of infection, including gangrene, tuberculosis, meningitis, syphilis, thrush, angina Ludovici, actinomycosis, noma, septicemia and pneumonia. Prevalence of systemic diseases in cases was 51% i.e. 102 patients have systemic disease among 200. In periodontal patients, highest prevalence is in 50- 59 age group (78.57%) and other age groups in decreasing order was; >60 (55.88%), 40- 49 (548.14%), 30- 39 (40%) and 18-29 (20%). No patients were found in age group above 60 without periodontal diseases, is in agreement with other studies. [25-27]

In controls, prevalence was 18% i.e. 18 patients have systemic diseases among 100, which is considerably less than cases group. Highest prevalence is in 50- 59 age group (33.33%) and other age groups in decreasing order is; 40- 49 (30%), 18- 29 (17.39%), 30- 39 (13.15%) and >60 (0%). Among cases, 65 patients are beginning destructive periodontal disease, 60 patients are Established destructive periodontal disease, and 75 patients are in Terminal disease. Patients with periodontal diseases (cases) had higher prevalence of hypertension, diabetes, CVS disorders. There were 10 males and 8 females in controls. In our study, as the age of the patient increases, number of teeth present were less and severity of periodontitis increases similar results were found in some studies. [28,29] Few studies30-32 reported that the prevalence of potential respiratory pathogens increases in periodontal patients. Several mechanisms can be hypothesized to explain oral colonization of microorganism caused by respiratory pathogens in susceptible patients. Medically compromised patients may be prone to oropharyngeal colonization by potential respiratory pathogens. Dental plaques of these subjects may also provide a surface to which respiratory pathogens adhere to provide a reservoir for infection to distal portion of the respiratory tract. [30-32]

Conclusion

Due to the high frequency of medical conditions, thorough evaluation of patients medical history should be a mandatory first step in the diagnosis and management of dental diseases. Dental practitioners may also contribute their expertise in assessing risk for several systemic conditions. The fact that the oral diagnostic samples (saliva, crevicular blood) can be readily obtained non-invasively, and at potentially lower costs, may offer important advantages to some traditional medical testing. A greater integration of medicine and dentistry will likely require that dentists take more responsibility for the management of their patients systemic health and conversely that physician assume a more active role in their patients oral health.

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