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Original Research Article

A Clinico-Epidemiological Assessment of Systemic Diseases in Individuals with Chronic Generalized Periodontitis

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Abstract:

Aim: To determine the prevalence of systemic diseases in individuals with chronic generalized periodontitis in the population of Bihar.

Materials and Methods: This epidemiological study was carried out in Department of Dentistry, ESIC Medical College & Hospital, Bihta, Patna, Bihar, India from march 2024 to Oct 2024. Among these patients, 400 patients with periodontal disease (cases) and 200 patients without periodontal disease (controls) were included in the study. A detailed case history of each patient was recorded on a pro forma. 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. Patient who had history of systemic disease and diagnosed by the physician with relevant investigation reports. Those who present suggestive signs or symptoms of systemic disorder were referred to appropriate medical clinics for evaluation. Minimum of 20 teeth present.

Results: Age group 30-39 had highest percentage of carious teeth (67.70%). Smokers are most commonly found in CVS disorders (61.90%), respiratory diseases (57.14%) and Cancer (57.14%), GIT disorders (47.05%), hypertension (39.70%), allergies (35.13%) and diabetes (29.41%). Habits are found to be more common in cases when compared to controls. Patients with periodontal diseases (cases) had higher prevalence of hypertension (17%), diabetes (12.75%) CVS disorders (5.25%) (Among 21 patients, 15-angina and 6-Myocardial Infarction) than patients without periodontal diseases (Controls) 2%, 2.5% and 0% respectively. Yates corrected Chi-square test, showed a significant difference between cases and controls. Cases had a higher prevalence of 4.25% GIT disorders(among 17 patients; 6-Gastro-esophageal reflux, 8-gastritis, 3-peptic ulcer), 4% of bone disorders (among 16 patients; 15-arthritis and 1-osteomalacia), 3.5% of respiratory diseases (among 14 patients; 8-asthmatic 4- tuberculosis, 2- COPD), 2% of epilepsy than Controls, 2%, 1.5%, 1% and 0.5% respectively. Yates corrected Chi- square test assessed showed no significant difference between cases and controls. Prevalence of psychiatric disorders in both cases and controls are same (0.5%).

Conclusion: The future of dental practice will be dramatically altered if subsequent research confirms that periodontal disease is a true risk factor for systemic disease and that the initiation or progression of these medical conditions can be reduced by periodontal treatment. Most obviously, there will be further integration of dental and general medicine that will bring new opportunities for diagnosis and collaboration across specialities. Dental practitioners may also contribute their expertise in assessing risk for several systemic conditions.

Keywords: Systemic Diseases, Periodontal Disease, Self-Reported Health Questionnaire.

Introduction

Chronic generalized periodontitis (CGP) is a widespread inflammatory condition of the periodontium, primarily caused by bacterial plaque accumulation, leading to the destruction of supporting tooth structures and eventual tooth loss. The impact of CGP, however, extends beyond the oral cavity, influencing various systemic conditions. The association between periodontal disease and systemic health has gained considerable attention, with emerging research suggesting a bidirectional relationship between periodontal infections and systemic diseases.[1,2]

Cardiovascular diseases (CVD) are among the most extensively studied systemic conditions linked to periodontitis. Evidence indicates that the

inflammatory response to periodontal pathogens can contribute to the pathogenesis of atherosclerosis, thereby increasing the risk of coronary artery disease, myocardial infarction, and stroke. The role of systemic inflammation and the direct invasion of periodontal pathogens into the bloodstream are considered critical mechanisms underlying this association.[3-5]

Diabetes mellitus is another significant systemic condition associated with periodontitis. Periodontal inflammation exacerbates insulin resistance, complicating glycemic control in diabetic patients. Conversely, poorly controlled diabetes increases susceptibility to periodontal infections, creating a harmful feedback loop. This bidirectional relationship highlights the importance of integrated medical and dental care for patients with diabetes.[6-8]

Respiratory diseases, such as chronic obstructive pulmonary disease (COPD) and pneumonia, are also linked to periodontitis. The aspiration of periodontal pathogens into the lower respiratory tract can lead to or exacerbate respiratory infections. Additionally, periodontal disease has been implicated in adverse pregnancy outcomes, including preterm birth and low birth weight. The systemic inflammatory mediators produced during periodontal infections can affect the fetal-placental unit, posing risks to fetal development.[9-11]

Moreover, there is growing evidence of the association between periodontitis and other systemic conditions, such as rheumatoid arthritis, chronic kidney disease, and certain cancers. The inflammatory pathways and immune responses involved in these conditions are thought to intersect with those in periodontal disease, contributing to the observed comorbidities.[12-15]

Understanding the frequency of systemic diseases in patients with CGP is crucial for developing comprehensive healthcare strategies that address both oral and systemic health. This study aims to investigate the prevalence of systemic diseases in patients with chronic generalized periodontitis, providing insights into the interconnected nature of oral and overall health.

Materials and Methods

This epidemiological study was carried out in Department of Dentistry, ESIC Medical College & Hospital, Bihta, Patna, Bihar, India from march 2024 to Oct 2024. Among these patients, 400 patients with periodontal disease (cases) and 200 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,

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 400 patients with periodontal disease, the Russell periodontal index (Russell. A.I 1956) 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 orderto relate the stages of the disease in an epidemiologicalsurvey 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 isobtained by adding all of the individual scores and divided by the number of teeth present or examined.

$$\text{PI Score per person} = \frac{\text{Sum of Individual Score}}{\text{Number of Teeth Present}}$$

The data was collected and analyzed statistically using Statistical Package for Social Sciences (SPSS version 20.0)

Results

Total 600 patients attending outpatient department gave consent for the study. These subjects were divided into cases and controls.

400 patients with periodontal diseases (cases)

200 patients without periodontal diseases (controls).

The total samples were grouped into the following agegroups: 18- 29, 29- 39, 40- 49, 50- 59 and 60 years and above. Information about medical conditions was obtained byhealth questionnaire.Periodontitis was assessed by Russel's Periodontal Index (PI). Periodontitis group had 212 (53%) male patients and 188 female (47%) patients. Controls had

110 (55%) males and 90 (45%) females. In periodontitis group, mean age of male patients is 46.67, and for female patients mean age is 46.51. In controls, mean age of male patients is 32.29, and for female patients mean age is 31.39 which are significantly lower than group I patients. Prevalence of systemic diseases in cases is 51.5% i.e. 206 patients have systemic disease among 400. In periodontal patients, highestprevalence is in 50- 59 age group (70.52%) and other age groups in decreasing order is; >60 (54.92%), 40-49 (51.96%), 30- 39 (39.58%) and 18- 29 (25%). (Table 1) In controls, prevalence is 18.5% i.e. 37 patients have systemic diseases among 200, which is considerably less than cases group. Highest prevalence is in 50- 59 age group (40%) and other age groups in decreasing order is; 40- 49 (33.33%), 18- 29 (17.20%), 30- 39 (13.15%) and >60 (0%) (Table 1). The greatest single systemic factor is hypertension, with 68 patients (24.46%). The greatest single systemic factor in patients without periodontal diseases (controls) is Allergies, with 9 patients. Among cases, 132 (33%) patients are beginning destructive periodontal disease, 121(30.25%) patients are Established destructive periodontal disease, and 147(36.75%) patients are in Terminal disease (Table 2).Statistically significant difference between severities of periodontitis is observed (Chi-square=184.1401 df = 8 p=0.0000*). Independent t- test shows, mean number ofteeth present in cases (n=400) is 28.18 and in controls (n=200) is 29.27, which is statistically significant (t-value -4.18 & p- value 0.0000*). Newman Keuls multiple post hoc procedure shows statistically significant results between following age groups; 18- 29 to >60 (p-value =0.0000*), 30-39 to >60 (p-value =0.0000*), 40-49 to >60 (p-value =0.0000*), 50-59 to >60 (p-value =0.0000*). Patients with carious teeth in periodontal patients (cases) were found to be58.5%. Age group 30-39 had highest percentage of carious teeth (67.70%). Smokers are most commonly found in CVS disorders (61.90%), respiratory diseases (57.14%) and Cancer (57.14%), GIT disorders (47.05%), hypertension (39.70%), allergies (35.13%) and diabetes (29.41%). Habits are found to be more common in cases when compared to controls. Patients with periodontal diseases (cases) had higher prevalence (Table 3) of hypertension (17%), diabetes (12.75%) CVS disorders (5.25%) (Among 21 patients, 15-angina and 6-Myocardial Infarction) than patients without periodontal diseases (Controls) 2%, 2.5% and 0% respectively (Table 4). Yates corrected Chi-square test, showed a significant difference betweencases and controls. Cases had a higher prevalence of 4.25% GIT disorders (among 17 patients; 6-Gastro-esophageal reflux, 8-gastritis, 3-peptic ulcer), 4% of bone disorders (among 16 patients; 15-arthritis and 1-osteomalacia), 3.5% of respiratory diseases (among 14 patients; 8- asthmatic 4- tuberculosis, 2- COPD), 2% of epilepsy than Controls, 2%, 1.5%, 1% and 0.5% respectively. Yates corrected Chi- square test assessed showed no significant differencebetween cases and controls. Prevalence of psychiatric disorders in both cases and controls are same (0.5%).

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

Cases				Controls		
Age Group	**Total number of patients**	**Patients with systemic diseases**	**Percentage**	**Total number of patients**	**Patients with systemic diseases**	**Percentage**
18- 29	36	9	25	93	16	17.20
30- 39	96	38	39.58	76	10	13.15
40- 49	102	53	51.96	21	7	33.33
50- 59	95	67	70.52	10	4	40
60+	71	39	54.92	0	0	0
Total	400	206	51.5%	200	37	18.5%

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

Age group	Beginning destructive periodontal disease	%	Establisheddestructive periodontal disease	%	Terminal disease	%	Total
18-29	30	83.33	6	16.67	0	0.00	36
30-39	48	50.00	40	41.67	8	8.33	96
40-49	36	35.29	35	34.31	31	30.39	102
50-59	18	18.95	35	36.84	42	44.21	95
60+	0	0.00	5	7.04	66	92.96	71
Total	132	33.00	121	30.25	147	36.75	400
Chi-square=184.1401 df=8 p=0.0000*							

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

Type of systemic diseases	Males	Female	Total
Hypertension	35	33	68(17%)
Diabetes Mellitus	30	21	51(12.75%)
Drug Allergies	17	20	37(9.25%)
CVS disorders	14	7	21(5.25%)
CA and RT	12	9	21(5.25%)
GIT disorders	7	10	17(4.25%)
Bone disorders	8	8	16(4%)
Respiratory disorders	9	5	14(3.5%)
Epilepsy	3	5	8(2%)
Blood disorders	3	4	7(1.75%)
Liver disorders	1	1	2(0.5%)
Psychological disorders	0	2	2(0.5%)
AIDS/ HIV	0	1	1(0.25%)
Totals	139	126	265(69.5%)

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

Type of systemic diseases	Males	Female	Total
Hypertension	3	1	4 (2%)
Diabetes Mellitus	2	3	5 (2.5%)
Drug Allergies	5	4	9 (4.5%)
CVS disorders	0	0	0 (0%)
CA and RT	1	0	1 (0.5%)
GIT disorders	1	3	4 (2%)
Bone disorders	1	2	3 (1.5%)
Respiratory disorders	2	0	2 (1%)
Epilepsy	1	0	1 (0.5%)
Blood disorders	2	3	5 (2.5%)
Liver disorders	0	0	0 (0%)
Psychological disorders	0	1	1 (0.5%)
AIDS/ HIV	2	0	2 (1%)
Totals	20	17	37 (18.5%)

Discussion

Recently, several reports have implicated long-standing periodontal diseases in the development of systemic diseases, the relationship between periodontal disease and systemic disease has given rise to a new discipline in periodontology termed Periodontal Medicine first proposed by Offenbacher at the 1996 World Workshop in Periodontics.[16] This new exciting era of research has far reaching clinical and public health implications. Since oral health is intimately related to systemic health as mouth is truly connected to the rest of body, the directionality of special relationships has to be clarified. The possibility that morbidity and mortality from systemic diseases may be reduced at improving periodontal health makes it imperativethat this relationship be examined more closely. The susceptibility of periodontal disease varies among people and is not even. Therefore, attention is aimed at identifying specific attributes and exposures, which in turn may affect the systemic consequences of periodontitis. The risk factors may involve host response, pathogenic flora, age, gender, education and frequency of dental visits. Using dataobtained from self-reported health questionnaire; we have been able to determine the extent of systemic conditions reported by patients attending general dental practices. Studies have shown that self-reported health questionnaire could be reliably used for clinical or social survey research.[17]

In our study, out of 400 patients (cases), 206 (51.5%) and in the 200 patients (controls) only 37 (18.5%) had oneor more systemic diseases. The prevalence of systemic conditions found in our study (51.5%) is slightly higher, than the prevalence found in a similar study.[18] Theprevalence of systemic diseases increased with increasing age in both cases and controls. Age groups 18- 29 (25%),30- 39 (39.58%), 40- 49 (51.96%), 50-59 (70.52%) except in >60 (54.92%) and 18- 29 (17.20%), 40- 49 (33.33%), 50-59 (40%), respectively. No patients were found in age groupabove 60 without periodontal diseases, is in agreement with other studies.[18-20] In our study, prevalence of systemic diseases in males (53.77%) is higher than females (48.93%). In Brasher and Rees study same results were found.[18] In our study most frequent conditions found in patients with periodontal disease were:

hypertension (24.46%), diabetes mellitus (19.06%), drug allergies (14.02%), cancer and radiotherapy (7.91), cardiovascular disorders (7.55%), gastrointestinal disorders (6.47%), bone disorders (5.75%), blood disorders (4.67%), respiratory diseases (4.31%), epilepsy (2.87%), psychological disorders (1.79%), kidney disorders (0.71%) and AIDS (0.35%). In few studies,[21,18] themedical conditions encountered most frequently were drug allergy and cardiovascular disorders (note: authors included hypertension, which, when merged with their cardiac group,gave a combined incidence of 23.5%). Other investigators[19,20,22,23] reported that in dental patients, the systemic condition with the highest prevalence was cardiovascular disease. In a study[34] of 590 patients, 21.7%of them had drug allergy. Other author[24] reported that, overall gastrointestinal diseases was most prevalent (11.9%), followed by bleeding tendencies (9.3%), renal disorders (8.7%), respiratory diseases (8.3%) and hypertension (6.4%). In our study, as the age of the patient increases, numberof teeth present were less and severity of periodontitis increases similar results were found in some studies.[25,26] Smoking is an established risk factor of periodontal disease. The smokers of the present study sample were found to have a significant greater frequency of severity of periodontal disease compared to non-smokers. Similar to other studies.[27,28] Among smokers' highest percentage (61.90%) ofsmokers were found in CVS disorder patients. In our study, single highest prevalent (17%) systemic disorder is hypertension in (cases) consistent with other studies[24]. In our study, the prevalence of Diabetes mellitus in cases (12.75%), and in patients in controls (2.5%) are higher when compared to the other studies.[21,17,20,29, 24] Drug allergies (9.25%) reported in our study is significantly lower than the findings of some investigators.[17,20,29] In our study, among 21CA and RT patients, 17 were diagnosed with squamous cell carcinoma and 4 patients under RT. So, the prevalence of CA and RT in patients with periodontitis (cases) is 5.25% and patients without periodontitis (controls) are 0.5% is considerably more compared to other studies.[21,18,17,20,29] In the present study, prevalence of CVS disorders in patients (cases) was found to be 5.25%, whereas in the control groupno patients with CVS disorders were found. Few studies[17,30] reported lesser prevalence of CVS disorders whereas few other studies [21,18,20,24] reported higher prevalence compared to our study. Periodontal disease and atherosclerosis both have complex causes genetic and sex related predispositions. In addition, they may share some risk factors, such as smoking.

In our study, the prevalence of respiratory diseases in patients (cases) was 3.5% and patients (controls) found to be1%. Other respiratory diseases reported were tuberculosis, COPD (Chronic Obstructive Pulmonary Disease). Significant difference between cases and controls was observed. Few studies[17,29] reported less prevalence and higher in one study[24] compared to our study. Few studies[30-32] 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. In our study, other systemic diseases like, GIT disorders, bone disorders blood disorders, epilepsy, psychological disorders, liver diseases, kidney disorders and HIV/AIDS were found to be less than 5%. Similar to results found in other studies[17,30,33,20,29,24] On the basis of this study it is evident that systemic diseases often play an important role in the diagnosis and management of the patients with periodontal disease. The high prevalence of systemic diseases dictates that the oral physician should always obtain a thorough medical history for each patient.

Conclusion

The future of dental practice will be dramatically altered if subsequent research confirms that periodontal disease is a true risk factor for systemic disease and that the initiation orprogression of these medical conditions can be reduced by periodontal treatment. Most obviously, there will be further integration of dental and general medicine that will bring new opportunities for diagnosis and collaboration across specialities. 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.

References

1. Bhuyan R, Bhuyan SK, Mohanty JN, Das S, Juliana N, Juliana IF. Periodontitis and Its Inflammatory Changes Linked to Various Systemic Diseases: A Review of Its Underlying Mechanisms. *Biomedicines*. 2022; 10(10):2659. https://doi.org/10.3390/biomedicines10102659
2. Reis, A. A., Paz, H. E. d. S., Monteiro, M. d. F., Casati, M. Z., Steiner-Oliveira, C., Pascon, F. M., et al. (2021). Early manifestation of periodontal disease in children and its association with familial aggregation. J. Dentist. Child 88, 140–143.
3. Chettri, Dronesh; Bagewadi, Anjana1; Angolkar, Mubashir. Prevalence of chronic periodontitis among the residents of PHC in

Belagavi and its association with systemic disease – A cross-sectional study. Indian Journal of Health Sciences and Biomedical Research (KLEU) 15(2):p 143-146, May–Aug 2022. | DOI: 10.4103/kleuhsj.kleuhsj_209_21.
4. Preshaw PM, Alba AL, Herrera D, Jepsen S, Konstantinidis A, Makrilakis K, Taylor R. Periodontitis and diabetes: a two-way relationship. Diabetologia. 2012;55(1):21-31. doi: 10.1007/s00125-011-2342-y.
5. Scannapieco FA, Papandonatos GD, Dunford RG. Associations between oral conditions and respiratory disease in a national sample survey population. Ann Periodontol. 1998;3(1):251-6. doi: 10.1902/annals.1998.3.1.251.
6. Gomes-Filho IS, Passos JS, Seixas da Cruz S. Respiratory disease and the role of oral bacteria. J Oral Microbiol. 2010;2. doi: 10.3402/jom.v2i0.5811.
7. Offenbacher S, Lieff S, Boggess KA, Murtha AP, Madianos PN, Champagne CM, et al. Maternal periodontitis and prematurity. Part I: Obstetric outcome of prematurity and growth restriction. Ann Periodontol. 2001;6(1):164-74. doi: 10.1902/annals.2001.6.1.164.
8. Vergnes JN, Sixou M. Preterm low birth weight and maternal periodontal status: a meta-analysis. Am J Obstet Gynecol. 2007;196(2):135.e1-7. doi: 10.1016/j.ajog.2006.09.027.
9. Fuggle NR, Smith TO, Kaul A, Sofat N. Hand to mouth: a systematic review and meta-analysis of the association between rheumatoid arthritis and periodontitis. Front Immunol. 2016;7:80. doi: 10.3389/fimmu.2016.00080.
10. Fisher MA, Taylor GW, Papapanou PN, Rahman M, Debanne SM. Clinical and serologic markers of periodontal infection and chronic kidney disease. J Periodontol. 2008;79(9):1670-8. doi: 10.1902/jop.2008.080011.
11. Bui FQ, Almeida-da-Silva CL, Huynh B, Trinh A, Liu J, Woodward J, et al. Association between periodontal pathogens and systemic disease. Biomed J. 2019;42(1):27-35. doi: 10.1016/j.bj.2018.12.001.
12. Han YW, Wang X. Mobile microbiome: oral bacteria in extra-oral infections and inflammation. J Dent Res. 2013;92(6):485-91. doi: 10.1177/0022034513487559.
13. Jepsen S, Kebschull M, Deschner J. Interaction between periodontitis and cardiovascular diseases - with focus on inflammation. Periodontol 2000. 2020;83(1):107-121. doi: 10.1111/prd.12267.
14. Monsarrat P, Blaizot A, Kemoun P, Ravaud P, Nabet C, Sixou M, et al. Clinical research activity in periodontal medicine: a systematic mapping of trial registers. J Clin Periodontol. 2016;43(5):390-400. doi: 10.1111/jcpe.12519.
15. Genco RJ, Sanz M. Clinical and public health implications of periodontal and systemic diseases: an overview. Periodontol 2000. 2020;83(1):7-13. doi: 10.1111/prd.12344.
16. Winning L, Linden GJ. Periodontitis and systemic disease: association or causality? Curr Oral Health Rep. 2017;4(1):1-7. doi: 10.1007/s40496-017-0121-4.
17. Suomi JD, Horowitz HS, Barbano JP. Self-reported systemic conditions an adult study population. J Dent Res 1975;54:1092.
18. Brasher WJ, Rees TD. Incidence of Certain Systemic Conditions Among patients presenting for Periodontal Treatment. J Periodontol 1974:669-71.
19. Stephen T. Sonis, Robert Fazio, Ann Setkowicz, David Gottlieb, Carol Vorhaus. Comparison of the nature and frequency of medical problems among patients in general, speciality and hospital dental practices. J Oral Med 1983;38;(2).
20. Mark E Peacock and Robert E. Carson. Frequency of self-reported medical conditions in periodontal patients. J Perio 1995;66;1004-7.
21. Brasher WJ, Rees TD. Systemic Conditions in the Management of Periodontal Patients. J Periodontol 1970;41:349-52
22. Dunne SM, Clark CG. The identification of the medically compromised patient in dental practice. J Dent 1985;13;45-51.
23. Ho AW, Grossi SG, Dunford RG, Genco RJ. Reliability of a self-reported health questionnaire in a periodontal study. J Periodontal Res 1997;32:646-50.
24. Yousef Saleh Khader, Oula Alsaeed, Samar Zaal Burgan, Zouhair Odeh Amarin. Prevalence of medical conditions among patients attending dental teaching clinics in north Jordan. J Contemp Dentl Pract 2007;(8)1:60-7.
25. Jansson L, Lavstedt S, Frithiof L, Theobald H. Relationship between oral health and mortality in cardiovascular diseases. J Clin Periodontol 2001;28;762-8.
26. Holmstrup P, Poulsen AH, Andersen L, Skudbol T, Fiehn NE. Oral infections and systemic diseases. Dent Clin North Am 2003;47:575-98.
27. Bergstrom J, Eliasson S & Dock J. A 10 year prospective study of tobacco smoking and periodontal health. J Periodontal 2000;71:1338-47.
28. Bergstrom J, & Preber H. Tobacco use as a risk factor. J Periodontal 1994;65:545-50
29. T O. Georgio, RI Marshall, PM Bartold. Prevalence of systemic diseases in Brisbane general and periodontal practice patients. ADJ 2004;49(4)177-84.
30. Nery EB, Meister Jr F, Ellinger RF, Eslami A, McNamara TJ. Prevalence of medical problems in periodontal patients obtained from three

different population. J Periodontol 1987; 58: 564-8.
31. Rams TE, Babalola OO, Slots J. Subgingival occurrence of enteric rods, yeasts and staphylococci after systemic doxycycline therapy. Oral Microbiol Immunol 1990;5:166-8.
32. Helovuo H, Hakkarainen K, Paunio K. Changes in the prevalence of subgingival enteric rods, yeasts and staphylococci after treatment with penicillin and erythromycine. Oral Microbiol Immunol 1993;8:75-9.
33. Lawrence J. Emrich, Marc Shlossman, and Robert J. Genco. Periodontal disease in non-insulin dependent diabetes mellitus. J Periodontal 1991;62;123-30.
34. Scully C, Boyle P, Reliability of self-administered questionnaire for screening for medical problems in dentistry. Community Dent Oral Epidemiol 1983;11;105-8.