

Oral Hygiene and Periodontal Health Status of Acute Coronary Syndrome Patients reported in PIMS Islamabad

DR Saira Rafique (DHQ Hospital Bagh AJK)

DR Syed USman Ali Gillani (CMH Rawalakot)

DR Qura tul Ain Fatima (Fazaia MC Islamabad)

DR Zuha Yasin (Fatima Jinnah Medical College)

DR Afia Hussain Usmani (PMC Rawalakot)

DR Saqlain Nazeer (AMC Abbottabad)

Objective: To evaluate oral hygiene and periodontal health status of Acute

Coronary Syndrome patients by using standardized oral hygiene and periodontal indices.

Methodology:

A cross sectional study conducted at the Cardiac center and Oral and Maxillofacial Surgery (OMFS) Department of PIMS hospital Islamabad. The convenience sampling technique was used in which the sample size was calculated to be 300. Either gender, age in-between

40-75 years was included. Smokers, known diabetic, patients having any cardiac procedure <6 months, or Patients reporting for periodontal disease treatment within 3 months were excluded. The data was analyzed by using SPSS software version 23.0. The frequencies and percentages were calculated for categorical variables and mean and standard deviation for continuous variables.

Results: In this study 51% were male and 49% were female. The mean age was 54.55±9.605. It was found that 56% of included participants were living in urban areas and round about 40% belongs to the middle class socioeconomically. On the basis of oral hygiene 74% of participants had poor status. Periodontal health status was also poor as the 38.0% have gingivitis and pocket formation.

Conclusion: In our study majority of acute coronary syndrome patients reported with poor oral hygiene and periodontal health status although it is not clear how oral hygiene and poor periodontal health effects cardiovascular changes. To find out the association of cardiovascular disease and periodontal disease and further details of pathogenesis there is much need for clinical evidence based studies.

Keywords: Oral Hygiene, Periodontal health status, Acute Coronary Syndrome,

Periodontitis, Gingivitis.

Introduction

All over the world, it is reported that cardiac disorders are the most frequent diseases and cause of death. Prevalence of heart disease in male gender of age from 45-54 years is 2-5% while in the above age of 55 years is 11-20%.¹ There are various kinds of risk factors that

accountable for cardiac diseases such as poor health, low socioeconomic status, age, gender, diabetes mellitus, hypertension, smoking, Hyperlipoproteinemia, as well as bacterial and viral infections of intra and extra oral

region. Nowadays it is reported that cardiac disease burden is decreasing in developed countries and increasing in developing countries due to change in lifestyle and more trend shifting towards urban side.²

Oral health is an essential constituent of general health. Common chronic infections in humans such as diseases of periodontium including periodontitis and gingivitis are caused by bacteria and bacterial products of dental plaque. Periodontal disease causes inflammation of specialized tissues i.e periodontium that surround and provide support to the teeth to be remained firm and fix

in the socket. Such Inflammation results in progressive loss of connective tissue attachment and alveolar bone. Loss of tissue integrity is characterized by the formation of periodontal pockets which acts as reservoirs for bacterial colonization of the dento-gingival environment.³

It has been hypothesized that chronic inflammatory response of periodontal disease has a causal connection with the systemic inflammatory response which may develop cardiac problems and these types of infections are mostly reported among adults and the senior population globally.⁴ The Epidemiological studies have demonstrated the association between oral health and cardiac diseases in which peoples with periodontal disease have increased chance, up to 25%, to develop cardiac problems.³ Mattila et al in 1989 and Stefano et al in 1993 found that chronic dental infections are strongly associated with acute myocardial infarction. Continuous presences of infective microbial colonies have the growing evidence which proves that oral bacteria chip in to systemic illness such as cardiac diseases.⁵

Studies had demonstrated the co-existence of periodontal and cardiac diseases which may have public health implications.^{6,7} Few studies show unpersuasive results about the association of cardiac problems with dental problems.^{8,9} Pakistan is a developing country and the study on periodontal health status in cardiac patients seems scanty. Therefore, this study was carried out to evaluate periodontal health status of patients reporting with acute coronary syndrome in cardiac center and followed in OMFS department PIMS Islamabad.

Methodology

A cross sectional study conducted at Cardiac center and Oral-Maxillofacial Surgery Department of PIMS hospital Islamabad from 15th of September to 31st of December 2020. An approval was sought from the Ethical Review Board (ERB) of Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU). The convenient sampling technique was used in which sample size was calculated by using WHO sample size calculator using 95% confidence interval at the rate of 73.5% of gingival inflammation with 5% absolute precision. The sample size turned out to be 300.¹⁰ A written informed consent was taken from every patient fulfilling the

inclusion/exclusion criteria for this study. Either gender having age in-between 40-75 years were included. Smokers, known diabetics, patients having any cardiac procedure or intervention within last 6 months or Patients

reporting periodontal treatment within 3 months were excluded.

Demographic details of participants including age, socio economic status (upper class, middle class and lower class on the basis of income), living habitat (urban/rural) and drug history were recorded on the Proforma designed. Clinical examination was performed by single investigator having basic dental qualification. The oral hygiene was calculated by using Simplified Oral Hygiene Index (OHI-S i-e Greene and Vermillion). On the basis of OHI-S final score were made i.e. Excellent with 0 score, Good with 0.1-1.2, Fair with 1.3-3, and Poor with 3.1-6 score.

Periodontal health status was assessed by using periodontal parameters such as bleeding on probing, periodontal pocket depth, and clinical attachment loss with modified Ram fjord Periodontal Disease Index.

The data was analyzed by using SPSS software version 23. The frequencies and percentages were calculated for categorical variables and mean and standard deviation for continuous variables. The association of oral hygiene and periodontal health status was seen with age groups, living standard, and socioeconomic status by using chi-square test. The level of significance was set as $P \leq 0.05$ at 95% confidence interval.

Results

In this cross sectional study sample size was set as 300 in which 51% were male and 49% were female. The mean age was 54.55 ± 9.605 . It was found that 56% of included participants were living in urban areas and about 40% belongs to the middle class socioeconomically. On the basis of oral hygiene 74% of participants had poor status. Periodontal health status was also poor as 38.0% have gingivitis and pocket formation as shown in table NO. I- III.

Table I: Demographic data of study sample.

Variable	Characteristic	N (%)
Gender	Male	154(51.3%)
	Female	146(48.7%)
Life style	Urban	167(55.7%)
	Rural	133(44.3%)
Socioeconomic	Upper class	98(32.7%)
	Middle class	119(39.7%)

status	Lower class	83(27.7%)
The association between the oral hygiene and periodontal health status with age and gender was insignificant but association of socioeconomic status with periodontal health status was significant as the $P=0.10$.		

Table II: Frequency and percentage of simplified oral hygiene index.

Oral Hygiene Status	Frequency (%)
Excellent	0(0%)
Good	9(3.0%)
Fair	70(23.3%)
Poor	221(73.7%)
Total	300(100%)

Table III: Frequencies and percentages of modified Ramfjord Periodontal Disease Index.

Periodontal health status	N (%)
Mild To Moderate Gingival Inflammation	31(10.3%)
Severe Gingivitis Tend To Bleed And Ulcerative	24(8.0%)
Severe Gingivitis, Pocket Depth< 3mm From CEJ	38(12.7%)
Severe Gingivitis, Pocket Depth 3-6mm From CEJ	93(31.0%)
Gingivitis, pocket depth>6mm from CEJ	114(38.0%)
Total	300(100%)

Discussion

In the last three decade modification in life style, exercise behavior and diet had produce high prevalence rate of obesity, hypertension, increase level of serum cholesterol and diabetes mellitus which are contributing factors for cardiovascular diseases.¹¹ Renvert and Persson et-al had found that severe periodontitis on the basis of alveolar bone loss was strongly associated with Acute coronary syndrome.¹² In respect to that we found the prevalence of periodontitis in our population of age group A who reported to our hospital with sign and symptoms of acute coronary syndrome to be 55%. This was much higher than the reported prevalence of 8.52% and 37% in the general population of NHANES III and Amruthlal et-al respectively.¹³ The Chi-Square test showed no significance among the gender, age groups and living habitat. The one-way ANOVA was significant in between socioeconomic status and periodontal health status ($P=0.010$) which also reported by Steptoe et-al.¹⁴

Different investigators had used different indices for assessing the state of gingival inflammation such as bleeding on probing (BOP) they conclude that the ACS patients report a worse gingival status than control subjects which is the similarity in our findings.¹⁵ The mouth is an important contributing factor for load of infection and inflammation which leads to the overall health and wellbeing of an individual.¹³ Regarding oral health status 74% of the participants had poor oral health status. Stryjewska et-al and Wlosowics et al had also reported the worse condition of oral hygiene in the patients with ACS as so we have found, but the relation

with age and other factors are insignificant in our study as compared to them.^{10, 16}

Periodontal problems are the most common problems in the oral cavity globally. These are preceded by gingivitis to a complex between host response and putative periodontal pathogens which causes the resorption. Local mediators in the inflammatory potential of periodontal disease are CRP, IL-1 β , IL-6 and TNF- α which are manifested at micro molecular level via systemic dissemination. Chamber et al proposed that this increase in a number of inflammatory molecules could be involved in acute coronary syndrome.¹⁷

This is non-conflicting with a clinical study, which reported that individuals with apical periodontitis are 5.3 times (95% CI, 1.5Y18.4) more prone to develop ACS than persons without apical periodontitis.¹⁸ Additionally this is supported by previous cohort study and systematic review in which patients with periodontitis reported a high burden of co morbidity and increased risk for CVD which suggests that the population with periodontal disease needs assessment for cardiovascular risk factors concerning the possibility of Acute coronary disease (ACS).¹⁹⁻²¹ Other investigators had established a correlation between poor oral hygiene and ACS.²² Some authors reported there is no association between oral hygiene and chronic Heart disease (CHD) and ACS.²³ The definitions for periodontal diagnosis are published earlier²⁴ but it might differ from similar studies.²⁵ This largely agrees with the results of these published studies so the ACS patients in this study had poor oral hygiene and compromised periodontal health status. In our current study, there is only significance seen between ACS/CHD and periodontal health status in lower socio-economic populations.

Conclusion

In our study majority of acute coronary syndrome patients reported poor oral hygiene and periodontal health status although it is not clear how oral hygiene and poor periodontal health affect cardiovascular changes. To find out the association of cardiovascular disease and periodontal disease and further details of pathogenesis there is much need for clinical evidence based studies.

Acknowledgment: We are grateful of Dr Abdul Bari Memon and Dr Ahsan ullah for their support and technical help in writing this study. We are also thankful to Dr Natasha Khalily for her contribution in data collection.

References

1. Ziebolz D, Priegnit A, Hasenfub G, Helms HJ, Hornecker E and Mausberg RF. Oral health status of patients with acute coronary syndrome- a case control study. *BMC Oral Health* 2012;12(1):1-8.
<https://doi.org/10.1186/1472-6831-12-17>
2. World health organization. Chronic diseases and health promotion. Preventing chronic diseases a vital investment. 2017;07-15.
3. Najafipour H, Malek MT, Rahim F, Haghdoost AA, Shadkam M and Afshari M. Association of oral health and cardiovascular disease risk factors 'results from a community based study on 5900 adult subjects. *ISRN Cardiology*. 2013;2013:12-17.
<https://doi.org/10.1155/2013/782126>
4. Wishwanathaiah SS, Anil K, Ojha SK, Radhika NB. Assesment of periodontal status in patients suffering from coronary artery disease. *IJSR Medical science*. 2013;2(12):446-48.
<https://doi.org/10.15373/22778179/DEC2013/137>
5. Shetty D, Dua M, Kumar K, Dhanapal R, Astekur M, Shetty DC. Oral hygiene status of individuals with cardiovascular diseases and associated risk factors. *Clinics and Practice*. 2012;2(86):221-24. <https://doi.org/10.4081/cp.2012.e86>
6. Bokhari SH, Khan AA, Leung WK, Wajid G. Association of periodontal and cardiovascular diseases: South-Asian studies 2001–2012. *J Indian Soc Periodontol*. 2015;19:495-500. <https://doi.org/10.4103/0972-124X.157876>
7. Briggs JE, McKeown PP, Crawford VL, Woodside JV, Stout RW, Evans A. Angiographically confirmed coronary heart disease and periodontal disease in middle-aged males. *J Periodontol* 2006;77:95-102.
<https://doi.org/10.1902/jop.2006.77.1.95>
8. Beck JD, Eke P, Heiss G, Madianos P, Couper D, Lin D. Periodontal disease and coronary heart disease: A reappraisal of the exposure. *AHA J Circulation*. 2005;112(1):19-24.
<https://doi.org/10.1161/CIRCULATIONAHA.104.511998>
9. Ylöstalo PV, Järvelin MR, Laitinen J, Knuutila ML. Gingivitis, dental caries and tooth loss: Risk factors for cardiovascular diseases or indicators of elevated health risks. *J Clin Periodontol*. 2006;33:92-101.
<https://doi.org/10.1111/j.1600-051X.2005.00875.x>
10. Stryjewska K, Polonczyk JP, Sagbraaten S, Sagbraaten SVM, Stryjewski PJ. The oral health of patients with acute coronary syndrome confirmed by means of coronary angiography. *Pol Med J*. 2020;XLVIII(283):23–26.
<https://doi.org/10.31928/1608-635X-2019.2.2331>
11. Kuller LH. Nutrition, lipids, and cardiovascular disease. *Nutr Rev*. 2006;64(1):15-26.
<https://doi.org/10.1111/j.1753-4887.2006.tb00230.x>
12. Renvert S, Pettersson T, Ohlsson O, Persson GR. Bacterial profile and burden of periodontal infection in subjects with a diagnosis of acute coronary syndrome. *J Periodontol*. 2006;77:1110-19.
<https://doi.org/10.1902/jop.2006.050336>
13. Jain SKA, Larsen T, Shaw M, Alexander P and David S. Oral disease as a risk factor for acute coronary syndrome – single center experience. *International Journal of Collaborative Research on Internal Medicine & Public Health (IJCRIMPH)*. 2012;4(6):1167-73.
14. Steptoe A, Shamaei-Tousi A, Gylfe A, Henderson B, Bergstrom S, Marmot MM. Socioeconomic status, pathogen burden, and cardiovascular disease risk. *Heart*. 2007;93:1567-70.
<https://doi.org/10.1136/hrt.2006.113993>
15. Meurman JH, Qvarnström M, Janket S, Nuutinen P. Oral health and health behavior in patients referred for open-heart surgery. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2003;95:300–7.
<https://doi.org/10.1067/moe.2003.22>
16. Włosowicz M, Woźakowska-Kapłon B and Górka D. Association of periodontal clinical status with myocardial infarction exponents. *J Dent Med Probl*. 2012;49(4):515-22.
17. Ilea A, Lazăr AC, Roșca D, Fărcaș AD, Mesaros AȘ, Câmpian RS, Băbțan AM, Petrescu NB and Boșca AB. Periodontitis in a group of patients with cardiovascular disease. *Anatomy Physiol Biochem Int J*. 2018;5(4):01-06.
18. An GK, Morse DE and Kunin M. Association of radiographically diagnosed apical periodontitis and cardiovascular disease: a hospital records based study. *J Endod*. 2016;42(6):916-20.
<https://doi.org/10.1016/j.joen.2016.03.011>
19. Hansen GM, Egeberg A, Holmstrup P and Hansen PR. Relation of periodontitis to risk of cardiovascular and all-cause mortality (from a Danish nationwide cohort study). *Am J Cardiol*. 2016;118(4):489-93.
<https://doi.org/10.1016/j.amicard.2016.05.036>
20. Manjunath BC, Praveen K, Chandrashekar BR, Rani RM and Bhalla A. Periodontal infections: a risk factor for various systemic diseases. *Nati Med J India*. 2011;24(4):214-19.
21. Hwang SY, Shim JL, kang D and Choi J. Poor oral health predicts higher 10-Year cardiovascular risk. A propensity score matching analysis. *Journal of Cardiovascular Nursing*. 2018;33(5):429-36.
<https://doi.org/10.1097/JCN.0000000000000497>
22. Dorn JM, Genco RJ, Grossi SG, Falkner KL, Hovey KM, Iacoviello L and Trevisan M: Periodontal disease and recurrent cardiovascular events in survivors of myocardial infarction (MI): the Western New York acute MI study. *J Periodontol*. 2010;81:502–11
<https://doi.org/10.1902/jop.2009.090499>
23. Hung HC, Joshipura KJ, Colditz G, Manson JE, Rimm EB, Speizer FE and Willett WC. The association between tooth loss and coronary heart disease in men and women. *J Public Health Dent*. 2004;64:209–15.
<https://doi.org/10.1111/j.1752-7325.2004.tb02755.x>
24. Liljestrand JM, Paju S, Pietiainen M and Buhlin K. Immunologic burden links periodontitis to acute coronary syndrome. *J.Atherosclerosis*. 2018;268(1):177-84.
<https://doi.org/10.1016/j.atherosclerosis.2017.12.007>
25. J.M. Liljestrand JM, Paju S, Buhlin K, Persson GR and Sarna S. Lipopolysaccharide, a possible molecular mediator between periodontitis and coronary artery disease. *J Clin Periodontol*. 2017;44(8):784-92.
<https://doi.org/10.1111/jcpe.12751>