

# Oral Manifestations of Hypertension and Rheumatic Heart Disease: A Cross Sectional Study in Elderly Patients

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**ABSTRACT:** Cardiovascular diseases and oral disorders share common risk factors. The aim of this study was to evaluate the involvement of oral cavity in patients with cardiovascular diseases. A cross sectional study was performed from September 2015 to December 2015 among patients attended to Cardiovascular Department, Imam Reza Subspecialized Clinic affiliated to Shiraz University of Medical Sciences, Shiraz, Iran. After receiving medical history from each patient, the oral cavity was examined by an oral medicine specialist using proper light, dental mirror and explorer. Data were analyzed using independent sample t test and Chi-square test. Patients had mean age of  $62.2 \pm 7.6$  years (Range: 47-77 years) and 78 (52%) of them were male. Xerostomia in 21 patients (14%), denture stomatitis, median rhomboid glossitis and angular cheilitis in 12 patients (8%), lichen planus and lichenoid reaction in 8 patients (5.3%) and oral stomatitis and aphthous ulcers in 7 patients (4.7%) were observed. The patients with diabetes mellitus showed more oral symptoms such as burning sensation, angular cheilitis, xerostomia and median rhomboid glossitis. No significant association ( $P=0.999$ ) between type of the drug and presence of oral lesions was detected. Oral lesions were significantly ( $P=0.047$ ) more common in dentate hypertensive patients than patients with rheumatic heart disease. No significant relations were detected between age, sex and presence of the oral lesions in both groups ( $P>0.05$ ). Our study provided an evidence for association of oral conditions and cardiovascular diseases. Performing further studies in longer time period and with higher number of patients are highly recommended.

**Keywords:** Cardiovascular diseases, Oral conditions, Hypertension, Rheumatic heart disease.

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## INTRODUCTION

All body organs and systems have their own status and environment, but due to interdependency of human body components, any abnormal condition in some organs or components, especially diseases, can affect the health status in other body locations (Carramolino et al., 2014). Several reports suggested a possible relation between periodontal disease and an increased risk of stroke and coronary heart disease. Such relationships were reviewed by Janket et al. (2003) in a meta-analysis study. Also, in a systematic review performed by Scannapieco et al. (2003) a modest association between periodontal disease and atherosclerosis, Myocardial Infarction (MI), and Cardio

Vascular Diseases (CVDs) was detected. Recently, a meta-analysis of 17330 participants also indicated that the presence of periodontal disease was associated with carotid atherosclerosis (Zeng et al., 2016).

Indeed, inflammation can create an inter-link between periodontitis as an oral disease and other systemic disorders such as arteriosclerotic, CVD or Metabolic Syndrome (MetS). Common susceptibility, inflammation via increased circulating cytokines and inflammatory mediators or molecular mimicry between bacterial and self-antigens are the possible mechanisms for such type relation (Ford et al., 2007). CVD is a major cause of death worldwide, with atherosclerosis as the underlying etiology in the vast majority of cases (Ford et al., 2007). Two of the

most CVDs are Hyper Tension (HT) and Rheumatic Heart Disease (RHD). HT is a chronic medical condition in which the blood pressure in the arteries is elevated. This induces harder work to the heart to circulate blood through the blood vessels (Alipour et al., 2015). In RHD, this organ is involved in Acute Rheumatic Fever (ARF) and causes permanent damage to the heart valves which is known as RHD which usually occurs after multiple attacks but may occasionally occur after a single case of ARF (Marijon et al., 2012).

On the other hand, the effect of oral health upon general health has been investigated by several studies. The pathogenesis and related risk factors for both oral diseases and CVDs are well studied. A recent but controversial possible relationship between oral infections and CVD is inflammation due to infectious agents (Wang et al., 2011). Also, oral bacteria-related systemic inflammation is an important mechanism in the oral related pathogenesis aspect of CVD (Kholly et al., 2015). Despite such relations, there are few reports regarding the oral manifestation of patients with CVD especially from Iran as a developing country in Asia. Most of previous studies are epidemiological based reports and performing well-conducted clinical studies are highly needed to explore these oral manifestations of CVD. Therefore, we aimed to investigate the oral manifestations of CVD in patients attending Cardiovascular Department of Imam Reza Subspecialized Clinic, Shiraz, Iran.

## MATERIALS AND METHODS

### Ethical statement

Shiraz Dentistry School Review Board approved the protocol of this study and the written consent was obtained from all patients who agreed for participation in the study.

### Participant

In a cross sectional study from September 2015 to December 2015, 77 patients with HT and 73 patients with RHD were included from patients who were admitted to Cardiovascular Department, Imam Reza Subspecialized Clinic affiliated to Shiraz University of Medical Sciences. The participants were residents in various locations of the Southern of Iran. Among them, 9 patients were edentulous with complete dentures (6%), 12 patients were using partial dentures (8%), 21 patients had crown and bridge (14%) and 108 cases had their own dentition (72%). Also, 6 patients (7.8%) had Diabetes Mellitus (DM) in the HT group. Patients with dementia were excluded because of

concerns about the reliability of self-reported oral health information.

### Evaluations

A medical history was obtained from the patients and all medications used by the patients were recorded. The oral cavity was examined by an oral medicine specialist using proper light, mirror and explorer. The lips, cheek, tongue, palatal mucosa, floor of the mouth, mucous membrane, gingiva, pharyngeal fauces, dentures, teeth and occlusion were completely checked. Several symptoms such as burning sensation, xerostomia and neurologic disorders were also recorded.

### Statistical analysis

Data were presented as mean or percentage and analyzed using SPSS software version 18.0 (SPSS Inc., Chicago, IL, USA) with the significance level set at  $P < 0.05$ . A comparison between the groups was performed using the independent sample t test. Any relationships between qualitative variables were analyzed using the Chi-square test.

## RESULTS

The study consisted of 150 participants with mean age  $62.2 \pm 7.6$  years (Range: 47-77 years) and 78 (52%) of them were male. Among them, 77 patients had HT and 73 patients had RHD. The frequency and percentage of diagnosed oral disorders and lesions are presented in table 1. As shown, the most diagnosed lesion in our patients was Xerostomia.

The patients with DM showed more oral symptoms such as burning sensation, angular cheilitis, xerostomia and Median Rhomboid Glossitis (MRG). A variety of medications were used by the patients such as  $Ca^{2+}$  channel blockers,  $\beta$ -blockers, diuretics, anti-platelet aggregation and anti-dysrhythmia such as captopril, amlodipine atenolol, propranolol, aspirin, clopidogrel bisulfate, losartan, furosemide, hydrochlorothiazide, and digoxin. Statistical analysis did not show a significant correlation between the type of the drug and presence of oral lesions ( $P=0.999$ ). Oral lesions were significantly more common in dentate HT patients than RHD ( $P=0.047$ ). All patients were age and sex matched and statistical analysis did not show significant relations between age, sex and presence of oral lesions in both groups ( $P > 0.05$ ).

**Table 1.** Frequency and percentage of diagnosed oral disorders and lesions in patients with hypertension or rheumatic heart disease who were enrolled in this study.

Disorders and lesions	Frequency	Percentage
Xerostomia	21	14
Denture stomatitis, median rhomboid glossitis (MRG) and angular cheilitis	12	8
Lichen planus and lichenoid reaction	8	5.3
Oral stomatitis and aphthous ulcers	7	4.7

## DISCUSSION

In the present study, the oral manifestations of HT and RHD were evaluated. We found that a wide variety of oral manifestations could be seen in patients with CVD. Many of medications used by these patients can give rise to oral manifestations in the form of xerostomia, lichenoid reactions, burning mouth sensation, and stomatitis. For the first time, Lockhart et al. (2012), proposed a relation between CVD to periodontitis. He proposed an association based on findings about the higher prevalence of periodontal diseases in patients with MI. After that, several studies discussed and expressed similar findings and also demonstrated that some of the risk factors for these two set of diseases are common (Carramolino et al., 2014). For instance, a significant decrease in endothelial response being recorded in the patients with severe periodontitis and treatment of periodontal inflammation improved the vascular endothelial response (Higashi et al., 2008). Gingival bleeding is a common clinical feature that is seen in HT patients (Kumar et al., 2012). Although we did not find gingival bleeding, but Kumar et al. (2012) and Holmlund et al. (2006) reported that gingival bleeding is one of the manifestations of HT. Although, it has been reported that amlodipine and nifedipine can cause the gingival enlargement (Kumar et al., 2012), but none of the studied patients in this research showed a gingival enlargement. This may be due to difference in the race of the studied population or other unknown reasons. As a result of increased systolic and diastolic blood pressures and antihypertensive medication especially diuretics, the hyposalivation (xerostomia) was occurred. Our findings about xerostomia was too close to those found by Kumar et al. (2012), and Glick (1998) who reported that xerostomia occurred in about 16-17% of HT patients. It has

been reported that suffering from DM or MetS is associated with the susceptibility to periodontitis (Carmellino et al., 2014; Morita et al., 2010 and Nibali et al., 2013). In a more advanced theory; it is proposed that DM is a risk factor for periodontitis (Campus et al., 2005 and Mealey et al., 2006). We found that more oral symptoms exist in patients with DM which is in line with all other studies (Carmellino et al., 2014; Morita et al., 2010; Mealey et al., 2006).

White bilateral lesions with linear striations that usually occur in the posterior regions of the buccal mucosa are called oral lichen planus like lesions (Farzin et al., 2012). They can be seen in HT patients as an adverse reaction of medication especially captopril (Kumar et al., 2012). Arias-Santiago and coworkers reported that chronic inflammation in lichen planus patients had a significant association with dyslipidemia (Arias et al., 2011). Also, having higher makers of both metabolic and cardiovascular risk factors in lichen planus in comparison to normal healthy controls were expressed (Saleh et al., 2014). Our results are in agreement with those found by Hurting et al. (2006) but are in opposite manner with those reported by Christensen et al. (1977) as they investigated no relationship between lichen planus and HT. In this study, candidiasis and candida associated lesions including denture stomatitis, MRG and angular cheilitis were detected in 12 (8%) patients. Ghapanchi et al. (2015). indicated that diabetic patients had significantly higher MRG with no association with other variables such as age, sex, duration of DM, drugs, fasting blood sugar and hemoglobin (Hb) A1c. In current research, oral stomatitis and aphthous ulcers were seen in 7 (4.7%) of the cases, but none of them suffered from Orofacial Pain (OFP). OFP may be defined as the pain localized to the region above the neck as well as pain within the oral cavity. Ghapanchi et al. (2015) reported that OFP is a common cause that leads the patients to visit dental clinics among adult and elderly patients attending Shiraz Dentistry School, Iran.

## CONCLUSION

It must be remembered that dentists have a rare opportunity to detect cases of HT and there are no recognized oral manifestations of hypertension, but antihypertensive drugs can often cause side-effects. We performed direct examination to prevent any misclassification which occurred due to subjects' self-reports of periodontal disease. The current research showed that a wide variety of oral manifestations could be seen in patients with CVDs. Many of used medications can induce

oral manifestations as xerostomia, lichenoid reactions, burning mouth sensation, and stomatitis. Candidia associated lesions could also be seen in dentate and edentulous elderly patients. However, further studies are needed to confirm our findings in fatal and non-fatal CVD among larger sample of patients.

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### Conflict of interest

There are no conflicts of interests.

### REFERENCES

- Alipour H& Goldust M(2015). The association between blood pressure components and cognitive functions and cognitive reserve. *Clinical and Experimental Hypertension*,1-5.
- Arias-Santiago S, Buendía-Eisman A, Aneiros-Fernández J, Girón-Prieto MS, Gutiérrez-Salmerón MT& Mellado VG, et al(2011) Cardiovascular risk factors in patients with lichen planus. *The American Journal of Medicine*,124(6):543-8.
- Campus G, Salem A, Uzzau S, Baldoni E&Tonolo G(2005). Diabetes and periodontal disease: a case-control study. *Journal of Periodontology* , 76(3):418-25.
- Carramolino-Cuéllar E, Tomás I& Jiménez-Soriano Y(2014). Relationship between the oral cavity and cardiovascular diseases and metabolic syndrome. *Medicina Oral, Patología Oral y Cirugía Bucal*, 19(3):e289.
- Christensen E, Holmstrup P, Wiberg-Jørgensen F, Neumann-Jensen B&Pindborg JJ(1977) Arterial blood pressure in patients with oral lichen planus. *Journal of Oral Pathology & Medicine* ,6(3):139-42.
- Farzin M, Mardani M, Ghabanchi J, Fattahi MJ, Rezaee M& Heydari ST, et al (2012). Serum level of matrix metalloproteinase-3 in patients with oral Lichen planus. *Iranian Red Crescent Medical Journal* ,14(1):10-3.
- Ford PJ, Yamazaki K& Seymour GJ(2007) Cardiovascular and oral disease interactions: what is the evidence? *Primary Dental Care*,14(2):59-66.
- Ghabanchi J, Andisheh Tadbir A, Darafshi R& Sadegholvad M(2011).The prevalence of median rhomboid glossitis in diabetic patients: a case-control study. *Iranian Red Crescent Medical Journal* , 13(7):503-6.
- Ghapanchi J, Rezaie M& Derafshi R(2015). A mini review of histological and genetic oral lesions in adult and elderly patients referred to Shiraz Dentistry School. *Comparative Clinical Pathology*:1-4.
- Glick M(1998). New guidelines for prevention, detection, evaluation and treatment of high blood pressure. *The Journal of the American Dental Association*,129(11):1588-94.
- Harting MS& Hsu S(2006). Lichen planus pemphigoides: a case report and review of the literature. *Dermatology Online Journal* ,12(4):10.
- Higashi Y, Goto C, Jitsuiki D, Umemura T, Nishioka K&Hidaka T, et al (2008) Periodontal infection is associated with endothelial dysfunction in healthy subjects and hypertensive patients. *Hypertension*,51(2):446-53.
- Holmlund A, Holm G&Lind L.(2006) Severity of periodontal disease and number of remaining teeth are related to the prevalence of myocardial infarction and hypertension in a study based on 4,254 subjects. *Journal of Periodontology* ,77(7):1173-8.
- Janket S-J, Baird AE, Chuang S-K& Jones JA(2003).Meta-analysis of periodontal disease and risk of coronary heart disease and stroke. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*,95(5):559-69.
- Kholy KEL, Genco RJ& Van Dyke TE(2015). Oral infections and cardiovascular disease. *Trends in Endocrinology & Metabolism*, 26(6):315-21.
- Kumar P, Mastan KMK, Chowdhary R& Shanmugam K.(2012). Oral manifestations in hypertensive patients: A clinical study. *Journal of Oral and Maxillofacial Pathology*,16(2):215-21.
- Lockhart PB, Bolger AF, Papapanou PN, Osinbowale O, Trevisan M& Levison ME, et al(2012) Periodontal disease and atherosclerotic vascular disease: does the evidence support an independent association? A scientific statement from the American Heart Association. *Circulation* ,125(20):2520-44.
- Marijon E, Mirabel M, Celermajer DS& Jouven X(2012) Rheumatic heart disease. *Lancet (London, England)*, 379(9819):953-64.

- Mealey BL&Oates TW(2006) Diabetes mellitus and periodontal diseases. *Journal of Periodontology* ,77(8):1289-303.
- Morita T, Yamazaki Y, Mita A, Takada K, Seto M&Nishinoue N, et al.(2010). A cohort study on the association between periodontal disease and the development of metabolic syndrome. *Journal of Periodontology* ,81(4):512-9.
- Nibali L, Tatarakis N, Needleman I, Tu Y-K, D'Aiuto F& Rizzo M, et al(2013) Association between metabolic syndrome and periodontitis: a systematic review and meta-analysis. *The Journal of Clinical Endocrinology & Metabolism* , 98(3):913-20.
- Saleh N, Samir N, Megahed H& Farid E(2014).Homocysteine and other cardiovascular risk factors in patients with lichen planus. *Journal of the European Academy of Dermatology and Venereology* ,28(11):1507-13.
- Scannapieco FA, Bush RB& Paju S(2003). Associations between periodontal disease and risk for atherosclerosis, cardiovascular disease, and stroke. A systematic review. *Annals of Periodontology* .8(1):38-53.
- Wang Z, Klipfell E, Bennett BJ, Koeth R, Levison BS& DuGar B, et al (2011).Gut flora metabolism of phosphatidylcholine promotes cardiovascular disease. *Nature* ,472(7341):57-63.
- Zeng X-T, Leng W-D, Lam Y-Y, Yan BP, Wei X-M& Weng H, et al (2016). Periodontal disease and carotid atherosclerosis: A meta-analysis of 17,330 participants. *International Journal of Cardiology*,203:1044-51.