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## Oral findings in hemodialysis patients; a cross-sectional study in Shiraz, Iran

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### ABSTRACT

**Background:** In hemodialysis patients, there are some oral hard and soft tissue changes.  
**Objectives:** The aim of this single-center, cross-sectional study was to evaluate oral findings in hemodialysis patients.  
**Patients and Methods:** A total of 144 patients participated. Of them, 28 patients (19%) had diabetes mellitus (DM), 17 patients (12%) had systemic lupus erythematosus (SLE), and 15 patients (10%) had severe hypertension. The oral cavity was inspected by an oral medicine specialist using proper light, mirror and explorer. The lips, cheek, tongue, palatal mucosa, floor of the mouth, gingiva, pharyngeal fauces, dentures, teeth and occlusion were checked. The significance level was  $P < 0.05$ .  
**Results:** Around 78% of the studied population had oral manifestations. The most diagnosed finding in hemodialysis patients was dryness of the mouth followed by tooth loss due to mobility and poor oral hygiene. Diabetic cases showed numerous oral symptoms than nondiabetic subjects.  
**Conclusions:** Oral lesions in hemodialysis patients is a prominent finding and untreated lesions may cause severe side effects.

### *Implication for health policy/practice/research/medical education:*

There exists an association between hemodialysis patients and oral hard and soft tissue changes. The most diagnosed finding in hemodialysis patients was dryness of the mouth followed by tooth loss due to mobility and poor oral hygiene. It seems that oral lesions in hemodialysis patients are evident and untreated lesions may cause severe side effects.

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### 1. Background

The human organs have a specific structure and environment, but due to interdependence of body elements, any atypical condition in some parts or components, especially illness can alter the health status in other body systems (1).

As the scientific knowledge and medical techniques progress, the oral health care professionals have to achieve a comprehensive approach to handling the patients with medical problems. Renal disorders may be the main cause of morbidity and mortality between all systemic disorders.

Many systemic diseases (such as HIV infection, diabetes

mellitus [DM], cardiovascular disorders and chronic renal failure) may affect oral hard and soft tissue (2).

The oral cavity is a potent diagnostic tool in the clinical evaluation of general health. Commonly, the reported oral disorders in systemic diseases comprise of periodontal disease, white lesions, red patches, oral burning sensation, taste changes and abnormalities mucositis, Candida and Candida-associated lesions, pale mucosa, xerostomia, oral pigmentation and changes in composition and flow rate of the saliva. Treatment of oral lesions may significantly improve the systemic health status (3–5).

Chronic kidney disease (CKD) is a major public health

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problem which affects the patient quality of life (6). Oral hard and soft tissue changes have been associated with hemodialysis patients. Radiographically, total or partial loss of lamina dura, cortical bone resorption and radiolucent lesions in the jaws were reported by some authors. Clinically, the soft tissue changes in hemodialysis patients are similar to the lesions who stated in other systemic diseases (3,7,8).

The high rate of graft rejection following oral infection has increased the need for oral health maintenance in such cases (9).

In hemodialysis patients, untreated oral lesions may deteriorate the underlying systemic disease.

The cause-effect correlation between oral infections and systemic disorders is yet to be fully determined. Considerable recovery in the underlying diseases has been stated following management of related oral lesions (3,9).

In spite of such correlations, there are little reports regarding the oral manifestation of hemodialysis patients from Iran as a developing country in Asia.

## 2. Objectives

Most of prior researches are epidemiological based reports and presenting well-conducted clinical research are essential to explore these oral manifestations. Therefore, we aimed to study the oral manifestations of hemodialysis patients who attending oral medicine department of Shiraz dentistry school, Shiraz, Iran.

## 3. Patients and Methods

### 3.1. Participant

In a cross-sectional study, 144 patients with end-stage renal disease (ESRD) were included (August 2016 to November 2016). All cases were orally examined prior to kidney transplantation in oral medicine department of Shiraz University of Medical Sciences. The participants were residents in various locations of the Southern of Iran. Among them, 23 patients were edentulous with complete dentures (16%), 31 patients were using partial dentures (21%), 19 patients had crown and bridge (13%) and 71 cases had their own dentition (49%). Also, 28 patients (19%) had DM, 17 (12%) had systemic lupus erythematosus (SLE), 15(10%) had severe hypertension. All laboratory tests and the proportion of hemodialysis per months also recorded. Cases with memory disorder were excluded because of concern about the trustiness of self-stated oral health information.

### 3.2. Evaluations

Medical history was obtained 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, gingiva, pharyngeal fauces, dentures, teeth and occlusion were checked. Several symptoms such as burning sensation, xerostomia and neurologic disorders were also recorded.

### 3.3. Ethical issues

This research was performed following the Declaration of Helsinki and its later amendments. Participants gave their written and informed consent to participate in this investigation by completing the consent form. This study received approval from the vice chancellor of Shiraz University of Medical Sciences.

### 3.4 Statistical analysis

Statistical analysis was performed using SPSS software with the significance level set at  $P < 0.05$ . Frequency and percentage were calculated.

## 4. Results

The study consisted of 144 participants with mean age 49 years (range, 15-70 years). All cases were undergoing hemodialysis 2 times per week and were candidate for kidney transplant. The frequency and percentage of diagnosed oral disorders and lesions are presented in Table 1. About 78% of the studied population had oral manifestations. The most diagnosed lesion in hemodialysis patients was dryness of the mouth.

A variety of medications were used by some cases such as antihypertensive and diabetic control medications. Oral lesions such as xerostomia (21, 75%), tooth loss due to mobility (18, 64%), poor oral hygiene (17, 60%), denture stomatitis (3, 10%), median rhomboid glossitis (MRG) (3, 10%), unusual bleeding after extraction (1,

**Table 1.** Frequency and percentage of diagnosed oral disorders and lesions in patients with end stage renal disease who were enrolled in this study

Disorders and Lesions	No.	%
Poor oral hygiene and halitosis	73	50.7
Xerostomia	52	36
Tooth loss due to mobility	27	18.7
Taste abnormalities	19	13
Oral pigmentation	18	12.5
Burning sensation	17	11.8
Angular cheilitis	11	7.6
Denture stomatitis	11	7.6
Intra-oral herpes and herpes labialis	4	2.7
Median rhomboid glossitis	3	2
Oral stomatitis	3	2
Severe bleeding after tooth extraction	2	1.3
Lichen planus	2	1.3
Non-Hodgkin lymphoma	1	0.6

3%) lichen planus (2, 7%), taste abnormality (14, 50%), herpes labialis (1, 3%), angular cheilitis (6, 21%), oral pigmentation (2, 7%), oral stomatitis (1, 3%), burning sensation (12, 42%), were found in diabetic patients. It seems that diabetic cases showed numerous oral symptoms than nondiabetic subjects and many of them exhibit more than one oral lesion.

A case with SLE suffered from non-Hodgkin lymphoma in the posterolateral of the palate which resembles a minor salivary gland tumor.

## 5. Discussion

In the present study, the oral manifestations of hemodialysis patients were evaluated. A wide variety of oral manifestations could be seen in hemodialysis patients. Oral disorders are often caused due to restricted regimens, undernourishment, anemia, dehydration, aging, various medications, poor oral hygiene, immunosuppression and effect of uremic toxins on the mucous membrane.

Many medications used by these cases can produce oral signs such as dry mouth, lichenoid lesions, burning sensation, and oral stomatitis. Dental care significantly reduced in the cases who undergoing hemodialysis, which worsen the patient general condition (10).

Oral inflammation may cause an inter-link between periodontal disease and different systemic disorders. A common acceptable mechanism for such relation may be increasing in circulating cytokines and inflammatory mediators or molecular imitation between bacterial and self-antigens. Many researchers reported the relation between oral disease and systemic disease. Lockhart et al (11) found a correlation between cardiovascular disease and periodontitis. He proposed a relationship between increased periodontal diseases in cases with myocardial infarction. In hemodialysis patients, oral lesions may cause morbidity and mortality. Various investigations about the prevalence of oral disorders in hemodialysis patients were stated. It is estimated that 57% of the world's population lives in Asia, so a wide range of systemic and oral disease could be seen. A study in India (3) showed that 100% of patients with CKD had oral symptoms.

In current research in Iran, 78% of patients had oral manifestation, next to poor oral hygiene and halitosis, xerostomia was a common oral symptom in hemodialysis patients. Restricted fluid intake, use of medications and decreased in salivary flow rate may be induced this phenomenon (12). This finding is in coordination with previous studies (7,13).

Taste abnormality, burning sensation and halitosis were frequently seen in cases with ESRD. Increased salivary amount of urea, which is changed to ammonia, elevation in the level of phosphate and protein and finally changes

in the salivary pH may cause such sensation in the oral cavity (14). In this study we found that burning sensation and abnormal taste were prominently seen in diabetic cases.

MRG, denture stomatitis and angular cheilitis are other finding of current research. A higher rate of such lesions was reported in diabetic cases without association with age, sex, duration of DM, medications, fasting blood glucose and glycated hemoglobin (HbA1c) (13,15). Oral candidiasis manifest to be a steady finding in patients with hemodialysis patients (2,7).

Oral ulcers such as herpes labialis, intraoral herpes and oral stomatitis were also seen in 7 cases. Gudapati et al (16) reported that dental caries, oral ulceration, dental plaque and calculus accumulation can act as a point of entry of the microorganisms into the bloodstream and may be hazardous for hemodialysis patients. They recommended oral antibiotic prophylaxis with vancomycin before invasive dental procedures.

Oral lichen planus and lichenoid lesions mostly resemble as white keratotic lesions in the oral cavity (17) and in current research detected in 2 diabetic patients. Anti-diabetic medication can promote the presence of such lesions in the oral cavity.

Oral physiologic pigmentation is a common finding in the south of Iran (13), but smoking and use of some medications increase the risk of melanosis. In this study oral pigmentation was seen in 18 hemodialysis patients. Oyetola et al (2) reported that the most prevalent lesion in the Nigerian CKD patients is abnormal lip pigmentation. He stated that genetic factors and abuse of customary or orthodox drugs may induce such lesions. The rate of pigmentation in this study is lower than the study by Oyetola et al.

Abnormal taste in CKD patients has been reported previously and was present in 19(%) subjects.

The mechanism of underlying changes in taste sense is unknown, but may be correlated to the effect of uremic toxins on the taste receptors in the central and peripheral nervous system (18). Poor oral hygiene and halitosis was a prominent oral finding in ESRD cases. Halitosis was higher in hemodialysis patients and may be related to xerostomia, inadequate oral hygiene and uremic smell (7). It seems that severe periodontal disease may induce a prominent decrease in endothelial response. Treatment of the inflammation ameliorates the vascular endothelial respond (19). Gingival bleeding is a major sign of poor oral hygiene and gingival inflammation. Although we did not find a significant gingival bleeding in our hemodialysis patients. Major bleeding after extraction were seen in 2 cases with diabetes and severe hypertension. These phenomena may be attributed to anticoagulant therapy and preserve of vascular access. Patients undergoing

hemodialysis commonly have lower platelet counts, platelet adhesiveness, and the existence of platelet factor 3, higher prostacyclin activity and increased capillary fragility. Seventeen patients in this study complain of burning sensation and it is in coordination with previous research (2,20). It was attributed to effects of medications, xerostomia and peripheral nerves damage due to uremic toxins. Use of topical honey inhibits *Candida*, bacterial and viral colonization (21).

Non-Hodgkin lymphoma (NHL) in the oral cavity is not a common finding in hemodialysis patients, but in this study a 45 years old women with SLE demonstrated an exophytic lesion in the posterolateral of the palate. Excisional biopsy of the lesion was done by an oral surgeon. Hatta and others (22) reported a 62-year-old man with NHL with acute renal failure which successfully treated with chemotherapy.

## 6. Conclusions

It is necessary to remember that oral lesions in hemodialysis patients is a prominent finding and untreated lesions may cause severe side effects for these cases. We performed a direct clinical examination to avoid any misclassification which happens due to subjects' self-reports. This study showed that a wide variety of oral manifestations could be seen in hemodialysis patients. Some of the used medications, immune suppression, dehydration and limited nutrition can induce these symptoms. However, further studies on larger groups are needed to confirm our findings in these patients.

## Study limitations

Our study is limited by its cross-sectional nature, therefore we suggest longitudinal studies in a larger population.

## Authors' contribution

HK and JG made a substantial contribution to the conception, design, analysis and interpretation of data. BA and NE performed the experiments. They were also involved in drafting the manuscript and revising it critically for important intellectual content. HK, JG, BA and NE collected data. JG and HK revised the manuscript critically for important intellectual content.

## Conflicts of interest

The authors declare no conflict of interest.

## Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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