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Evaluation of the Prevalence of Oral Manifestations and the Related Factors in Hemodialysis Patients at Selected Hospitals of Tehran Province in 2016

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ABSTRACT

Background and Aim: Halitosis, candidiasis, and metallic taste are some of the oral complications in chronic renal failure patients undergoing dialysis. The aim was to evaluate the prevalence of oral manifestations and the related factors in hemodialysis patients at selected hospitals of Tehran in 2016.

Materials and Methods: This cross-sectional study was performed through observation, examination, interviewing, reviewing the medical records, and completing the information form. Oral manifestations were examined with indices of halitosis, metallic taste, and candidiasis. The presence of each indicator was considered as oral manifestations, and the measurement was standardized and performed by a student under the supervision of the respective professors. The training required for measurements was provided by the supervisor and the advisor. The reliability was measured in a seven-day pilot study. An organoleptic method was used to measure halitosis. The diagnosis of metallic taste and candidiasis was made through interviewing and observation, respectively.

Results: The study was performed on 250 patients (58.8% male and 41.2% female) with the mean age of 59 years (17 to 88 years). The average duration of dialysis was 62 months. Oral manifestations were present in 91.2% of patients. The most common oral manifestation was halitosis (90%), followed by metallic taste (12%), and candidiasis (10.8%). The incidence of candidiasis was higher in older patients and denture wearers ($P \geq 0.05$). Halitosis and metallic taste did not relate to the studied factors ($P \geq 0.2$ and ≥ 0.9).

Conclusion: The prevalence of oral manifestations in chronic kidney failure patients undergoing hemodialysis is high. Etiologic studies are recommended to understand the causes and to reduce the complications.

Original Article

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Introduction:

Currently, one of the concerns of dentists is the development of oral lesions in chronic renal failure patients.[1,2] A wide range of oral manifestations, such as gingivitis, xerostomia, uremic fetor, mucosal pallor, mucosal lesions, dental sensitivity, malocclusion, and increased risk of dental erosion due to recurrent gastroesophageal reflux, has been reported in patients with kidney disease.[1,3] Various studies have shown that more than 90% of renal failure patients have oral manifestations.[4] The first who evaluated these manifestations was not found in the research background, but what is being discussed is, in most cases, the oral manifestations have been present.[5-7] The results of the research show that informing patients about oral lesions induced by hemodialysis can be a valuable way of controlling these complications; therefore, dentists can provide effective help in this regard.[8] The number of renal failure patients requiring dialysis increases by 10% to 15% annually, and the need for dental treatments in these patients is likely to increase.[9]

Considering the prevalence of oral manifestations and their known complications and the weakness of the immune system in hemodialysis patients,[10] there is a theory regarding the probability of the high prevalence of these manifestations. Also, there is a higher risk of these manifestations due to the underlying disorders. Considering that there are no accurate statistics regarding oral manifestations in patients undergoing hemodialysis and there is little research on these manifestations in the community,[11] we decided to study the prevalence of oral manifestations in patients undergoing hemodialysis at selected hospitals of Tehran province during 2015-2016.

Materials and Methods:

This cross-sectional research was performed on 250 subjects. Data collection was performed through examination accompanied by interviewing and reviewing the medical records and completing the information form. This research was conducted on patients who had undergone hemodialysis due to chronic renal failure and referred to selected hospitals of Tehran province in 2016. The patients signed a written consent form. To gain patient cooperation, the subjects were instructed on how to brush their teeth using a dental replica. In this study, oral manifestations with the indices of halitosis, oral candidiasis, and oral metallic taste were investigated,[3] and those who were treated with immunosuppressive agents or iron compounds were excluded. The presence of each of the indicators was considered as oral manifestations, and the method of measuring them was standardized and carried out by a student under the supervision of the respective professors. The training required to measure oral manifestations was provided by the supervisor and the advisor. The reliability of the experiment was measured in a seven-day pilot study, and the research was proven to be reliable (the reliability of the questionnaire was confirmed by Cronbach's alpha equal to 0.79). The studied variables included age, sex, the duration of dialysis, history of hypertension and diabetes, cigarette smoking, and use of dentures.

The reliability was evaluated in a seven-day period by the student and after oral examinations to check for the presence or absence of the lesions, interviewing the patient, and transferring the information to a questionnaire. Correct evaluation of the presence or absence of the lesions was taught by the professors.

The organoleptic method was used to measure and diagnose halitosis: the patient blew in a clear tube, and the examiner smelled the exhaled air at the other side of the tube at a distance of 10 cm. The measurement was performed according to a 5-point scale (0: no odor, 1: slight, 2: slight but noticeable, 3: average, 4: strong, and 5:very strong).[12] Since this grading is subjective, in the present study, we did not examine the grade or the severity of the odor and only determined the presence and the absence of halitosis. The patients refrained from eating, drinking, chewing gum, tooth brushing, and using mouthwash for 2 hours before the study.[13]

The diagnosis of different types of oral candidiasis was as follows: pseudomembranous candidiasis with numerous white plaques resembling

cottage cheese that can be easily removed; the underlying mucosa may be red, and there is no scarring. The hyperplastic type with white plaques that cannot be removed. The erythematous type is comprised of lesions that are characterized by a red appearance and erythema, may be seen in any mucosal region, and mostly affect the tongue and the palate; this type is also seen in denture wearers. Angular cheilitis is characterized by cracking and scaling or ulcers in the corner of the mouth.[14] Detection of oral metallic taste was done by interviewing the patient.[15] The prevalence of oral manifestations in the patients was examined, and the role of the factors associated with oral manifestations was examined by Chi-square test.

Result:

In this study, 250 patients with chronic renal failure, undergoing hemodialysis, who referred to the dialysis departments of selected hospitals of Tehran city in 2016 were studied. 147 subjects (58.8%) were males and 103 subjects (41.2%) were females. The mean age of the subjects under study was 59 years, with the minimum age of 17 years and the maximum age of 88 years. The average duration of dialysis was 62 months for all subjects. 187 patients (74.8%) had a history of hypertension, 113 patients (45.2%) had a history of diabetes, 105 patients (42.2%) had dentures, and 35 patients (14%) were cigarette smokers. Oral manifestations were observed in 228 patients (91.2%), whereas 22 patients (8.8%) had no oral manifestations. The type of oral manifestations in the affected patients is presented in Figure 1 which shows that the most common oral manifestation in subjects undergoing hemodialysis was halitosis (90%), followed by oral metallic taste (12%) and oral candidiasis (10.8%).

In this study, 10.8% of the patients suffered from oral candidiasis (2% pseudomembranous, 8% erythematous, and 0.8% hyperplastic). Angular cheilitis was not detected in the studied patients.

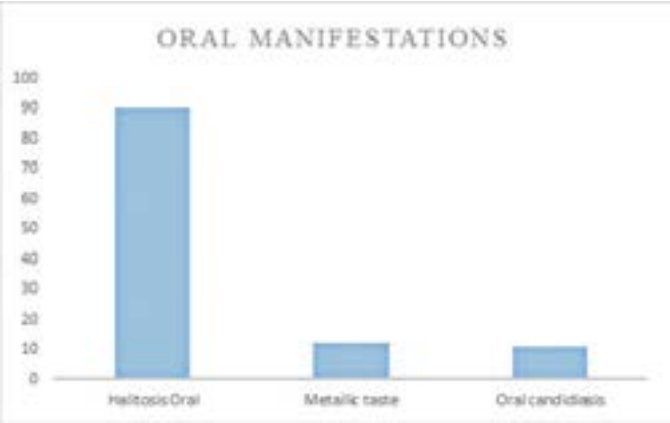

Figure 1: Distribution of 250 patients undergoing dialysis by type of oral manifestations

The distribution of subjects based on oral manifestations and categorized by the related factors is presented in Tables 1, 2, and 3. According to the amount obtained for the three oral manifestations, there was no statistically significant correlation between gender and oral manifestations (P≥0.9). There was no significant correlation between age and halitosis (P≥0.9) or between age and oral metallic taste (P≥0.5) but age was significantly correlated with oral candidiasis (P≤0.05).

There was no significant correlation between hypertension and halitosis (P≥0.9), oral metallic taste (P≥0.9), and candidiasis (P≥0.5). There was no significant correlation between diabetes and halitosis (P≥0.5), oral metallic taste (P≥0.9), and candidiasis (P≥0.9). There was no significant correlation between the mean duration of hemodialysis and halitosis (P≥0.2), oral metallic taste (P≥0.9), and candidiasis (P≥0.5). There was no significant correlation between the use of dentures and halitosis (P≥0.9) and oral metallic taste (P≥0.9) but there was a significant correlation between the use of dentures and oral candidiasis (P≤0.005). There was no significant correlation between cigarette smoking and halitosis (P≥0.9), oral metallic taste (P≥0.9), and candidiasis (P≥0.2).

Table 1: Distribution of dialysis patients according to candidiasis and categorized by the related factors

Candidiasis / Related factors	No	Yes	Test result
	N=223	N=27	
Gender			
Male	59.2%	58.7%	P≥0.9
Female	40.8%	41.3	
Age			
Below the mean	11.1%	47.1	P≤0.05
Above the mean	88.9%	52.9	
Hypertension			
Yes	63%	76.2	P≥0.5
No	37%	23.8	
Diabetes			
Yes	44.4%	45.2%	P≥0.9
No	55.6%	54.8	
Denture			
Yes	96.3%	35	P≤0.005
No	3.7%	65	
Cigarette smoking			
Yes	22.2%	13%	P≥0.2
No	77.8%	87	
Duration of dialysis			
Below the mean	63%	78.9	P≥0.5
Above the mean	37	21.1	

Table 2: Distribution of dialysis subjects according to halitosis and categorized by the related factors

Related factors \ Halitosis	No N=25	Yes N=225	Test result
Gender			
Male	44%	60.4%	P≥0.9
Female	56%	39.6%	
Age			
Below the mean	52%	50.7%	P≥0.9
Above the mean	48%	49.3%	
Hypertension			
Yes	72%	75.1%	P≥0.9
No	28%	24.9%	
Diabetes			
Yes	64%	43.1%	P≥0.5
No	36%	56.9%	
Denture			
Yes	36%	42.2%	P≥0.9
No	64%	57.8%	
Cigarette smoking			
Yes	20%	13.3%	P≥0.9
No	80%	86.6%	
Duration of dialysis			
Below the mean	84%	72%	P≥0.2
Above the mean	16%	28%	

Table 3: Distribution of dialysis subjects according to oral metallic taste and categorized by the related factors

Oral metallic taste / Related factors	No	Yes	Test result
	N=220	N=30	
Gender			
Male	58.6%	60%	P≥0.9
Female	41.4%	40%	
Age			
Below the mean	47.7%	66.6%	P≥0.5
Above the mean	52.3%	33.4%	
Hypertension			
Yes	74.5%	76.6%	P≥0.9
No	25.5%	23.4%	
Diabetes			
Yes	47.7%	43.3%	P≥0.9
No	52.3%	56.4%	
Denture			
Yes	42.7%	%33.3	P≥0.9
No	57.3%	%66.4	
Cigarette smoking			
Yes	13.6%	16.6%	P≥0.9
No	86.4%	83.4%	
Duration of dialysis			
Below the mean	76.3%	50%	P≥0.9
Above the mean	23.7%	50%	

Discussion:

Currently, the number of renal failure patients requiring dialysis is increasing by 10% to 15% annually, and as a result, the need for specific dental interventions in these patients will increase. End-stage renal disease (ESRD) is the final stage of some primary renal diseases or a kidney-related systemic disease, in which kidney function is stopped. The manifestations of this disease include uremic syndrome, severe fluid imbalance, and deposition of uremic toxins which are excreted through the urine under normal conditions.[16] The most important causes of this disease are hypertension, diabetes mellitus, chronic glomerulonephritis, and autoimmune disease. Dialysis treatment and kidney transplantation are major and important treatments for patients with ESRD. (16) Dialysis is considered the most important modality in the prevention of early mortality in patients with renal insufficiency.[17]

Currently, one of the concerns of dentists is the development of oral lesions in patients with chronic kidney failure.[1,2] A wide range of oral manifestations, such as gingivitis, xerostomia, uremic fetor, mucosal pallor, mucosal lesions, malocclusion, and an increased risk of dental erosion due to recurrent gastroesophageal reflux, has been reported in patients with renal insufficiency.[1,3] Various studies have shown that more than 90% of patients with kidney disease have oral manifestations.[4] Hemodialysis is also associated with necrotizing ulcerative gingivitis (NUG) and malocclusion. Patients with renal disease receiving dialysis lose their teeth at a younger age than non-dialysis patients. Dialysis also causes xerostomia and delayed wound healing, thus reducing the success of oral treatments. [2,18-26]

We examined halitosis, oral candidiasis, and oral metallic taste in the current study. Patients with chronic renal disease who require hemodialysis have a lower salivary flow rate as well as suppressed immune systems and are more susceptible to the colonization of opportunistic infections such as candidiasis. Many of these patients have anemia, malnutrition, xerostomia, and low levels of serum albumin, which facilitate the colonization of Candida species.[27]

Due to the nature of their disease and various treatments, chronic renal disease patients on hemodialysis experience changes in taste (dysgeusia) as well as a sense of metallic taste in the mouth and halitosis. These symptoms are usually the result of inherent metabolic and physiological abnormalities of their disease. The cause of the metal taste in uremic patients is the increase in the amount of urea and ethyleneamines and low levels of zinc in their saliva. On the other hand, decomposition of urea and its conversion into ammonia and carbon dioxide cause an unpleasant uremic odor.[28,29]

The present research showed that oral manifestations were present in 91.2% of hemodialysis patients. The most common oral manifestation was halitosis (90%), followed by oral metallic taste (12%) and oral candidiasis (10.8%).

Regarding the frequency of oral manifestations, the findings of our research were similar to the results of a study by Oyetola et al, which was performed on 90 cases and 90 controls and showed that 96.5% of them had oral manifestations.[9]

The cited study was conducted in developing countries, and therefore the same may have been the case in our population. Our study was also similar to the research done by Santosh P et al on 100 cases and 100 controls, both of whom did not have any other systemic diseases, did not consume any drugs that affect oral and dental health, and did not have a history of cigarette smoking or alcohol consumption. Their results showed that 91% of the patients had oral manifestations.[20] The results of a study by de la Rosa García et al on 112 dialysis patients and 117 non-dialysis patients, both of whom had diabetes, showed that 77.8% of dialysis patients had oral manifestations.[7] In a research by Kaushik et al on dialysis patients in India, 65% of the patients had oral manifestations.[21] Belazelkovska et al, in their study on 30 dialysis patients and 30 renal transplantation patients, reported that 72.22% of the patients showed oral manifestations.[22] The results of these three studies differed from those of our research, which may be due to the studied population, nutritional habits, and the region under study.

In the present study, 90% of the patients suffered from halitosis, and this rate differed from

those reported by Santosh P et al ,Kaushik et al, Souza et al , due to fewer samples or different measurement and grading methods.[20,21,23] We used the organoleptic measurement method, while Patil et al interviewed the patients used the modified Fosdick method. The measurement method was not mentioned in the other two studies.

In our study, 12% of patients on hemodialysis were suffering from oral metallic taste; this variable has not been evaluated in similar studies, and this was one of the advantages of our study. Of the patients in our study, 10.8% suffered from oral candidiasis (2% pseudomembranous, 8% erythematous, and 0.8% hyperplastic), and no angular cheilitis was observed. This rate was almost similar to the results of studies by Oyetola et al, Belazelkovska et al, Gavaldac C et al and Gautam NR et al.[9,22,24,25] Our results differed from the results reported by de la Rosa García et al and Ruospo M, et al.[7,26] This difference can be due to different nutrition and different health conditions in these patients.

In the current study, the related factors including age, sex, smoking, denture use, diabetes, hypertension, and the duration of dialysis were investigated. In our study, halitosis and oral metallic taste did not have any significant correlation with any of the related factors, but oral candidiasis had a significant correlation with age; therefore, as the age increases, the incidence of candidiasis also increases ($P \leq 0.05$). Also, candidiasis significantly correlated with using denture, and there was a higher incidence of candidiasis in denture wearers ($P \leq 0.005$). Other related factors, such as diabetes, sex, the duration of dialysis, hypertension, and smoking were not associated with candidiasis.

In our study, the three oral manifestations were studied separately with the related factors, which was not done in any of the other studies mentioned here. Ruospo M, et al reported that the prevalence of candidiasis increases with age ($P \leq 0.01$) but does not correlate with sex, the duration of dialysis, or the area of residence,[26] which was similar to the result of our research. In the study by Rosa Garcia et al, candidiasis correlated with age and diabetes mellitus (36% to 67%).[7] In our study, candidiasis associated with age ($P \leq 0.05$) but showed no correlation with diabetes ($P \geq 0.9$).

Conclusion:

The prevalence of oral manifestations in chronic renal failure patients on hemodialysis is high and is a matter of concern. We recommend etiologic studies to understand the causes and to reduce the incidence of complications.

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