



ORIGINAL RESEARCH PAPER

Oral Medicine & Radiology

ASSESSING THE ORAL MANIFESTATIONS AMONG CHRONIC RENAL FAILURE PATIENTS IN CHENGALPATTU DISTRICT TAMILNADU – A CASE-CONTROL STUDY

KEY WORDS: Chronic Renal Failure, Dialysis, Halitosis, Oral Health.

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ABSTRACT

Aim: To determine the nature, incidence, and severity of oral manifestations that occur in chronic renal failure patients in Chengalpattu district Tamilnadu. **Methods:** A total of 100 people participated in the study—50 CRF patients and 50 controls. The control group was chosen from the same age range as the case group, had a normal GFR, and seemed to be disease-free. The case group was chosen at random from a population of CRF patients with GFR values between 15 and 30 mL/min. To rule out any signs, the patients underwent an intraoral examination. The outcomes of the investigation were then contrasted with those of several other comparable studies. **Results:** The most prevalent oral conditions in CRF patients were halitosis (34%), changed taste (42%), pallor (88%), and dry mouth (90%). CRF patients had much greater oral alterations than individuals in the control group. These alterations could be attributable to metabolic problems brought on by renal failure. **Conclusion:** Significant oral alterations in the individuals who were the subject of the study provided evidence of the influence of CRF on the oral cavity and suggested a connection between CRF and oral health. To link the severity of such alterations to disease progression, more research is needed.

INTRODUCTION

Numerous illnesses affecting mankind have a variety of etiological causes. Changes typically occur in the oral cavity indicating sickness elsewhere in the body, regardless of the organ system implicated. Chronic renal failure (CRF) is an irreversible decline in renal function that often occurs over several years as a result of a decrease in functioning nephrons. It is defined as a low glomerular filtration rate that lasts for three months or more. It is well recognised that CRF is becoming more common everywhere¹. Every organ system in the body reflects improper kidney function, exhibiting a range of signs and symptoms. Oral symptoms are present in 90% of patients with renal failure, and they may be brought on by dialysis, kidney transplantation, or aetiological causes that contribute to chronic renal failure².

Patients with CRF are more prone to infection due to overall weakness and immune response reduction. Both dental work and oral disorders can cause bacteraemia, which can cause considerable morbidity and even death in dialysis patients with renal failure³. Microbes in the bloodstream are caused by periodontal disorders, pulpal pathology, oral ulcers, and dental operations⁴. It is crucial to have a thorough understanding of the oral changes that occur in CRF patients to correctly identify the disease, prevent bacteraemia, and diagnose the underlying condition⁵.

MATERIALS AND METHODS

A cross-sectional case-control design was used for creating this study. The Adhiparasakthi Dental College and Hospital's Institutional Ethical Committee approved the study and the hospitals where the patients were evaluated granted their consent. The research population was chosen at random from

the CRF patients who routinely visited the nephrology departments of one medical college and two private hospitals in the Chengalpattu district of Tamil Nadu, India was enrolled. A total of 50 patients (37 male and 13 female) with CRF were recruited. They were from 18 years to 78 years of age and were patients with a glomerular filtration rate (GFR) of between 15-30 mL/min for more than three months.

The following patients were excluded from the study: those suffering from any systemic disease that could affect their GFR and/or oral health status and those who were receiving any type of drugs that could affect their oral health status.

The Adhiparasakthi Dental College and Hospital, Melmaruvathur, Chengalpattu district of Tamil Nadu served as the recruitment site for the control group, which consisted of systemically healthy individuals who were seeking dental care but had no history of kidney disease, or any other chronic debilitating illnesses, a habit of smoking or drinking, and/or were not taking any medications that might have an impact on their oral health.

This group was a perfect match for the test group, consisting of 50 people ranging in age from 18 to 78, with 37 men and 13 women. The investigation lasted for three months.

One examiner handled all of the exams. The examiner and a different author who is an expert in diagnosing oral diseases calibrated the clinical examination before recording the clinical data. The fact that the participants were evaluated in a hospital meant that the examiner could not have been "blind" to their overall systemic health. However, the examiner was "blind" to the specific form of renal failure that each patient in

the test group had. Examining for oral alterations including tongue coating, pallor, ulceration, red and/or white lesions, and enamel hypoplasia, along with questions concerning dry mouth, taste and halitosis, mucosal discomfort, bleeding tendencies, and burning feeling in the mouth, was done on patients.

Records for each patient in the research group were consulted to learn more about their blood chemistry. After receiving informed permission, a standard pro forma was utilised to collect all the pertinent data for each patient. All examinations were performed with basic tools at the patient's bedside for convenience. All CRF patients were checked while still in their beds, making it impossible to obtain radiographs of their teeth or investigate their periodontal tissues using a periodontal probe. This greatly constrained any evaluation of tooth caries and periodontal health, and these conditions were not documented.

Statistical Analysis

The collected data were entered in a Microsoft Excel spreadsheet after which they were subjected to statistical analysis by using a statistical software program (Statistical Package for the Social Sciences; SPSS Inc, Chicago, USA). Descriptive statistics were obtained for the study population and the Chi-square test was used to examine the significance of the differences in means and distribution of categorical variables between groups. The level of significance was set at a p-value less than or equal to 0.05.

RESULTS

90% of individuals in the study group had dry mouth and 20% of the patients in the control group had dry mouth ($P = 0.00001$, which was extremely significant). 14% of patients in the study group and 2% of patients in the control group had mucosal discomfort ($P 0.001$, extremely significant). Halitosis was present in 34% of study group patients and 14% of control group patients ($P 0.001$, which was highly significant), while altered taste sensation was present in 42% of study group patients and 8% of control group patients ($P 0.0001$, which was highly significant). In comparison to the control group, 4% of patients in the study group and 12% of patients in the study group had mouth burning ($P=0.08$, not statistically significant) (Table 2). For nose bleeding or appetite loss, there were no statistically significant changes between the study and control groups (Table 2).

88% of patients in the study group and 12% of patients in the control group both displayed mucosal pallor ($P<0.00001$, which was statistically significant). Neither the control group nor the research group had any hematomas. In the study group, 12% of patients had either red or white or red and white lesions in their mouths. In the control group, however, there were no had either red or white or red and white lesions in their mouths ($P<0.03$, which was statistically significant). 10% of patients in the study group had enamel hypoplasia whereas 12% of patients had enamel hypoplasia ($P>0.6$, which is statistically not significant)

DISCUSSION

There have been reports of more than 30 oral signs and symptoms in patients with chronic renal failure, some of which are frequently observed: calculus, high salivary urea concentration, ammonia-like odour, xerostomia, oral bleeding, stomatitis, pale gingivae, drug-induced gingival hyperplasia, loss of lamina dura, maxillary and mandibular radiolucent lesions, abnormal bone remodelling after extraction, enamel hypoplasia⁶. All 50 CRF patients in the current study had alterations in the oral cavity, some of which were brought on by the disease itself and others by the pathology's therapy.

Some of the prevalent results included halitosis (34%), taste changes (42%), pallor (88%), and dry mouth (90%)⁷. In the

literature, there have been several reports of gingival bleeding, taste acuity changes, and dry mouth in CRF patients. To a lesser or greater extent, the current study confirms earlier results about similar oral abnormalities in CRF patients. When the prevalence of dry mouth was examined between the CRF (90%) and control group (20%) in the current investigation, statistically highly significant values were found. In earlier investigations, 32.9% and 56% of CRF patients, respectively, were reported to have dry mouth, which was a relatively smaller rate⁸.

Some authors speculate that this finding may be due to mouth breathing, secondary effects of medication (primarily antihypertensives), chemical inflammation, glandular involvement (atrophy of the parenchyma of the minor salivary glands), and decreased salivary secretion (as a result of liquid intake restrictions). The loss of taste sense is linked to this manifestation. One of the most frequent oral findings in this investigation was mucosal pallor, which was seen in 88% of CRF patients. When compared to the control group (12%), its incidence was statistically significant⁹.

DeRossi and Glick (1996) also reported on this discovery³. In CRF patients, pallor is observed in the oral mucosa as a result of anaemia. This condition may be brought on by the kidneys producing less erythropoietin, renal loss of red blood cells, marrow fibrosis, and increased red cell fragility with consequent early destruction¹⁰. Approximately 34% of patients in the study group reported having halitosis, which was manifested as a urinous odour, as opposed to 14% of those in the control group. Between these two groups, a statistically significant difference was discovered. Our results were similar to those of prior research that found halitosis in 34% of CRF patients, but not with those of a subsequent study that found halitosis in 24% of CRF patients¹¹.

The majority of CRF patients have altered taste perceptions, particularly for sweet and acidic foods. The presence of dimethyl- and trimethyl-amines, high urea levels, or low zinc levels (caused by malabsorption brought on by gastrointestinal diseases) might all be contributing factors. A high urea content in saliva, which is then converted into ammonia, results in this uraemic fetor, an ammoniacal stench. Urea levels in the blood and saliva, where it is converted to ammonia, rise as a result of the kidneys' reduced function¹². Because of this, uraemic people develop distinctive halitosis. Another symptom of this halitosis is the sense of an unpleasant, metallic taste.

Interestingly, a considerable change in taste was seen in patients with CRF (42%) in the current research compared to the control group (8%), although 31% and 31.7% of CRF patients were reported to have taste abnormalities in prior investigations. Other potential contributing components, besides urea, include changes in salivary pH and a rise in phosphate and protein content. In the current study, there were no signs observed for petechiae, ecchymosis and haematoma but a prior study found that 12.2% of CRF patients had petechiae and ecchymosis.

These results may be related to the underlying increased capillary fragility, decreased platelet adhesion, increased prostacyclin activity, decreased availability of platelet factor 3, renal anaemia (secondary to deficient erythropoiesis), and decreased availability of platelet factor 3. They may also be related to dialysis, which lowers platelet count due to mechanical damage and heparin anticoagulation during this process. This leads us to the conclusion that haemodialysis increases the risk of oral mucosal ecchymosis, petechiae, and bleeding¹³. Uraemic stomatitis is a very uncommon oral complication of uncertain aetiology that typically affects individuals with end-stage or untreated renal failure.

Clinically, it is distinguished by the presence of regional or

widespread erythematous lesions. Pseudomembranous exudates that cover these lesions can be removed, leaving intact or ulcerated mucosa. Since this manifestation has no histological pathognomonic symptoms, histopathology is used with the clinical findings and the exclusion of other illnesses to make the final diagnosis. An involution will often occur when uraemia is restored and does not require a particular course of therapy. 10% hydrogen peroxide gargles (1:1 in water) four times a day might be advised to aid in lesion healing. Mucosal discomfort was experienced by 15% of CRF patients, which was far higher than the 2% rate in the control group¹⁴.

In the current study, 6% of CRF patients experienced intra-oral ulceration, although none of the patients in the control group did. This result contrasted with the findings of two previous studies, which found ulcers in 1% and 1.2% of CRF patients, but was similar to another study's finding that 6% of CRF patients had ulcers. Due to the patients' adequate medical treatment, uraemic stomatitis and intra-oral ulcers were uncommon in the current research. A prior study that evaluated the oral mucosa of people with chronic renal failure found that 37% of the patients had multiple mucosal lesions, uraemic stomatitis, and Candida infections. In the current study, 5% of participants had white lesions¹⁵.

These proportions were lower than those identified in prior research, which discovered white lesions in 11% of CRF patients. The white lesions in the present investigation resembled lichen planus lesions, which may have occurred as a result of the patients' drugs. Only one CRF patient in the current research had an asymptomatic left submandibular gland enlargement. Patients with CRF may occasionally experience complications like enlarged salivary glands. A CRF patient with an enlarged submaxillary salivary gland who also had significant neck oedema was documented in prior research.

Various authors have suggested that there will be involvement of salivary glands in patients with chronic renal failure due to direct gland involvement, chemical inflammation, and dehydration^{16,17}. In the present study, enamel hypoplasia was seen to be slightly more common in the control group (12%) when compared to the study group (10%). This was perhaps a little surprising as it has been suggested that if uraemia is present during the development of the dentition, it results in teeth with enamel hypoplasia and brownish discolouration. Thus, it might have been expected that more CRF than control group patients would have had these problems. The early evaluation of the oral health status of renal patients is essential to eliminate potential infection foci from the oral cavity. The need for prophylactic antibiotic therapy before operative dental procedures to prevent local or distant infection, the patient's ability to tolerate dental treatment, the coagulation profile, and the severity of cardiac arrhythmias should also be assessed¹⁸. In conclusion, the current investigation found that modifications to the oral soft tissues were nearly always present in CRF patients. These changes may have been a source of active infection in these patients with weakened immune systems, which may have increased morbidity and death. Dental professionals must thus be aware of the unique oral characteristics associated with people with CRF. The present study's findings may help doctors better understand and, as a result, recognise early oral symptoms in CRF patients. Maintaining excellent dental health may benefit this high-risk patient population.

Because the CRF patients were in bed, this study was limited to an investigation of the oral soft tissues. Dental caries and periodontal health were not assessed. It would be desirable to assess these aspects in a future study.

Table 1 – Demographic data of individuals who participated in the study

	Study group	Control group
No. of individuals (n)	100	100
Gender		
Male	77	77
Female	23	23
Age range (in years)	18-78	18-78
Mean $\pm$ SD (years)	48.02 $\pm$ 15.5	49.49 $\pm$ 16.45
Smoker	0	0
Alcoholic	0	0
CRF	100	0

Table 2 – Distribution of various symptoms in control and study group

Symptoms	Study group	Control group	Statistical analysis
Dry mouth			
Present	91	20	Chi-square = 102.0550, df=1, P<0.0001, S
Absent	9	80	
Mucosal pain			
Present	15	2	Chi-square = 0.8650, df=1, P<0.001, S
Absent	85	98	
Taste change			
Present	42	7	Chi-square = 33.1130, df=1, P<0.0001, S
Absent	58	93	
Halitosis			
Present	34	14	Chi-square = 10.9650, df=1, P<0.001, S
Absent	66	86	
Burning sensation			
Present	12	5	Chi-square = 3.1500, df=1, P<0.08, NS
Absent	88	95	
Others			
Nasal bleeding	1	0	Chi-square = 1.0204, df=2, P>0.6, NS
Loss of appetite	2	1	
Total Present	3	1	
Total Absent	97	99	

Table 3 - Distribution of various signs in control and study group

Signs	Study Group	Control group	Statistical analysis
Pallor			
Present	87	13	Chi-square = 109.5200, df=1, P<0.00001, S
Absent	13	87	
Petechiae /ecchymosis/ haematoma			
Present	1	0	Chi-square = 9.4240, df=2, P>0.02, S
Absent	99	100	
Red/white lesion			
Present	12	2	Chi-square = 8.8230, df=3, P>0.03, S
Absent	88	98	
Enamel hypoplasia			
Present	10	12	Chi-square = 0.2060, df=1, P>0.6, NS
Absent	90	88	

CONCLUSION

Significant alterations to the soft tissues in the individuals who were the subject of the study provided evidence of the influence of CRF on the oral cavity and suggested a connection between oral health and CRF. More research is necessary to connect the severity of such alterations to the disease's development.

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