Oral Health Needs of Chronic Kidney Disease Patients on Hemodialysis - A Clinical Retrospective Study

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Abstract

Background: Chronic kidney disease patients under hemodialysis and their association with oral health changes have been reported in many studies. Patients who have CKD will have an alteration in the calcium and Vitamin D homeostasis which can show alterations in osteoblastic-osteoclastic mechanisms which can also affect the maxillofacial region. **Aim and Objectives:** This study aims to assess the oral health needs of patients with chronic kidney disease undergoing hemodialysis.The objective of the study is to assess oral health changes in CKD patients and effect of oral infection on renal parameters and to evaluate dental care needs. **Materials and methods:** A retrospective cohort analysis was carried out at a private dental institution in Chennai.The data collection was done from the institution's electronic database from April 2019 to April 2023 which included age and gender of the subjects, duration of dialysis, oral health status and presence of any mucosal or bony lesions related to CKD. **Results:** The study sample included 14 males and 3 females. The minimum and maximum age of the study population were 30 years and 78 years, respectively. The Mean±SD age was 43.06±14.50 years.A statistically significant association was found between dialysis period and mean GFR. **Conclusion:** The higher prevalence of oral lesions in CKD patients necessitates mandatory oral screening to identify patients with deteriorating renal function, the management of such lesions and restoring the carious tooth and periodontal health will enhance the overall well-being of CKD patients.

Keywords: Oral health status, chronic kidney disease, hemodialysis

Introduction

The term Chronic kidney disease/ Chronic Renal Failure (CKD/CRF) describes a progressive and irreversible decrease in the overall number of nephrons that are functional, which lowers the glomerular filtration rate. Clinical and laboratory abnormalities associated with renal failure (CRF) are linked to the kidney's incapacity to eliminate metabolites and carry out endocrine

functions[1].Renal diseases are divided into acute and chronic categories based on how they first manifest. The main renal conditions that dentists will likely treat are patients with chronic kidney disease (CKD), with nephrotic syndrome and renal transplants appearing from time to time. Numerous conditions, such as diabetes, glomerular nephritis, interstitial nephritis, pyelonephritis, and hypertension, can cause chronic kidney disease (CKD).A gradual decline in kidney function leads to the clinical syndrome known as uremia[2].End-stage renal disease (ESRD) is a type of kidney impairment that cannot be cured and necessitates dialysis or kidney transplantation in order to sustain survival[3].It's likely that more people with this type of illness will need dental care in the future. Oral and systemic symptoms are associated with CRF and its treatment. Few comprehensive reports exist regarding the signs and symptoms of dental and oral diseases, as well as the pertinent medical needs of CRF patients[4].certain abnormalities of the mouth such as xerostomia, mucosal pain, uremic smell, and unpleasant taste cannot be reversed and will continue even with appropriate medical care[5].Uremia and chronic renal failure are linked to several changes in the oral cavity[6].Both oral disease and dental manipulation create bacteraemia that may lead to significant morbidity and mortality in patients with CKD especially who are undergoing hemodialysis. CKD is classified into 5 stages based on the criteria put forward by the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines in 2012 [6].

This study aims to investigate oral health needs of patients undergoing hemodialysis. Treatment depends on the severity and progression of CKD, response to treatment, serum parameters and eGFR levels. Initial stages of CKD are managed conservatively. Albuminuria, the first clinical sign of CKD starts appearing when the disease progresses to Stage III. Stage IV and Stage V CKD requires extensive multidisciplinary management including immunosuppressant therapy, hemodialysis or even renal transplantation [8].

Materials and methods

The study was carried out at a private dental institution in Chennai.The data collection was done from an electronic database - Dental Information Archiving Software (DIAS) with a total of 17 samples with history of chronic kidney disease . IRB number got approved, ethical clearance obtained with details as IHEC/SDC/OMED-2204/23/218. This was a retrospective, observational, non-interventional, clinical study.

The inclusion criteria were patients with chronic kidney disease undergoing hemodialysis , who were 14 years of age or older. Database search was conducted using terminologies including chronic kidney disease, serum creatinine, blood urea nitrogen, oral health status, mucosal changes and bony alterations. Data were collected from an electronic database from April 2019 to April 2023. The data was statistically analyzed using chi square test and spearman's correlation and results were obtained.

Statistical analysis

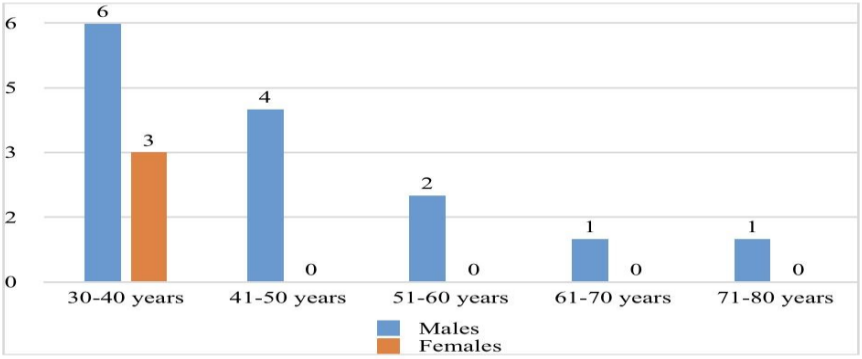
Data was collected in an excel spreadsheet and analyzed with IBM SPSS 23. For quantitative variables, mean and standard deviation were presented as statistics. Chi square tests were used to

identify associations between chronic kidney disease and oral health status , and a p-value of less than 0.05 is considered to be significant. P-values of 0.01 or lesser are regarded as highly significant.

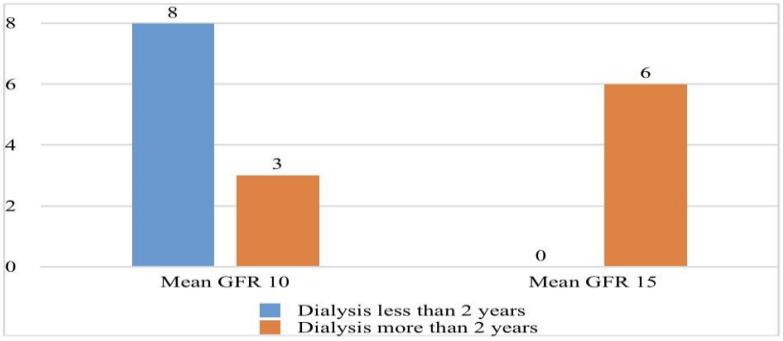
Results

The study sample included 14 males and 3 females. The minimum and maximum age of the study population were 30 years and 78 years, respectively. The Mean±SD age was 43.06±14.50 years. No significant difference was found between age groups and gender (p=0.519). Graph 1 depicts the distribution of study population based on age groups and gender.The study sample is grouped based on the dialysis period and mean GFR. The dialysis period ranges from 2 months to 120 months with a Mean±SD of 34.24±32.77 months. A total of 11 patients had a mean GFR of 10 and 6 had a mean GFR of 15. A statistically significant association was found between dialysis period and mean GFR (p=0.004, Chi Square test). The graph 2 shows the distribution of study population based on dialysis period and mean GFR.Almost all the study participants had oral diseases and halitosis except 2 male patients. The oral diseases including dental caries, edentulism, periodontal diseases and oral mucosal lesions were found in more than half of the study participants. The graph 3 shows the oral health status of the study population. No significant association was found between oral health status and age, gender,mean GFR as well as dialysis period. The table 1 shows the distribution of oral health status among the study population based on dialysis period.

Graph 1: Distribution of study population based on age and gender



Graph 2: Distribution of study population based on dialysis period and mean GFR



Graph 3: Distribution of study population based on their oral health status

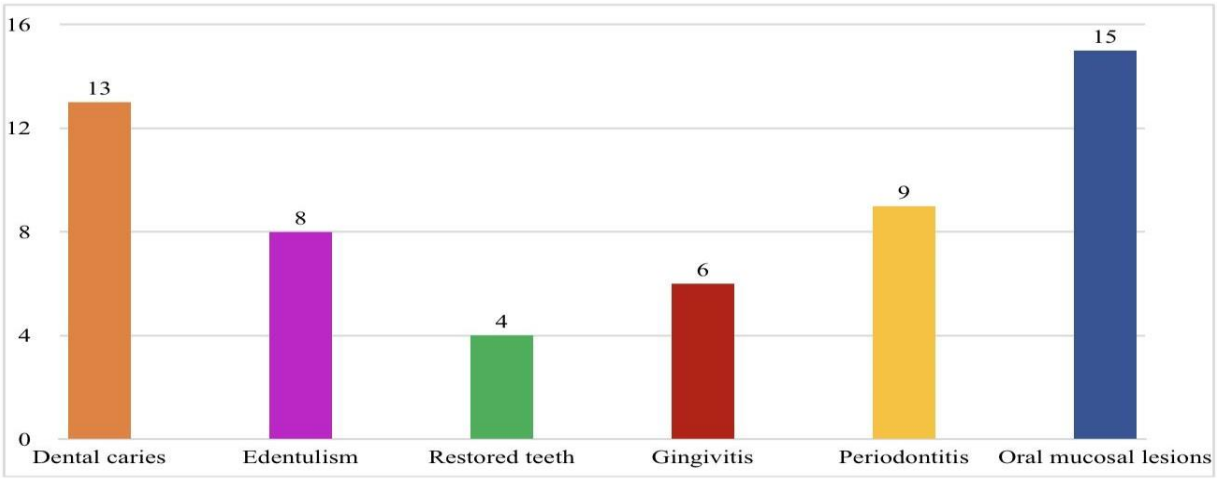


Table 1: Distribution of oral health status among the study population based on dialysis period

		Dialysis			p-value
		Less than 2 years n (%)	More than 2 years n (%)	Total n (%)	
Dental caries	Present	7 (41.2)	6 (35.3)	13 (76.5)	0.312
	Absent	1 (5.9)	3 (17.6)	4 (23.5)	
Edentulism	Present	3 (17.5)	5 (29.4)	8 (47.1)	0.457
	Absent	5 (29.4)	4 (23.5)	9 (52.9)	
Restored teeth	Present	3 (17.6)	1 (5.9)	4 (23.5)	0.200
	Absent	5 (29.4)	8 (47.1)	13 (76.5)	
Gingivitis	Present	4 (23.5)	2 (11.8)	6 (35.3)	0.232

	Absent	4 (23.5)	7 (41.2)	11 (64.7)	
Periodontitis	Present	4 (23.5)	5 (29.4)	9 (52.9)	0.819
	Absent	4 (23.5)	4 (23.5)	8 (47.1)	
Oral mucosal lesions	Candidiasis	1 (5.9)	1 (5.9)	2 (11.8)	0.952
	Halitosis	1 (5.9)	2 (11.8)	3 (17.6)	
	OSMF	2 (11.8)	1 (5.9)	3 (17.6)	
	Uremic Frost	2 (11.8)	3 (17.6)	5 (29.4)	
	Xerostomia	1 (5.9)	1 (5.9)	2 (11.8)	
	Absent	1 (5.9)	1 (5.9)	2 (11.8)	

Discussion:

The primary goal of our study is to assess the relationship between oral health related changes with patients undergoing hemodialysis.

The oral cavity is not an exception to the numerous systemic manifestations of CRF. Dialysis is now widely available, which has extended the life expectancy of CRF patients. Diabetes mellitus, which by itself causes a number of oral manifestations, is the most common cause of CRF[7].Inadequate periodontal care and poor oral hygiene may be the cause of increased plaque accumulation.Inadequate nutrition can dramatically worsen gingiva's reaction to plaque bacteria[8].According to Hajian-Tilaki A et al, there was a significant correlation between the patients' elevated BUN levels and the presence of halitosis. One of the main reasons for bad odor is elevated blood urea concentration[9]. Our study showed out of 17 patients undergoing hemodialysis 3 had positive result for halitosis. Parkar SM et al, stated that patients with CRF have

higher rates of severe, common, prevalent, and undiagnosed periodontal disease.Rather than chronic uraemia, oral hygiene neglect is the primary cause of the higher prevalence of periodontal diseases in CRF patients[10].Sobrado Marinho JS et al stated that regarding prevalence and pocket depth, periodontal disease in CRF patients is comparable to that in the general population[11].our study agreed with Parkar m et al that 0.8% of patients undergoing hemodialysis had periodontitis.Gavalda C et al noted that adult CRF patients receiving hemodialysis had a greater prevalence of caries than did healthy controls[12].Patients with CRF are susceptible to developing candidiasis due to altered white blood cell production and function, as well as inadequate nutrition[13].Ruospo M et al, found that between 5 and 10% of dialysis patients at any given time have clinical mucosal lesions[14].our study results showed that 0.3% and 0.9% of patients had dental caries and oral mucosal lesions respectively which shows that chronic kidney disease patients especially who are under hemodialysis treatment has several alterations in their oral health mainly due to poor oral hygiene practice. Patient's are need to be educated about oral health changes due to hemodialysis and good oral hygiene practice should be incorporated in their daily routine in order to avoid certain oral complications.

Conclusion: The higher prevalence of oral lesions in CKD patients necessitates mandatory oral screening to identify patients with deteriorating renal function, the management of such lesions and restoring the carious tooth and periodontal health will enhance the overall well-being of CKD patients.

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Conflicts of interest: Nil

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