

ASSOCIATION OF ORAL PATHOLOGIES AND DETERIORATION OF ORAL HEALTH STATUS IN END STAGE RENAL DISEASE PATIENTS ADMITTED IN SHARIF MEDICAL AND DENTAL COLLEGE, LAHORE

Hira Butt¹, Nauman Rauf Khan¹, Maria Jabbar¹, Fizza Tahir², Maila Habib Piracha², Fatima Hafeez²

¹College of Dentistry, Sharif Medical and Dental College Lahore Pakistan

²Institute of Dentistry, CMH Lahore Medical College Lahore (National Institute of Medical Sciences) Pakistan

ABSTRACT

Objective: To compare status of oral health in patients with End stage renal disease to disease free individuals and to assess their periodontal treatment needs.

Material and Methods: A Cross sectional comparative study was conducted on 58 patients with End stage renal disease and 58 renal disease-free controls over a period of one year. Data collection was based on the following parameters: Community Periodontal Index of Treatment Needs (CPITN) and Decayed Missing and Filled Teeth Index (DMFT). The data was analyzed using IBM SPSS Statistics 23. P value ≤ 0.05 was taken as significant.

Results: There was found to be significant association between periodontal health and the status of disease (healthy individuals in comparison to end stage renal disease) ($p=0.001$). The CPITN score for patients with End stage renal disease was higher than that for disease free individuals. The mean DMFT score of end stage renal disease patients was higher than that for disease free individuals. There was a significant association between the status of oral health of renal disease patients and renal disease-free patients ($p\leq 0.001$).

Conclusion: Individuals with a healthy periodontium were greater in number in patients with ESRD as compared to disease free individuals. Periodontal pocket depths of 6 mm or more were found only in ESRD patients. Majority of patients with ESRD had high DMFT score as compared to disease free individuals. It was also seen that the periodontal treatment needs for complex treatment, scaling and prophylaxis along with oral hygiene instructions required by patients with ESRD was more in comparison to kidney disease free individuals.

Key Words: Community periodontal index for treatment needs (CPITN), DMFT index (Decayed, Missing, Filled Teeth), End stage renal disease (ESRD), Chronic kidney disease (CKD), C-reactive protein (CRP).

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INTRODUCTION

Chronic Kidney disease has been defined as damage to the kidneys for a period of three or more months which is associated with abnormalities related to kidney function or structure, either with a decreased glomerular filtration rate (GFR) or without it [1]. The effect of Chronic renal disease on the quality of life of the patients is very strong [2]. Individuals are considered to have chronic kidney disease when they have a GFR <60 ml/min/1.73 m² for a time period of 3 months [3]. Based on glomerular filtration rate, CKD has five stages. In Stage 1, the Glomerular Filtration Rate is ≥ 90 ml/min/1.73 m² with persistent albuminuria. In Stage 2, the Glomerular Filtration Rate is 60–89 ml/min/1.73 m². In Stage 3, the Glomerular Filtration Rate is 30–59 ml/min/1.73 m². In Stage 4, the Glomerular filtration rate is 15–29 ml/min/1.73 m². In Stage 5, there is Established kidney failure and the Glomerular Filtration Rate is <15 ml/min/1.73 m², end-stage

kidney disease or permanent renal replacement therapy [4].

Literature supports that Chronic Kidney disease is associated with oral health problems [5]. One of the problem is Periodontitis. Predominantly the bacterial species involved in development of periodontitis are *Treponema denticola*, *Tannerella forsythia*, and *Porphyromonas gingivalis* [6,7]. In Chronic Kidney disease there is an evident change of oral microflora of approximately 85 % to anaerobic and gram negative from gram positive bacteria. These bacteria include *Tannerella forsythensis*, *Prevotella intermedia*, *Treponema denticola*, *Campylobacter rectus*, *Porphyromonas gingivalis* and *Actinobacillus action mycete-mcomitans* serotypes a and b [8]. It has been reported that periodontitis in patients with ESRD causes an increase in the systemic inflammatory mediators. Correlation of elevated C reactive protein (CRP) values with levels of IgG to *Porphyromonas gingivalis* has been reported in a study [8].

Many other oral problems include gingival inflammation, periodontal pocket formation, bleeding gums, calculus, gingival recession, tooth mobility,

Correspondence: Dr Hira Butt, Demonstrator, Sharif Medical and Dental College, Lahore Pakistan

Email: hira.ah.butt@gmail.com

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oral lesions, oral infections and bone lesions have been reported [9,10]. It has also been seen that the patients with chronic kidney disease have very few carious lesions which has been reported to be due to increased levels of urea and phosphate [11]. The presence of these signs in addition to helping in the diagnosis of chronic kidney disease also help in determining the severity of the underlying systemic condition [5]. Another commonly observed finding is that Hemodialysis also worsens the oral health. It was reported in a study that patients undergoing dialysis had shown a greater deposition of plaque [12] and an overall alteration of oral microflora [13]. Literature reports that periodontal disease has been seen to be related to Chronic Kidney Disease. Radiographic changes in the oral cavity have also been seen in chronic kidney disease patients. There are innumerable radiolucencies of the maxilla and the mandible and the Lamina Dura is lost [14].

Alkaline Phosphatase which is a biomarker for chronic periodontitis is found to be very high in patients with Chronic Kidney Disease due to a disturbance in bone mineralization [15]. Furthermore, periodontal infections have been found to have an affinity for patients with ESRD [16].

OBJECTIVES

1. To compare status of oral health of renal disease-free individuals and patients with End stage renal disease.
2. To compare the periodontal treatment needs of disease-free individuals with End stage renal disease patients

MATERIAL AND METHODS

A Cross sectional comparative study was conducted in the department of Nephrology and Urology, Sharif Medical and Dental College, Lahore on 58 patients with ESRD and 58 disease free controls in the time duration of one year. The study was conducted after ethical approval certificate No. SMDC/SMRC/100-19 from Sharif Medical Research Centre (SMRC). Sample size was calculated to be 58, keeping the power of study to be 90, precision at 10% and prevalence 69%. The sampling technique employed was non-probability convenient sampling. Patients above the age of 18 years, belonging to both the genders and same socioeconomic status were a part of the study. Patients undergoing renal dialysis for reasons other than CRF, those who were critically ill and those with any systemic illnesses were excluded from the study. The controls (disease free individuals) included were healthy subjects free of

any systemic illness belonging to the same socioeconomic status. Controls with a history of renal disease in the family or those with a past medical history of kidney disease were excluded from the study. The disease- and disease-free group patients included belonged to the same socioeconomic status. Data was collected after taking an informed consent from the patients. The demographic data along with a list of variables associated with End stage renal Disease was recorded using a structured questionnaire. Data collection was based on the following parameters: Community Periodontal Index of Treatment Needs (CPITN) and Decayed Missing and Filled index (DMFT). The DMFT scores were classified as shown in table-I [17] and the coding method for CPITN is shown in table-II [18,19]. The data was analyzed using IBM SPSS Statistics-23. P value ≤ 0.05 was considered significant.

Fisher Exact test was used to find the statistical association between periodontal health of patients with the presence or absence of ESRD while the association between oral health status (decayed, missing and filled teeth score) of patients with the End stage renal disease- and disease-free individuals was found using Chi square test.

Table-I: DMFT classification [17].

DMFT CLASSIFICATION	
1	Disease free ((DMFT =0)
2	Low score (DMFT 1 to 3)
3	High score ((DMFT 4 and above)

Table-II: Scoring for community periodontal index for treatment needs [18,19].

Periodontal Health	Coding
Healthy	0
There is bleeding either after the use of mouth mirror, probe or directly	1
The black band on the probe visible. During probing Calculus is observed	2
The margin of the gingiva is within the black band on the probe and the pocket depth is 4 - 5 mm	3
The black band on the probe is invisible and the pocket depth is 6 mm or higher	4
Excluded sextant	X
Not recorded	9

RESULTS

This study was conducted on 116 participants, out of which 58 were patients of ESRD while 58 were disease free individuals. The mean age of the participants was 39.77 ± 17.898 years with 60.3% males and 39.7% females. Among the patients with ESRD 43 were undergoing dialysis while 15 were not. The blood thinning agent used by the patients undergoing dialysis was Loprin.

The CPITN score for patients with End stage renal disease was 2.17 ± 0.135 which was higher than that for disease free individuals (1.91 ± 0.135). There was found to be significant association between periodontal health and the status of disease (end stage renal disease in comparison to healthy individuals) ($p=0.001$). It was seen that the percentage of individuals with a healthy periodontium was greater in patients with end stage kidney disease (4.3%) as compared to disease free individuals (2.6%). It was also seen that an equal percentage of pocket depth 4 to 5mm was seen in both the groups as shown in figure-I.

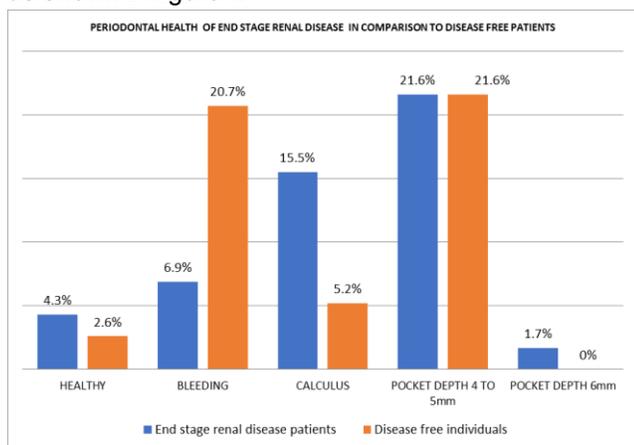


Figure-I: Periodontal health of End stage renal disease patients in comparison to disease free individuals.

It was further seen that the mean DMFT score of ESRD patients was 11.4 ± 0.834 , which was much higher than that for disease free individuals (5.10 ± 0.454). There was a significant association between the oral health status of the patients with ESRD and renal disease-free individuals as determined by Decayed, Missing and Filled Teeth Index (DMFT) ($p \leq 0.001$). It was seen that a greater percentage of patients with ESRD (47.4%) had high DMFT score as compared to disease free individuals as shown in figure-II.

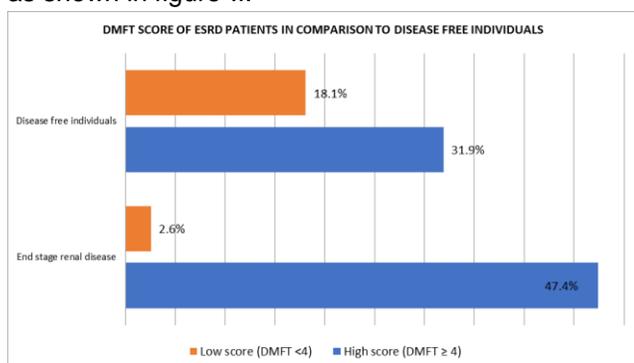


Figure-II: DMFT score of both the groups.

It was very evident that the mean score for decayed and missing teeth was greater for ESRD

patients in comparison to the renal disease-free individuals while the contrary was true for the mean score of filled teeth as shown in table-III.

Table-III: DMFT descriptive analysis

Status	ESRD		Controls		P Value
	%(n)	mean	%(n)	mean	
Decayed teeth	45.7% (53)	5.16 ± 0.379	44.8% (52)	2.52 ± 0.319	0.751
Filled teeth	8.6% (10)	0.26 ± 0.084	13.8% (16)	0.55 ± 0.156	0.182
Missing teeth	42.2% (49)	5.98 ± 0.685	29.3% (34)	2.03 ± 0.285	0.002

It was further seen that although a higher percentage of ESRD patients were found to have a healthy periodontium and hence 9% required no treatment, it was also seen that the periodontal treatment need for complex treatment, scaling and prophylaxis alongwith oral hygiene instructions required by patients with ESRD was more in comparison to disease free individuals as shown in figure-3.

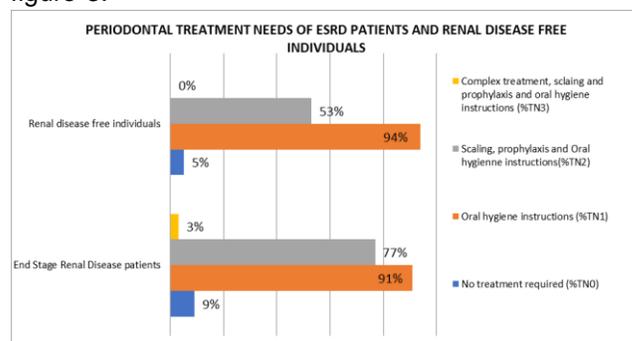


Figure-III: Periodontal treatment needs.

DISCUSSION

A cross sectional comparative study was conducted on patients with ESRD reporting to the department of Nephrology and Urology, Sharif Medical and Dental College, Lahore to assess the effect of ESRD on periodontal health.

In one study that studied the periodontal health of patients with chronic kidney disease in comparison to the healthy controls, it was stated that none of the patients with chronic kidney disease had a healthy periodontium in comparison to 9.3% of the individuals without kidney disease [11]. These results were contrary to our study where it was seen that a greater percentage of ESRD patients (4.3% had healthy periodontium in comparison to the healthy individuals (2.6%). It was also reported in the above study [11] that 39.4% of the patients without kidney disease had bleeding gums while none of the ESRD patients reported bleeding gums. These results were comparable to our study where it was seen that a

higher percentage of disease-free individuals (20.7%) had bleeding gums with only 6.9% ESRD patients in this category. It was also seen in our study that the deposition of calculus was found to be more in ESRD patients (15.5%) in comparison to healthy individuals (5.2%). This finding differs from another study which stated that 29.7% ESRD patients had calculus in comparison to 32% disease free individuals [11]. The periodontal pocket depth of 4 to 5mm was seen to be reported by an equal percentage of both the groups (21.6% each) in our study. Contrary results were seen in another study where a greater percentage (33.8%) patients with ESRD had pocket depth of 4 to 5mm as compared to 19.3% of the disease-free individuals [11]. Our study also reported that pocket depths of 6mm or more were found to be 1.7% in ESRD patients while none of the disease-free individual had them. These results are very similar to another study where the 36.5% ESRD patients reported pocket depths of 6mm or more while none of the disease-free individuals had them [11].

According to our study 5.2% patients of End stage renal disease on dialysis had a healthy periodontium. These results are contrary to another study in which none of the patients on dialysis had a healthy periodontim [20]. The percentage of patients with bleeding gums in our study was 8.6%. These results are very comparable to a reference study, where it was seen that 7.5% patients had bleeding gums [20]. It was also seen that 24.1% patients in our study had calculus deposition. This was very different from another study that reported calculus deposition to be 65.4% [20]. The percentage of patients with periodontal pocket of 4 to 5 mm in our study was 34.5% and that for periodontal pocket depth of 6mm or more was 1.7%. These results are comparable to another study, in which it was seen that 24.3% patients had periodontal pocket depth of 4 to 5mm while 0.4% had the pocket depth of 6mm or more [20].

According to our study the mean DMFT score of ESRD patients was higher (11.4 ± 0.834) in comparison to the healthy individuals (5.10 ± 0.454). These findings were different from another study where it was seen that mean DMFT score of ESRD patients (1.37 ± 1.46) was lower in comparison to disease free individuals (2.24 ± 1.82) [11]. Our study reported that the mean score for decayed teeth for ESRD patients (5.16 ± 0.379) was higher in comparison to the disease-free individuals (2.52 ± 0.319). This finding was in contrast to another study which reported that the mean score for decayed teeth for ESRD patients (1.05 ± 1.31) was lower in

comparison to the healthy group (2.19 ± 1.79) [11]. Our study reported the mean score for missing teeth to be higher (5.98 ± 0.685) for ESRD patients as compared to the disease-free group (2.03 ± 0.285). These findings were comparable to another study which reported the mean score for missing teeth for ESRD patients to be higher (0.21 ± 0.53) in comparison to the disease-free group (0.05 ± 0.22) [11].

CONCLUSION

Individuals with a healthy periodontium were greater in number in patients with ESRD as compared to disease free individuals. Periodontal pocket depths of 6 mm or more were found only in ESRD patients. Majority of patients with ESRD had high DMFT score as compared to disease free individuals. Although ESRD patients were found to have a healthy periodontium and hence required no treatment, it was also seen that the periodontal treatment need for complex treatment, scaling and prophylaxis along with oral hygiene instructions required by patients with end stage kidney disease was more in comparison to kidney disease free individuals.

RECOMMENDATIONS

A timely diagnosis of oral problems and treatment needs in patients suffering from chronic kidney disease is extremely important. It helps to identify the problems at an early stage and ensures the employment of appropriate and timely treatment modality to salvage the oral health and function of the patient in turn ensuring a good quality of life for the patient.

AUTHOR CONTRIBUTION

Hira Butt: Conception and design, literature review, study design, data collection, result analysis, drafting manuscript, proof reading, critical revision and final approval

Nauman Rauf Khan: Concept and design, data analysis, critical revision, proof reading and final approval

Maria Jabbar: Data collection and literature review

Fizza Tahir: Literature review, critical revision, proof reading and final approval.

Maila Habib Piracha: Literature review and proof reading

Fatima Hafeez: Critical review, proof reading and final approval

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