

PERIODONTAL STATUS AND ORAL HYGIENE HABITS IN END STAGE RENAL DISEASE (ESRD) PATIENTS UNDERGOING DIALYSIS

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ABSTRACT

Chronic renal failure is a progressive disease caused by the damage of the functional unit of the kidney, the nephron. Periodontal diseases are common among renal failure patients; however this relationship is not clearly understood.

The aim of this study was to evaluate the oral hygiene habits and its impact on periodontal status in end stage renal disease (ESRD) patients.

Eighty ESRD patients attending the Tygerberg Hospital Renal Unit and stable on haemodialysis or peritoneal dialysis for at least 3 months participated in the study. Patient demographics, smoking status and type of dialysis were obtained from the patient's file. Patients were asked to complete a questionnaire about their oral hygiene habits. The periodontal examination was done by a single blinded examiner. The periodontal examination included assessment of gingival index (GI), bleeding on probing (BoP), probing depths (PD) and clinical attachment loss (CAL). All periodontal examinations were confined to the six 'Ramjford teeth'. The presence of one sextant showing GI ≥ 2 , PD > 4 mm or CAL > 3 mm and positive bleeding on probing was considered diagnostic of periodontal disease.

Mean age of the participants was 50.3 ± 9.06 years; with a median time on dialysis therapy of 24 months (range 3-156 months), Forty-six (57.5%) subjects were diagnosed as having periodontal disease. Forty subjects (50%) reported brushing twice a day (BD) and six (7.5%) three times a day (TDS). Most of them (85%) never used dental floss. Only 22.5% used mouth wash in their daily routine and majority of them (70%) visited their dentist only in case of some dental problem. There was statistically significant difference in the periodontal status with regards to brushing frequency, use of mouth wash and visit to dentist. However, no significant difference was found for the use of floss.

Oral hygiene habits show significant impact on the periodontal status of ESRD patients.

Key Words: End stage renal disease (ESRD), periodontal diseases, oral hygiene habits.

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INTRODUCTION

The incidence of chronic renal failure (CRF) and end-stage renal disease (ESRD) is rising constantly because the repair of the damaged parenchymal tissues is rare.¹ Chronic renal failure is a progressive disease caused by the damage of the functional unit of the kidney, the nephron. Diseases which cause the destruction of nephrons are diabetes mellitus, pyelonephritis, glomerulonephritis, nephrosclerosis, polycystic kidney disease and vascular collagen disease.² Chronic Kidney disease (CKD) is characterized by a reduction in glomerular filtration rate (GFR). All patients on dialysis or renal transplantation, irrespective of the level of GFR are categorised as being in end-stage renal disease (ESRD).³

The mortality rate is very high among ESRD patients. The main cause of mortality in ESRD is the cardiovascular disease which accounts for premature death in more than 50% of dialysis patients.⁴⁻⁷ The high cardiovascular mortality rate indicates that ESRD

patients are subject to a process of accelerated atherogenesis.⁴ The causes of atherosclerotic cardiovascular disease in ESRD are probably multifactorial. Several risk factors have been identified. The identifiable risk factors include age, sex, race, family history, diabetes mellitus, dyslipidemia, hypertension, left ventricular hypertrophy, obesity and cigarette smoking.^{4,6,8} However, previous studies have shown that the high prevalence of cardiovascular disease in ESRD patients is only partly explained by these traditional risk factors.^{7,8} It has been postulated that additional factors such as oxidative stress and inflammation may be more important than the established risk factors.^{6,7}

In the last three to four decades, improvements in dialysis and transplantation have reduced morbidity and mortality among patients with ESRD.⁹ Because of increased life span, increasing number of such patients will present for dental treatment. The incidence of a variety of soft and hard tissue conditions such as gingival inflammation, gingival overgrowth, periodontal disease, enamel hypoplasia, pulp obliteration and osseous changes of the jaw seems greater among chronic renal failure patients.^{9,10}

Chronic renal failure is often compounded by multiple infections. The increased susceptibility to infection may be due to impairment in both specific and non-specific immune responses.¹¹ Periodontal diseases are common among renal failure patients, however this relationship is not clearly understood.¹² There is substantial evidence that the relationship between periodontal diseases and systemic diseases may be bi-directional. That is, not only the systemic conditions have oral manifestations, but periodontal diseases can also affect certain systemic conditions.¹³⁻¹⁵

Chronic infections are reported to be an important cause of persistent systemic inflammation in ESRD patients.¹⁶ In our previous publication we reported that periodontitis is associated with increased systemic inflammation reflected by CRP values, in patients with ESRD, on maintenance haemodialysis or peritoneal dialysis.¹⁷ Currently there is very limited data available regarding oral hygiene attitude and its impact on periodontal status of ESRD patients.

Therefore, the aim of this study was to evaluate the oral hygiene attitude and its impact on periodontal status in ESRD patients.

METHODOLOGY

The study was a cross-sectional analytical observer-blinded study and was approved by the Ethical and Research Committee of the University of Western Cape. Eighty ESRD patients attending the Tygerberg Hospital Renal Unit and stable on haemodialysis or peritoneal dialysis for at least 3 months participated in the study. All participants gave informed written consent. Subjects were excluded if they had less than 20 permanent teeth, or had received antibiotics or periodontal treatment in the preceding three months.

Patient demographics, smoking status and type of dialysis were obtained from the patient's file. Patients were asked to complete a questionnaire about their oral hygiene habits.

The periodontal examination was done by a single blinded examiner who had no knowledge of the patient's medical history and oral hygiene practices. The periodontal examination included assessment of gingival index (GI), bleeding on probing (BoP), probing depths (PD) and clinical attachment loss (CAL). Intra-examiner calibration was checked by repeating 10% of the sample.

All periodontal examinations were confined to the six 'Ramjford teeth'. The GI was measured at four sites per tooth (mesial, buccal, distal and lingual/palatal) and was scored from 0-3 according to Gingival Index outlined in the publication by Loe.¹⁸ Bleeding on probing (BoP) was recorded at two sites per tooth (buccal and lingual/palatal) and scored 0 if there was no bleeding and 1 if bleeding occurred within 10 seconds of probing. Probing depths (PD) were measured from the gingival margin to the base of the periodontal pocket at six sites per tooth (mesio-buccal, buccal, disto-buccal, disto-lingual, lingual and mesio-lingual). Clinical attachment loss (CAL) was measured from cemento-enamel junction (CEJ) to base of the pocket at the same six sites per tooth. PD and CAL were recorded to the nearest millimetre using a calibrated periodontal probe. Mean values were calculated for all variables. The most severe index value in each sextant was recorded. If the Ramjford index tooth in any segment was missing, then provided there were two or more teeth remaining in the sextant, the periodontal tissues in all the remaining teeth were examined and the most severe index values were recorded.

The presence of one sextant showing $GI \geq 2$, $PD > 4$ mm or $CAL > 3$ mm and positive bleeding on probing was considered diagnostic of periodontal disease.¹⁹

The information obtained was statistically analysed by Chi-square test for each variable using a commercially available statistical software package (SPSS 13.0® and Stata/IC® version 10.1.). For the few continuous variables descriptive statistics, such as means, standard deviation and medians were calculated.

RESULTS

Eighty end-stage renal disease patients (ESRD) met the inclusion criteria. Mean age of the participants was 50.3 ± 9.06 years; with a median time on dialysis therapy of 24 months (range 3- 156 months). Thirty four (42.5%) subjects were male; only six (7.5%) subjects had Diabetes and 14 (17.5%) were active smokers. Fifty two (65%) subjects were on peritoneal dialysis and 35% (n=28) were on haemodialysis.

Forty-six (57.5%) subjects were diagnosed as having periodontal disease. In the affected sextants where the parameters were diagnostic for periodontal disease, mean PI was 2.63 ± 0.54 , GI was 2.13 ± 0.42 , PD was 4.36 ± 0.61 mm, and CAL was 4.13 ± 1.10 mm. For the whole group overall mean values for all sextants were as follows: PD 2.66 ± 0.45 , CAL 1.09 ± 1.00 , gingival index (GI) 1.11 ± 0.47 and bleeding on probing (BoP) 0.31 ± 0.27 .

Forty subjects (50%) reported brushing twice a day (BD) and six (7.5%) three times a day (TDS). Most of them (85%) never used dental floss. Only 22.5% used

mouth wash in their daily routine and majority of them (70%) visited their dentist only in case of some dental problem (Fig 1).

The possible impact of the oral hygiene habits of the ESRD patients on their periodontal status was analysed using the chi square test (Table 2). For the purpose of analysis variables were divided into following groups: (Table 1).

There was statistically significant difference in the periodontal status with regards to brushing frequency, use of mouth wash and visit to dentist. However, no significant difference was found for the use of floss (Table 2).

Of the thirty four participants who brushed their teeth once a day, 82.4% (n=28) showed the signs of periodontal disease while of the 46 subjects who brushed their teeth more than once a day only 39.1% (n=18) had periodontal disease. In addition periodontal disease was evident in 67.7% of the subjects who never used any mouth wash as compared to 22.2% who used mouth wash in their routine oral hygiene measures.

Similarly, of the twenty four participants who visited their dentist at least once a year only four (16.7%) had periodontal disease, on the other hand, of the fifty six subjects who visited their dentist only in response to some dental problem, 75.0% (n=42) had periodontal disease (Table 2).

DISCUSSION

Periodontal diseases are common among renal failure patients, however it is not fully established

TABLE 1: VARIABLES GROUPING

Vari-ables	Groups	Description
Brushing	Group -1	Once a day
	Group -2	More than once a day
Dental floss	Group -1	Used dental floss
	Group -2	Never used dental floss
Visit to dentist	Group -1	Visited dentist at least once a year
	Group -2	Visited dentist only in case of problem

TABLE 2: IMPACT OF ORAL HYGIENE HABITS

Variables		Periodontal disease		Total	Significance (p<.05)
		Yes	No		
Brushing	Once a day	28 (82.4%)	6 (17.6%)	34	Significant (p=0.000)
	More than once	18 (39.1%)	28 (60.9%)	46	
Floss	Yes	6 (50.0%)	6 (50.0%)	12	Not significant (p=0.396)
	No	40 (58.8%)	28 (41.2%)	68	
Mouth wash	Yes	4 (22.2%)	14 (77.8%)	18	Significant (p=0.001)
	No	42 (67.7%)	20 (32.3%)	62	
Visit to dentist	Once a year	4 (16.7%)	20 (83.3%)	24	Significant (p=0.000)
	Infrequently	42 (75.0%)	14 (25.4%)	56	

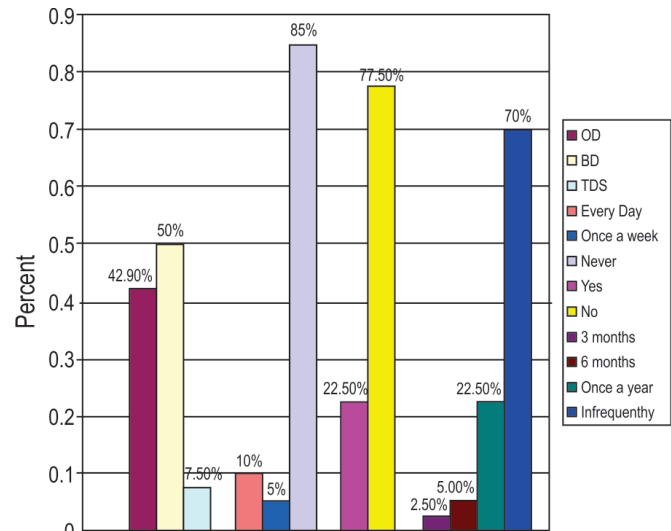


Fig 1: Oral Hygiene Habits

whether it is related to host defence alterations or to the carelessness in maintaining oral hygiene.¹²

Davidovich et al.¹ in their study on four renal failure groups provide evidence that the progression of the periodontal disease in chronic renal failure patients was correlated with bad oral hygiene. Similarly, Marakoglu et al.² in a case control study observed that there was no significant difference in the clinical parameters of periodontal disease between the subjects and control groups. On the basis of their findings they concluded that renal failure does not seem to be a traditional risk factor for more severe periodontal destruction. Moreover, Kitsou et al.¹² in their case control study on experimental gingivitis, among chronic renal failure patients and healthy controls observed that there was no significant difference in the development of gingivitis between the two groups.

Participants of the present study were asked to complete a questionnaire regarding their oral hygiene habits. The data showed highly significant difference in the periodontal status of the subjects in terms of brushing frequency, use of mouth wash and visit to dentist. However, there was no significant difference with regards to the use of dental floss.

These results support the findings of the other studies which suggest that high prevalence of the periodontal diseases in renal failure patients compared to healthy individuals is due to negligence of the oral hygiene.^{1,2,20} However, the results failed to show any statistically significant difference in the prevalence of periodontal disease with regards to the use of dental floss. This finding may be due to fact that majority of the participants (85%) never used dental floss. Therefore, it can be suggested that worsening of the periodontal status in renal failure patients is mainly due to the negligence of the oral hygiene rather than of chronic uraemia in the ESRD population.

Since there is increasing evidence that periodontitis may be an overlooked source of inflammation in ESRD patients,^{17,21,22} it is very important that efforts should be made to motivate the renal patients to improve their oral hygiene practices to reduce the incidence of periodontal diseases among this population.

Data from the present study showed that patients who brushed their teeth more than once a day and used mouth wash had a significantly less prevalence of periodontal disease as compared to those who brush their teeth only once a day and never used mouth wash (Table 2). Therefore, it can be recommended that the patients with ESRD must be educated on regular basis about the importance of maintaining the oral health because it could directly affect the long term survival of such patients.

Results also indicated that there is a highly significant difference in the expression of periodontal disease among patients who visited their dentist at least once a year compared to those who visited their dentist infrequently (Table 2). Therefore, dental check-up must be an integral part of the medical evaluation of the ESRD patients and they should be referred to the dentist for dental check-up preferably every six months.

Several studies have shown that periodontal therapy resulted in a decrease in serum CRP and other inflammatory markers in healthy individuals with periodontal disease.^{23,24} Therefore, dentist could play a key role in maintaining the CRP levels of ESRD patients within acceptable limits by providing them with periodontal therapy, thus improving their quality of life because increased levels of CRP predict all-cause and cardiovascular mortality in these patients.

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