



Prevalence of Periodontal Disease in Patients Undergoing peritoneal dialysis: A Cross Sectional Study

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ABSTRACT

Chronic renal failure patients undergoing peritoneal are susceptible to periodontal diseases due to several complicating factors and the systemic condition of the patient. A cross sectional study was conducted to assess the periodontal disease prevalence among 30 patients undergoing peritoneal dialysis. Comparison was made with an age and sex matched control subjects from the hospital based population. Thirty peritoneal dialysis patients (15 males, 15 females) with the mean age of 42.6 ± 10.4 years comprised the study group. Periodontal parameters such as plaque index (PI), bleeding on probing (BOP), Probing pocket depth and clinical attachment level (CAL) were measured in these patients and an age and sex matched 30 control subjects. The data were collected and analysed. The PI, BOP, PPD and CAL were significantly higher in patients undergoing haemodialysis compared to control subjects. The mean duration of dialysis was 5.50 ± 3.02 (2 to 10. years) From the observation of the study it can be concluded that patients undergoing peritoneal dialysis are more prone to periodontal diseases. Further studies with larger population and comparison with the duration of dialysis may further substantiate the current findings.

Keywords: peritoneal, Periodontal disease, Oral hygiene, clinical attachment level, bleeding on probing, Plaque index.

INTRODUCTION

The kidneys play an essential role in the maintenance of haemostasis by their capacity to remove metabolic waste products, electrolytes and water from the body. Chronic renal failure (CRF) is the result of progressive and chronic deterioration of nephrons, which makes it necessary to employ extra-renal blood-filtering techniques, mainly, haemodialysis (Stenvinkel and Alvestrand 2002). The pivotal role of the kidneys in human metabolic homeostasis is exemplified by the fact that renal failure has been shown to result in anaemia,

hypertension, neuropathy, thyroid dysfunction and reduced libido (Stenvinkel 2000, Szczech et al. 2003).

Although renal replacement therapies have proven to be successful in prolonging the life expectancy of chronic renal failure patients, several limitations and long-term complications exist (Mallick and Gokal 1999). Since the majority of dialysis patients has no residual urine output, they have to maintain a fluid restricted diet to prevent fluid overload and are thus allowed to consume only approximately 500 mL per day. If patients do not adhere to the restriction in

fluid intake, fluid overload may occur, which can result in hypertension, acute pulmonary edema, congestive heart failure and consequently death (Szczec et al. 2003).

Oral manifestations that have been reported include mucosal lesions, oral infections, dental anomalies and bone lesions due to secondary hyperparathyroidism, gingivitis, mucosal pallor and lesions, an altered microbiological environment, tooth mobility, malocclusion and an increased risk for dental erosion (Ross 3rd and Salisbury 3rd 1993, Klassen and Krasko 2002, Proctor et al. 2005). Maintaining oral health at a high level is in any case very important for those HD patients waiting for a renal transplant since oral pathologies or infections could jeopardize the success of the transplantation (Sowell 1982). Conflicting data have been reported in literature on the effect of chronic dialysis therapy on oral health status (Ferguson and Whyman 1998, Gavalda et al. 1999).

Periodontal diseases are a group of inflammatory diseases that affect the supporting tissues of the dentition in individuals. Severe periodontal conditions have been observed in haemodialysis patients; however no significant relations have been noted with the increased dialysis durations (Al-Wahadni and Al-Omari 2003). Periodontitis is an immunoinflammatory disease that destroys the supporting tissues of the teeth, induces local inflammation, and is associated with a systemic inflammatory response (Ide et al. 2003, D'Aiuto et al. 2004, Kshirsagar et al. 2007). Studies have shown an association between high levels of C-reactive protein and interleukin-6 in periodontitis (Craig et al. 2007, Marcaccini et al. 2009). Hence an association with the systemic inflammatory response, CP has recently been included as a non-traditional risk factor for CKD (Fisher and Taylor 2009). An increased prevalence and/or severity of periodontitis have been reported in patients undergoing haemodialysis (Naugle et al. 1998, Gavalda et al. 1999, Al-Wahadni and Al-Omari 2003). The predisposing and aggravating factors for periodontal disease such as hyposalivation and xerostomia, impaired immunity and wound healing, alveolar bone destruction due to renal

osteodystrophy, malnutrition are widespread in chronic renal failure (Charra and Chazot 2002, Chuang et al. 2005). A cross-sectional study is conducted to evaluate the prevalence and severity of periodontitis among patients undergoing dialysis. The observations were compared with a control group.

MATERIALS AND METHODS

A cross-sectional study was conducted in 30 patients undergoing dialysis. The study was approved by the institutional review board in college of Medicine and by College of Dentistry Review Committee. This study was conducted on two groups: patients with chronic renal failure receiving peritoneal dialysis (PD) and healthy control subjects (C). The PD group consisted of 30 patients currently receiving peritoneal dialysis therapy at King Khalid University hospital, Riyadh. Thirty age-matched control subjects were included from the hospital population. The distribution of subjects in the study and control is shown in Table 1.

The participants' age, gender, dialysis duration, consumed drugs (drug name, daily dosage and time for consumption) as well as the existing systemic disease were recorded. The patients with systemic diseases affecting periodontium status such as diabetes mellitus other than dialysis were excluded from the study. All the subjects in the PD group have been treated with hemodialysis for at least 6 months.

CLINICAL PERIODONTAL EXAMINATION

The medical history of each patient was recorded using a written questionnaire and an interview lasting 20 to 30 min. For each patient, complete examination and recording of the intraoral clinical parameters was performed. One clinical examiner performed all the clinical measurements. Calibration exercises for probing measurements were performed in five patients before the actual study. Intra-examiner agreement was good, with a kappa value of 0.82. Periodontal probing depth (PPD), clinical attachment level (CAL), plaque index (PI), and bleeding on probing (BOP) were measured using the Williams periodontal probe at the mesio-buccal,

mid-buccal, disto-buccal, mesio-lingual, mid-lingual and disto-lingual surfaces of each tooth.

The plaque score percentage was calculated after applying a disclosing agent (Displaque®, Pace-maker Corporation, Oregon, USA) by the method of O’Leary et al. After rinsing the oral cavity the mesial, distal, buccal and lingual surface were examined for the staining. When there is presence of plaque it is marked. Those surfaces which not do not have soft accumulations at the dentogingival junction, are not recorded. After all teeth are examined and scored, the index is calculated by dividing the number of plaque containing surfaces by the total number of available surfaces.

DATA ANALYSIS

Statistical analysis of the data was performed using GraphPadInStat® software (GraphPad Software, San Diego California USA, www.graphpad.com). Mean and standard deviation scores were calculated for age, plaque index (PI), bleeding on probing (BOP), periodontal probing depth (PPD) and clinical attachment level (CAL). Comparisons were made between the groups using g groups using the ‘paired’ test.

RESULTS

The demographic status of the healthy and dialysis patients are given in Table 1. The mean age of the dialysis patients were 42.63±10.49 and control subjects 41.60±9.34. No statistically difference was observed in the age of the patients. The duration of dialysis varied from 2 to 10 years with a mean of 5.50±3.02 yrs. The mean and S.D of Plaque index, Bleeding on probing percentage, probing pocket depth and Clinical attachment level loss id shown in Table 2 and figure 1-4. All periodontal parameters were significantly higher in patients undergoing dialysis compared to the age matched control subjects. The mean clinical attachment level was found to be significantly higher among the dialysis patients (2.54 ±0.74) compared to control subjects (1.97 ± 0.480. The plaque and bleeding on probing also showed a similar pattern in patients undergoing haemodialysis.

Table 1. Demographic characteristics of the study population

	peritoneal dialysisPts (Mean ± SD)	Control (Mean ± SD)
Number of Subjects	30	30
Age (in yrs)	42.63±10.49	41.60±9.34
Duration of Dialysis (yrs)	5.50±3.02	N/A

Table 2: Periodontal parameters in peritoneal dialysis patients and controls

Parameters (n=30)	Haemodialysis Pts (Mean ± SD)	Control (Mean ± SD)	P Value
PI %	81.87±18.01	34.07±19.79	< 0.0001
BOP %	65.13 ± 30.44	35.80 ±26.85	< 0.0001
PPD(mm)	5.27±0.84	3.59±0.75	< 0.0001
CAL(mm)	2.54 ±0.74	1.97 ± 0.48	< 0.0001

PI: Plaque index, BOP: Bleeding on Probing, PPD; Probing pocket depth, CAL; Clinical attachment level,

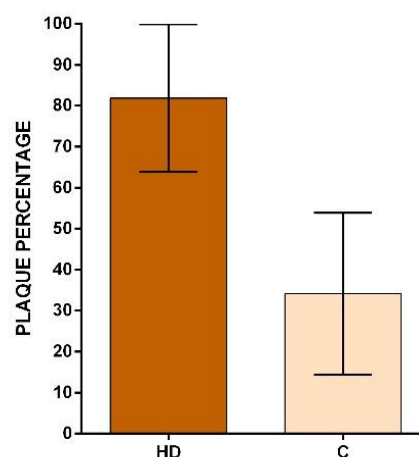


Figure 1. The plaque index (percentage) level in haemodialysis and control subjects

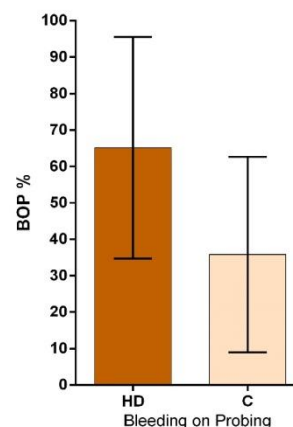


Figure 2. The Bleeding on Probing (percentage) level in haemodialysis and control subjects

DISCUSSION

Periodontal disease is a common, initially bacteria driven, chronic inflammatory condition leading to the formation of infected periodontal pockets, destruction of deep collagenous structures of the periodontium and alveolar bone, excessive mobility of the teeth and then their premature loss (Spahr et al. 2006). The susceptibility to periodontal disease depends on factors such as host response, pathogenic flora, age, gender, education, and the frequency of dental visits. Several studies have been published in the literature, providing evidence for an increased prevalence of periodontal disease in patients with renal disease, especially in dialysis patients and renal transplant recipients (Kardachi and Newcomb 1978, Gavalda et al. 1999, Bayraktar et al. 2007). End stage renal disease has been shown to affect not only general health of the patient but also oral and periodontal health. The observations from this study revealed that patients on PD had severe periodontal problems compared to controls. These problems may be related to a variety of factors, such as a relative state of immunosuppression, medications, renal osteodystrophy and bone loss, and restriction of oral fluid intake.

This increase in the plaque and calculus deposition in the Dialysis patients could be attributed to poor oral hygiene maintenance (Epstein et al. 1980). This may be related to their negligence as well as the compliance during dental treatment (Galili et al. 1983). In the periodontally compromised patients, inflammatory cytokines are secreted in response to lipopolysaccharides of periodontitis pathogens causing renal disorders or making the disease more severe, so that, there are some suggested periodontal assessments to determine the risk of renal diseases (Fisher and Taylor 2009).

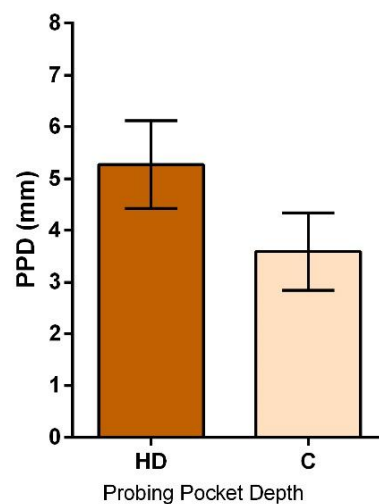


Figure 3. The Probing pocket depth (PPD) level in haemodialysis and control subjects

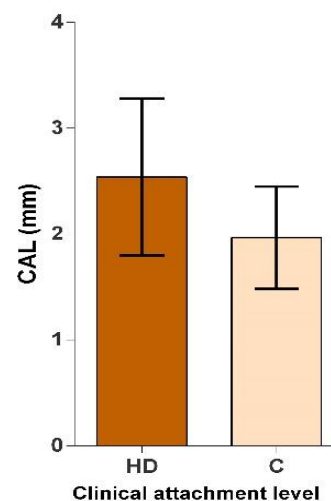


Figure 4. The Clinical attachment level (CAL) in haemodialysis and control subjects

There is No significant differences were found in age or gender distribution among peritoneal dialysis and Haemodialysis except control groups. in Plaque Index and saliva flow, the control group shows normal readings. Peritoneal dialysis and haemodialysis shows significant drop in the readings (Bayraktar G 2009)

Systemic and salivary changes due to chronic renal failure, the use of multiple medication, vomiting and reduced oral self-care could all potentially affect oral health in these patients (Epstein et al. 1980). The uremic state in the dialysis patients may suppress inflammatory reactions in the tissues, which would result in infrequent detection of gingival inflammation (Kerr 2001). In contrast, the

other investigations found that uremia would not retarded gingival inflammation in dialysis patients (Kitsou et al. 2000). In the present study we found that the gingival inflammation and subsequent destruction of periodontal tissues were more compared to the control subjects. Although patients receiving haemodialysis have a certain degree of immunosuppression they still can achieve a similar response to existing bacterial plaque with their systemically healthy counterparts to periodontal pathogens

The limitations of the present study include its performance in a single centre and a relatively small, but comparable with most of the previous reports (Naugle et al. 1998, Bots et al. 2006).

CONCLUSIONS

Based on the observations of this cross sectional study it can be concluded that chronic renal failure seem to be additional risk factor for severe periodontal destruction. This reiterates the need to carry out dental treatment to be performed ahead of the dialysis to control and prevent further infection which could eventually complicate the systemic condition and vice versa.

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