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Periodontal status of patient's underwent hemodialysis therapy

Abstract

Background: Chronic renal failure patients undergoing hemodialysis are susceptible to periodontal diseases due to systemic complications of the disease and using different drugs. The present study investigated the periodontal status of patient's who underwent hemodialysis, in Babol, northern Iran.

Methods: One-hundred-fifteen hemodialysis patients (63 males, 52 females) with the mean age of 47.9 ± 15.3 years were studied at Shahid Beheshti Hospital in Babol, Iran. Periodontal parameters including plaque index (PI), gingival index (GI), clinical attachment level (CAL) and probing pocket depth (PPD) were measured in these patients. The data were collected and analyzed.

Results: The PI, GI, CAL and PPD were 2.37 ± 0.55 , 2.36 ± 0.63 , 3.98 ± 1.61 and 4.41 ± 1.4 , respectively. Significant positive correlations were found between the participants' age and PI ($p < 0.024$) and $p < 0.001$, respectively. Also, CAL was significantly higher in males than females (4.39 ± 1.57 vs. 3.53 ± 1.56 , $p < 0.02$).

Conclusion: The results show that longer duration of hemodialysis is associated with severe periodontal diseases, especially in males.

Keywords: Haemodialysis, Periodontal disease, Oral hygiene

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Chronic renal failure is the severe and irreversible destruction of nephrons in patients, which causes them to lose nephrons' functional capacity. It is a clinical situation in which internal renal functions stop and the patients require alternative treatments like renal transplantation or hemodialysis up to his/her death (1). The most frequent etiology of chronic renal failure includes diabetes mellitus, hypertension, glomerulonephritis, polycystic kidney disease and pyelonephritis (2). Previously, glomerulonephritis was known to be the main cause of chronic renal failure, however, diabetes mellitus and hypertension are the etiologic factors of the disease today which are considered to have genetic origin mostly (1, 2). Hemodialysis is the most accepted treatment modality in this stage of the disease (3).

In addition, periodontal diseases are a group of inflammatory diseases that affect the supporting tissues of the dentition in individuals. As reported before, 58.9% of renal failure individuals demonstrate moderate to severe periodontitis (4). Furthermore, periodontitis is significantly associated with malnutrition and inflammation status, both of them considered as a predicting factor for morbidity and mortality in those receiving long-term hemodialysis treatment (4-6). Periodontal diseases were suggested as the risk factors for the development of chronic renal disease, too (7). Some investigations demonstrated an association between periodontal diseases and dialysis treatments, however; this relationship has not been found in other studies (8-10). Recently, severe periodontal conditions have been observed in hemodialysis patients; however no significant relations have been noted with the increased dialysis durations (11).

Periodontal diseases are possibly associated with renal failure. In the periodontally compromised patients, inflammatory cytokines are secreted in response to lypopolysaccharides 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 (12).

The present study was performed to investigate the duration of hemodialysis on the periodontal status of patients in Babol, northern of Iran.

Methods

In this cross-sectional study, hemodialysis patients referring to Hemodialysis Center of Shahid Beheshti Hospital (Babol, Iran) were enrolled to investigate their periodontal status. The patients underwent dialysis treatment with the diagnosis of end stage renal disease. The participants' age, gender, dialysis duration, consumed drugs (drug name, daily dosage and time for consumption) as well as the existing systemic disease (disease type and involvement duration) were recorded.

The patients with systemic diseases affecting periodontium status such as diabetes mellitus other than dialysis were excluded from the study. All the studied patients have been treated with hemodialysis for at least 3 months. The exclusion criteria were malignancy, edentulousness, clinically evident infectious diseases, hospitalization, or surgery within the preceding 3 months. Twenty one edentulous patients were excluded from the study.

The study was approved by the Medical Ethics Committee of Babol University of Medical Sciences and informed consent was obtained by all the patients. Four parameters were noted to indicate the oral health status of each patient, including Silness-Loe plaque index (PI), Loe and Silness gingival index (GI), probing pocket depth (PPD, mm) and clinical attachment level (CAL, mm). All hemodialysis participants underwent dental examinations relying on 6 Ramfjord index teeth.

In the case of missing teeth, the adjacent teeth and in the case of missing adjacent teeth, the opposite teeth were examined. If the patient lacked 1 of the 6 Ramfjord teeth, the average score of the other teeth was recorded. Periodontal parameters were scored by means of Williams' probe. The patients were classified in 3 groups regarding dialysis

duration (2 years and less, 3-5 years, and more than 5 years). The differences of periodontal indices regarding the time of dialysis were statistically analyzed using Kruskal-Wallis test and compared by Mann-Whitney U test in terms of gender. Furthermore, the correlation between periodontal scores and age were investigated by Spearman ratio. $P < 0.05$ was considered significant.

Results

In total, 115 hemodialysis patients [63 males (54.8%) and 52 females (45.2%)] were studied. The mean age of the patients was 47.9 ± 15.3 years (ranged 21-88 years). In 45 (39.1%) subjects, no attachment loss was observed. The mean PI, GI, CAL and PPD in the studied patients were 2.37 ± 0.55 , 2.36 ± 0.63 , 3.98 ± 1.61 and 4.41 ± 1.4 , respectively. The mean PI, PPD and GI was found to be similar in males and females, however, significantly higher CAL was noted in males than females (4.39 ± 1.57 vs. 3.53 ± 1.56) (table 1).

Table 1. Mean and standard deviation of periodontal parameters regarding gender

Parameters	Female (n=52) Mean±SD	Male (n=63) Mean±SD	Pvalue
PI	2.4 ± 0.57	2.34 ± 0.54	0.46
PPD(mm)	4.39 ± 1.23	4.41 ± 1.53	0.89
CAL(mm)	3.53 ± 1.56	4.39 ± 1.57	0.02
GI	2.37 ± 0.62	2.35 ± 0.65	0.82

PI; Plaque index, PPD; Probing pocket depth, CAL; Clinical attachment level, GI; Gingival index

Significant differences were found among the groups of dialysis durations suggesting increased values of PI, PPD, CAL and GI with the increased treatment times (table 2). Furthermore, significant differences were noted among the paired groups of hemodialysis durations except to PI which was similarly reported between two groups of "3-5 years" and "more than 5 years" treatment duration ($p=0.42$).

The significant positive correlations were noted between the participants' age and PI ($r=0.21$, $p<0.024$) and PPD ($r=0.298$, $p<0.001$), however the correlations between age and CAL ($r=0.17$, $p=0.16$) or also the age and GI ($r=0.11$, $p=0.24$) did not reach the significant level.

Table 2. Mean and standard deviation of periodontal parameters regarding haemodialysis duration

Parameters	≤2 years (n=26) Mean±SD	3-5 years (n=57) Mean±SD	≥5 years (n=32) Mean±SD	Pvalue
PI	1.93±0.59	2.46±0.49	2.57±0.38	0.001
PPD(mm)	3.68±1.69	4.45±1.18	4.92±1.29	0.01
CAL(mm)	2.65±1.54	3.83±1.11	4.91±1.77	0.001
GI	1.62±0.72	2.68±0.32	2.38±0.46	0.001

PI; Plaque index, PPD; Probing pocket depth,
CAL; Clinical attachment level, GI; Gingival index

Discussion

The present study assessed the periodontal status of the hemodialysis patients due to lack of adequate knowledge in this issue. According to this study, the patients showed high periodontal indices including PI, GI, CAL and PPD which all significantly increased with the longer dialysis duration. Derby et al. showed similar results to the present study (13). Tollefsen concluded that all of the participants had over 50% plaque index (14). Davidovich et al. demonstrated that the duration of dialysis uremic stomatitis had a direct positive correlation with the periodontal indices which is in accordance with the result of this study (15). However, Torkzaban et al. did not find any relationship between dialysis duration and periodontal indices, which probably is due to the shorter average duration of dialysis (1.3 years) (16). Some studies suggested that the uremic state in the hemodialysis patients may suppress inflammatory reactions in the tissues, which would result in infrequent detection of gingival inflammation (17). In contrast, the other investigations found that uremia would not retarded gingival inflammation in hemodialysis patients (18).

Al Wahadni and Al Omari indicated that individuals on hemodialysis treatment might ignore oral hygiene behaviors or other health-related potential problems due to spending long time in the dialysis center (11). Likewise, Galili et al. stated that the patients on hemodialysis therapy would be depressed due to their severe systemic condition and thus, would show inadequate compliance during dental treatments

and neglect oral health care (19). Consequently, it could be concluded that the finding of gingival inflammation in this study and studies with similar findings might be due to insufficient oral hygiene.

In this study, PI and PPD increased significantly with age, but the increase found in GI and CAL was not significant. Tollefsen et al. and Oshrain et al. reported similar results in their studies (10, 14). Insignificant change of GI may be due to suppression of immune system. According to Tollefsen et al. in laboratory conditions, blood lymphocytes of elderly patients react less effectively to dental plaque solution (14). Also, Nemain et al. showed that immunosuppressive treatments suppressed plaque induced inflammations (20). These findings could be the answer of insignificant change of GI.

In the present study, since the periodontal status was assessed once, but not over time, the association between periodontal status and other factors related to dialysis could not be clarified. Future studies with series of periodontal examinations and/or therapeutic interventions would provide more solid evidence to clarify the limitations of the present study. One of the main problems in the hemodialysis patients is the side effect of the renal drugs on their periodontal health status.

However, the present investigation aimed to assess the current periodontal health status and its correlation with hemodialysis duration. In this regard, further studies should be done to categorize the dialysis patients regarding their medication in their treatment protocol and to analyze the effects of medications on periodontal health status.

According to the present study, the hemodialysis patients showed high level of periodontal parameters, while this condition becomes more severe with the dialysis duration. Therefore, the patients should be kept under regular oral hygiene follow up to receive the appropriate treatments. In summary, the results show that longer duration of hemodialysis is associated with severe periodontal diseases.

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