Original Article

ASSESSMENT OF PERIODONTAL HEALTH STATUS OF CHRONIC KIDNEY DISEASE PATIENTS UNDERGOING HEMODIALYSIS; A CROSS SECTIONAL DESCRIPTIVE STUDY

Arsalan Wahid[*], Saima Chaudhry[**], Muhammad Arshad Badar[***], Ayyaz Ali Khan[****], Ayesha Wahid[*****]

[*]Senior Registrar& HOD, Oral Medicine, UMDC, Faisalabad, Pakistan.
[**]Assistant Professor, College of Dentistry, University of Lahore.
[***]Associate Professor & HOD, Oral & Maxillofacial Surgery, UMDC, Faisalabad, Pakistan.
[****]Professor & HOD, Oral Health Sciences, Shaikh Zayed Medical Complex, Lahore.
[*****]Demonstrator, University Medical & Dental College, Faisalabad, Pakistan.

ABSTRACT:

OBJECTIVE:

To assess the periodontal health status of Chronic Kidney Disease patients on maintenance hemodialysis therapy

STUDY DESIGN:

Cross Sectional Descriptive Study

STUDY SETTINGS:

National Institute of Kidney Diseases (NIKD), Shaikh Zayed Medical Complex, Lahore

MATERIALS & METHODS:

One sixty (160) patients undergoing maintenance hemodialysis therapy were enrolled for the study on the basis of inclusion/exclusion criteria. Their demographic, medical and periodontal parameters were assessed using UNC-12 periodontal probe and findings were recorded on a structured Performa.

RESULTS:

The mean age of patients was 41.37 ± 12.47 and the male female ratio was 10/6. Majority of the patients (72.5%) were having education metric or below, 69% patients were not able to work due to their disease status. 79% patients were hypertensive and 59% patients were not getting dialysis according to international nephrology guidelines (thrice a week). Regarding periodontal status, three parameters BOP (60.5 ± 21.9) PPD (2.0 ± 0.41) and CAL (2.4 ± 0.9) were assessed which are reliable indicators of periodontal health. PPD and CAL were also categorized in 4mm and 3mm categories. PPD sites ≥ 4mm (3.1 ±5.6) and CAL Sites ≥ 3mm (22.6 ± 11.8). Statistical analysis revealed significant association between hemoglobin, creatinine, albumin and periodontal parameters (PPD, CAL, BOP)

CONCLUSION:

Periodontal health of CKD patients on maintenance dialysis therapy was poor and it might be a factor in the poor prognosis of their kidney disease due to increased systemic inflammatory burden of periodontal diseases. Oral health awareness campaign must be an integral part of hemodialysis therapy to get a better prognosis.

KEY WORDS: Periodontal Health, Hemodialysis Therapy, Systemic Inflammation,

Corresponding Author:
Dr. Arsalan Wahid Malik (Head, Department of Oral Medicine/Oral Diagnosis) University Medical & Dental College, Faisalabad.
Email: dr.arsalanmalik@gmail.com
Phone: +92-321-6685228

INTRODUCTION:

Periodontitis is a chronic periodontal disease characterized by the inflammation of gums, ligaments, and bone, usually caused by Gram-negative bacteria living in biofilm. [1]Bacterial pathogens cause destruction of supporting periodontal tissues leading to the formation of a space by recession of the supporting bone. This space becomes a site for interaction between bacteria and host. [2]Destruction of periodontal tissues by detachment of surrounding tissues of the teeth and entry of pathogens and their products into the systemic circulation leads to the increased systemic inflammation. [3]It contributes to the worsening of systemic diseases due to increased inflammatory burden. Diabetes Mellitus (DM), Cardiovascular Diseases (CVD) and Chronic Kidney Disease (CKD) are examples of diseases affected by systemic inflammation.[4, 5] However psychological factors also play an important role in the progress of periodontal disease as well as systemic diseases. Neglect of oral hygiene, hormonal imbalance and decreased immunity leads to increased periodontal inflammation. [6]Patients having CKD are treated by hemodialysis to keep the balance between various electrolytes. Previous studies had reported that patients having severe periodontal inflammation had comparatively poor prognosis for CKD. This is because of the fact that in periodontal disease and CKD, inflammatory markers are raised. [7]Researchers reported that periodontal problems in CKD patients could be an important source of systemic inflammation, so if periodontal problems are treated at early stage the potential source of infection can be prevented. [8]Some clinical trials performed in this regard reported decreased levels of serum inflammatory markers (ESR and c-reactive proteins) after periodontal therapy, because of decrease in systemic inflammation.[9,10,7] A researcher reported significant reduction in risk of CVD in cardiac patients after periodontal therapy. [11]Several studies from literature showed increased periodontal inflammation in patients undergoing hemodialysis. [12]The relationship between periodontal inflammation and CKD is not in single direction. CKD also affects the periodontal status of patients because of increased systemic inflammatory burden. [4, 13] Researchers have observed that the amount of dental plaque was found to be high in hemodialysis patients as compared to healthy people.[14] It may be due to the compromised medical condition of kidney disease patients which leads to neglected oral care. [15]The aim of this study was to assess the periodontal health parameters in CKD patients on maintenance hemodialysis therapy and to observe the association between periodontal and biochemical parameters.

MATERIALS & METHODS:

Study Subjects

This is a cross sectional descriptive study conducted over a period of 4 months (10th April 2012 to 10thJuly 2012) in National Institute of Kidney Diseases (NIKD), Shaikh Zayed Medical Complex Lahore; a tertiary care hemodialysis facility. Inclusion criteria of the study were CKD patients who were on maintenance hemodialysis therapy for not less than 3 months and were able to give informed consent. The minimum requirement of teeth present in oral cavity was 14 teeth (excluding third molars). Subjects of both genders and all ages were included. Patients who had undergone periodontal therapy in the past one year were excluded from the study. Ethical Review Committee approved the study and informed consent was obtained from all the patients participated in the study.

Study population and study protocol:

Two hundred and fifteen patients were enrolled for dialysis in NIKD at the beginning of the study. After screening for inclusion/exclusion criteria of the current study, one hundred & sixty (n=160) patients fulfilling the general, medical and periodontal parameters were offered to be the part of study. These patients were examined for periodontal health parameters (BOP, PPD, CAL) and their medical record (Urea, Hemoglobin, Creatinine, Albumin) was obtained from hospital files.

Clinical examination and charting:

UNC-12 probe (HDL® Pakistan) was used to assess the periodontal health parameters of patients (Bleeding on Probing, Pocket Probing Depth and Clinical Attachment Level). Clinical examination of patients was done by the principal investigator under appropriate light and recorded on a structured chart. Some biochemical parameters (Urea, Hemoglobin, Creatinine and Albumin) were recorded from medical files of patients. These investigations are done on routine bases in central laboratory for all the patients on maintenance hemodialysis therapy.

Statistical Analysis:

Descriptive statistics were calculated for all categorical variables. Age of the patients was presented in mean and standard deviation whereas gender, employment status, income, smoking status and medical parameters were presented in frequencies and percentages. Oral health parameters (teeth cleaning, mode of teeth cleaning, frequency of teeth cleaning, number of teeth and reason of teeth loss) as well as periodontal parameters (BOP, PPD and CAL) were presented in mean and SD. Chi square test was applied between oral & periodontal parameters and medical parameters. Data was entered and analyzed in statistical program SPSS version 20.0.

Tables

Table 1. Demographic Characteristics of Study Participants {Mean (SD)/ n (%)}	
Age (years)	41.37 ± 12.47
Gender -Male -Female	 100(62.5) 60(37.5)
Education -Up to Metric -Intermediate up to Bachelors -Masters and Above	 116(72.5) 40(25) 4(2.5)
Smoking -No -Yes	 152(95) 8(5)
Income (rupees per month) -Up to 20,000 -20,000 - 40,000 -Above 40,000	 50(31.5) 88(55) 22(14)
Employment Status -Working -Not Working	 50(31) 110(69)
Table2. Medical Parameters	
Dialysis Frequency (per week) -Once -Twice -Thrice	 2(1.3) 92(57.5) 66(41.3)
Hypertension (>140/90) -No -Yes	 34(21) 126(79)
Serum Albumin Levels (g/dL)	4.1 ± 1.9
Hemoglobin	10.59 ± 1.95
Urea (mg/dL)	45.37 ± 13.27
Creatinine (mg/dL)	10.31 ± 2.81
Table 3: Oral & Periodontal Health Parameters	
Oral Health Parameters	
Teeth Cleaning **-**Yes -No	 156(97.5) 4(2.5)
Mode of teeth cleaning -Tooth brush -Miswak -Tooth powder	 128(80) 24(15) 8(5)
Frequency of teeth cleaning **-**Once -Twice -Occasionally	 128(80) 32(20) 0(0)
Number of Total Teeth Present	23.4 ± 4.22
Reason of teeth loss -Caries -Perio -Others	 78(48.8) 62(38.8) 20(12.5)
Periodontal Clinical Parameters	
Bleeding on Probing (BOP) (%)	60.5 ± 21.9
Pocket Probing Depth (PPD) (mm)	2.0 ± 0.41
Clinical Attachment Loss (CAL) (mm)	2.4 ± 0.9
PPD Sites ≥4mm	3.1 ± 5.6
CAL Sites ≥3mm	22.6 ± 11.8

Table 4: Association between Variables

Variables	P Value
Teeth Cleaning * BOP	0.003
Teeth Cleaning * PPD	0.029
Creatinine * CAL	0.043
Creatinine * BOP	0.047
Dialysis Frequency * Hemoglobin	0.002
Dialysis Frequency * Albumin	0.011
Hemoglobin * BOP	0.017

RESULTS:

Study parameters:

The mean age of patients was 41.37 ± 12.47 and the male female ratio was 10/6. Majority of the patients (72.5%) were having level of education metric or below, 69% patients were not able to work regularly due to their disease status. (Table 1) 79% patients were hypertensive and 59% patients were not getting dialysis according to the international nephrology guidelines (thrice a week). (Table 2) Regarding periodontal status, three parameters BOP (60.5 ± 21.9) PPD (2.0 ± 0.41) and CAL (2.4 ± 0.9) were assessed which are reliable indicators of periodontal health. PPD and CAL were also categorized in 4mm and 3mm categories. PPD sites ≥ 4mm (3.1 ±5.6) and CAL Sites ≥ 3mm (22.6 ± 11.8). (Table 3)

Chi Square test revealed a significant relationship between oral health parameters and periodontal parameters.(Table 4) Teeth cleaning was found to be significantly associated with BOP (***p***=0.003) and PPD (***p***=0.029). Regarding biochemical parameters, serum creatinine levels were significantly associated with BOP (***p***=0.047) and CAL (***p***=0.043), hemoglobin levels were associated with CAL (***p***=0.017). Dialysis frequency was associated with serum hemoglobin levels (***p***=0.002) and serum albumin levels (***p***=0.011). No other significant relation was observed in biochemical, medical or periodontal parameters.

DISCUSSION:

Total 160 patients were inducted in this study, and the mean age of patients was41.37 ± 12.47 and the male female ratio was 10/6. It is in accordance with the studies performed on this topic internationally [16-19] however some researchers inducted a small sample size (n=42)[20] or comparatively large sample size of dialysis patients (n=253).[21]

Periodontal health is a matter of concern in ESRD patients as they remain in immunocompromised state for a long time. It invites many opportunistic infections which remained dormant in normal health.[22] Neglect of oral hygiene due to compromised medical status of patient is an additional factor in poor periodontal health of those patients. [23] According to the studies performed in various countries, plaque index was higher in patients of maintenance dialysis therapy as compared to healthy controls. [14, 24] It may be due to the fact that usually those patients remain in low mood[25] and do not brush their teeth regularly. [26]

Regarding periodontal health of patients on maintenance dialysis therapy, various researchers reported different findings due to the difference in assessment parameters. Some studies were in agreement with our findings and some were not. In this study we used BOP, PPD and CAL to assess the periodontal conditions of patients. These are the reliable parameters of periodontal health status and are commonly used in studies these days. [27,11,28,29] A researcher observed increased levels of PPD and CAL in ESRD patients of Jordan who were on maintenance dialysis therapy. In age group of 10-15 years, PPD was 2.99 ± 1.29 in subjects as compared to 1.94 ± 1.00 in healthy controls and in age group of 16-28 years; it was 3.04 ± 0.96 in subjects as compared to 1.87 ± 0.70 in healthy controls. [30]A study from Brazil reported increased levels of CAL and PPD in maintenance dialysis patients, however they reported equal improvement in periodontal condition of both groups in response to non surgical periodontal therapy. [31]Some studies found no significant relationship between CKD and periodontal status. [14, 32, 33] In Pakistan, a

study recommended to give prime importance to oral health care as oral health becomes worse with hemodialysis which contributes to systemic inflammation. [34]

In this study, a significant relationship was observed between frequency of teeth cleaning and BOP percentage. (Table 4) It is in agreement with the studies performed in past showing significant association between daily routine of teeth cleaning and gingival bleeding. Researchers observed decreased gingival bleeding with interproximal brushing.[35,36] This study also reported significant association between serum creatinine levels, serum albumin levels and periodontal parameters (BOP, CAL). Previous studies reported an inverse relationship between biochemical parameters (serum creatinine levels, serum albumin levels) and periodontal parameters (BOP, CAL).[37-39]It is in accordance with the findings of current study. Researchers observed that mean CAL and CRP were greater in a group with low albumin levels as compared to control group. [37] In another study, researchers reported inverse relationship between serum creatinine levels and CAL and PPD. Decrease in CAL and PPD increases serum levels of creatinine. [39]A clinical trial on 65 patients showed significant contribution of periodontal disease in systemic inflammatory burden. It also reported decreased level of inflammatory markers after periodontal therapy. [40]A meta-analysis showed a strong association between serum markers and periodontal disease. [41]They also observed reduction in CRP levels after periodontal therapy. A study reported significant association between hemoglobin and glycemic control and periodontal disease however they did not find the effect of doxycycline therapy. [42]However a researcher from Brazil reported no significant association between biochemical markers of kidney and periodontal disease. [43]. In a study from Turkey, authors reported no significant difference in periodontal status of CKD patients and healthy controls. According to their study, CKD is not an additional risk factor for periodontal disease. However they observed certain degree of immunosuppression in hemodialysis patients. [32]

CONCLUSION:

This study showed that periodontal health of the patients on maintenance dialysis therapy was not satisfactory. 80 % patients reported that they clean their teeth once daily that is not sufficient to maintain proper oral hygiene. It may be due to the fact that 72.5 % patients were below metric level so they have low level of awareness for their oral hygiene. In addition to this, only 41.3 % patients were getting dialysis thrice a week which is recommended in international guidelines. This may also be a reason for their poor prognosis. BOP and PPD were associated with frequency of teeth cleaning. Biochemical parameters (albumin and creatinine) were found to be significantly associated with periodontal health parameters.

RECOMMENDATIONS:

Oral health awareness program must be included in the maintenance hemodialysis therapy. This will improve their oral hygiene and will lead to better prognosis by decreasing systemic inflammation.

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