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Prevalence of Periodontitis in Chronickidney disease: A Prospective Study

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Abstract

Introduction: Oral health of chronic kidney disease patients is often poor and it becomes more prevalent as uraemia progresses. The aim of this study Is to observe the prevalence of periodontal conditions in chronic kidney disease patients and to determine the relationship of severity of periodontitis with the different stages of chronic kidney disease.

Material and Method: It is a prospective study conducted at SRN Hospital, MLN Medical College Prayagraj. We evaluated the periodontal status of 50 chronic kidney disease patients by using CDC- AAP classification.

Result: Out of 50 Chronic kidney disease patients, 80% patients presented with periodontitis changes which was considered as cases while 20% patients did not show any sign of periodontitis and was considered as control. . The percentage of chronic kidney disease stage 5 was higher in both the cases (80%) and the control(80%) group as well. In cases, the percentage of male was higher than females. Chronic kidney disease stage 5 is more associated with periodontitis. In cases, the percentage of mild periodontitis, moderate periodontitis, severe periodontitis with respect to chronic kidney disease stage 5 is 57.3%, 60%, 89.29% respectively that was found significant (p value=0.012).

Conclusion: Our study clearly states that the prevalence of periodontitis is 80% in chronic kidney disease patients especially among the higher stages of chronic kidney disease, therefore periodontitis is the important

preventable risk factors if not treated early may deteriorate the prognosis of chronic kidney disease patients.

Summary: Periodontal disease is a chronic inflammatory disease caused by interaction between pathogenic anaerobic bacteria in dental plaque biofilm and host immune-inflammatory reaction. The studies of periodontal status in adults with chronic kidney disease performed in the past 10 years are very limited especially on Indian population. Therefore the objective of this study is to find out the prevalence of periodontitis in chronic kidney disease patients. This prospective study comprised of patients visited to nephrology department from july 2021 to june 2022 at SRN Hospital Prayagraj. Laboratory assays of serum BUN, serum creatinine was measured and assessment of dental and periodontal status by two dentists who were blinded to chronic kidney disease status. Periodontitis were present in 40 out of 50 Patients with chronic kidney disease. This represents the prevalence of 80% .In our study severe chronic periodontitis was significantly more frequent among patients with grade 5 chronic kidney disease. Therefore the early detection and intervention of periodontal disease, would be an appropriate strategy to facilitate overall better quality of life for chronic kidney disease patients.

Keywords: Chronic Kidney Disease, Stages, Prevalence, Severity, Periodontitis.

Introduction

All through the history of mankind, it has been believed that oral disease and maladies which includes periodontal disease, might have an impact on the systemic condition of the body. As a consequence of it the idea of linking periodontitis and systemic diseases could be traced back to the beginning of recorded history and medicine[1]. Recent studies have shown that, periodontitis is associated with several diseases including coronary heart disease and stroke[2], respiratory systems[3], outcome of pregnancy[4], and kidney diseases[5]. There are clinical studies which have demonstrated a close association between chronic kidney disease and periodontal disease[6-13].The underlying pathogenesis might be due to the circulating periodontal bacteria which translocate and could damage, the renal endothelium[14]. Any alteration of endothelial function may lead to the reduction of renal blood flow, periodontal infection might consequently worsen kidney function. Due to the fact both CKD and chronic periodontitis are inflammatory in nature and the tissue damages occur in both are the result of major inflammatory components (e.g. prostaglandins and cytokines) activated by the host response[15-16]. These persistent inflammatory state play the predominant role in promoting endothelial dysfunction of the glomerulus, initially causing protein leakage in urine. The early manifestation of kidney endothelial cell dysfunction which is potentially reversible and may subsequently lead to impairment of kidney function noted by a decrease in the renal glomerular filtration rate (GFR)[17]. Moreover, the studies of periodontal status in adults with chronic kidney disease (CKD) performed in the past 10 years are very limited especially on Indian population. The aim of this study Is to observe the prevalence of periodontal conditions in chronic kidney disease patients and to determine the relationship of severity of periodontitis with the different stages of chronic kidney disease.

Material and method

Study Design: This prospective study comprised of patients visited to nephrology department from July

2021 to June 2022 at SRN Hospital Prayagraj. All adults (age>18 years), male and female patients, were recruited after informed consent. Previously diagnosed CKD patient was evaluated and recorded. Exclusion Criteria comprised of: individual who underwent periodontal therapy, Malignancy, HIV, Hepatitis Upper respiratory tract infections, pregnant and lactating women, other systemic infection like AKI and Pancreatitis.

Study Procedure

Medical history and clinical Examination was taken and recorded. CKD & its stages were evaluated by eGFR and USG abdomen. Laboratory assays of serum BUN, serum creatinine was measured and assessment of dental and periodontal status by two dentists who were blinded to CKD status. Periodontal measures were done on randomly assigned half-mouths, one upper quadrant and one lower quadrant selected at the beginning of the examination[19]. The buccal and mesial-buccal aspects of each tooth were scored separately for each periodontal measure: gingival bleeding, calculus, gingival recession, and pocket depth. Loss of attachment was derived from two measurements made at each site: (1) the distance from the free gingival margin to the cemento-enamel junction, and (2) the distance from the free gingival margin to the bottom of the sulcus (pocket depth). When the gingival margin had receded and the cemento-enamel junction was exposed, the first number was scored as a negative value and was an indication of gingival recession. The loss (level) of attachment variables was calculated by subtracting the recorded distance of the free gingivalmargin to cemento-enamel junction (1) from the recorded distance of the free gingival margin to the base of the sulcus (2). Periodontal disease was defined based on the Centers for Disease Control and Prevention (CDC) criteria.

Statistical analysis

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean and Standard deviations. Quantitative variables were compared using Mann Whitney U test/Unpaired T test as appropriate between two groups. Qualitative variables were compared using Chi –Square test and fischer exact test as appropriate. To measure the strength of Association between two scale parameters using spearman correlation coefficient as appropriate. A P value of <0.05 was considerely statistically significant. The data was entered in MS Excel spreadsheet and analysis was done using statistical package for Social Science version 23.0.

Result

Out of 50 CKD patients , 40 patients showed the changes of periodontitis were taken as cases, where as 10 patients had no findings suggestive of periodontitis were taken as controls. The distribution of CKD status based on their groups is depicted below in table 1 and fig 1.

Table 1 : Distribution of CKD stages based on their groups

CKD stages	Groups						χ^2 value (df)	p-value
	Cases		Controls		Total			
	N	%	N	%	N	%		
Stage 3	2	5.0%	2	20.0%	4	8.0%	3.75 (2)	0.153
Stage 4	6	15.0%	0	.0%	6	12.0%		
Stage 5	32	80.0%	8	80.0%	40	80.0%		

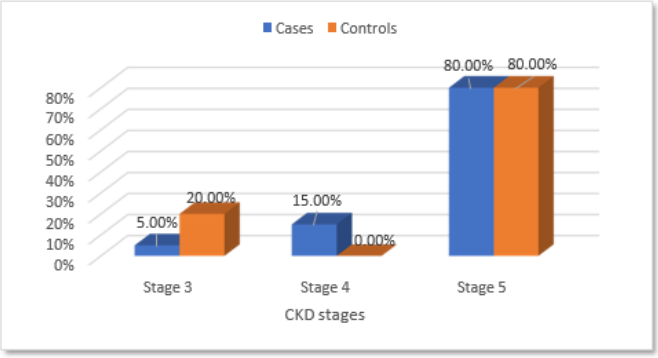

Fig 1: Bar graph showing frequency of Distribution of stages in group

Table 1 and Fig. 1 reveals that In Cases the percentage of Stage 5, Stage 4 and Stage 3 are 80.0%, 15.0% and 5.0% respectively. In controls the percentage of Stage 5, Stage 4 and Stage 3are 80.0%, 00.0% and 20.0% respectively. It shows an insignificant difference between the groups (p value = 0.153). The Gender distribution of study population illustrated below in table 2 and fig 2.

Table 2 : Gender distribution of study population based on their groups.

Gender	Groups						χ^2 value (df)	p-value
	Cases		Controls		Total			
	N	%	N	%	N	%		
Male	29	72.5%	5	50.0%	34	68.0%	1.86 (1)	0.172
Female	11	27.5%	5	50.0%	16	32.0%		

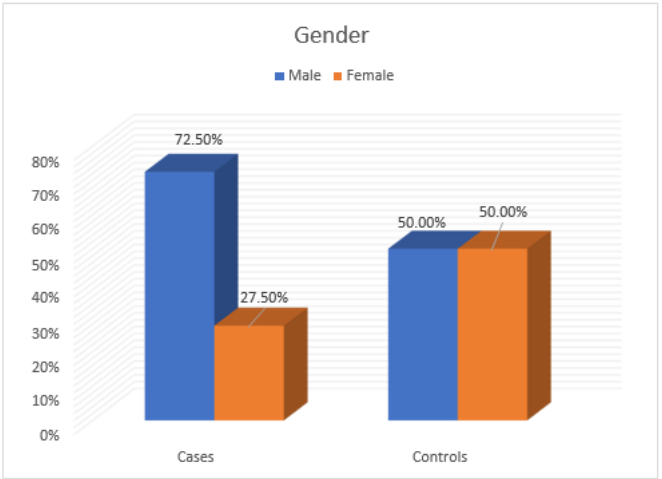

Figure 2: Bar graph showing the frequency of sex distribution in cases & control

In table2 and figure 2, In cases, the percentage of males was higher than females among cases while an equal ratio of males and females was observed in the controls group. The distribution of CKD status based according to periodontal status depicted below in table 3 and fig 3.

Table 3 : showing Distribution of CKD stage according to the periodontal status in cases

CKD stage	Periodontal status						χ^2 value (df)	p-value
	mild		moderate		severe			
	N	%	N	%	N	%		
stage 3	2	28.5%	0	.0%	0	.0%	12.866(4)	0.012
stage 4	1	14.2%	2	40%	3	10.71%		
stage 5	4	57.3%	3	60%	25	89.29%		

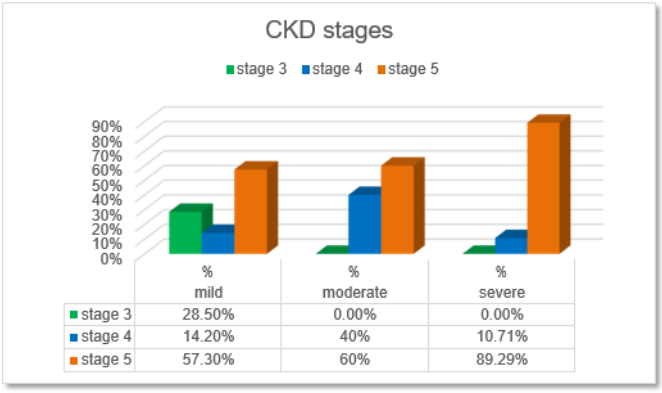

Fig. 3: showing Distribution of CKD stage according to the periodontal status in cases

Table 03 and figure 03 explains that CKD Stage 5 is more associated with the Periodontitis in the study population. In mild cases, the Percentage of Stage 5, Stage 4, and Stage 3 are 57.3%, 14.2%, and 28.5% respectively. In moderate and severe cases of periodontitis the percentage of Stage 5 was 60% and 89.29% respectively that is significant. (P value=0.012).

Discussion

Periodontal disease is a chronic inflammatory disease caused by interaction between pathogenic anaerobic bacteria in dental plaque biofilm and host immune-inflammatory reaction. Periodontal disease is characterized by destruction in the tooth-supporting

structures and alveolar bone resorption[21]. Several studies have described the association between periodontal disease and chronic kidney disease especially those on hemodialysis[22] however our study focused on predialysis CKD patients. Data on predialysis patient is minimal hence our study is unique in this aspect and it is first of its kind in UP. Periodontitis were present in 40 out of 50 Patients with CKD. This represents the prevalence of 80% which is slightly consistent with studies done before from different geographical regions of the world, where the reported prevalence varies from 95% to 100%.[18] In our study, the percentage of males in cases was higher than females while an equal ratio of males and females were observed in the controls group which was consistent with Bastos et al. also reported male predominance in cases when compared to the control group. In our study severe chronic periodontitis was significantly more frequent among patients with grade 5 CKD. Very few studies evaluated the extent and severity of periodontal diseases in CKD patients; therefore, it is very difficult to compare our results with others. But the exacerbation of periodontal disease, as the disease progresses from early to late stage has been reported by other investigators like Borawski et al which was based on the Community Periodontal Index of Treatment needs and described a higher prevalence of severe Periodontitis among predialysis, CAPD and HD Patients compared with healthy individuals [19]. Thorman et al. showed that predialysis and HD patients had significantly more clinical attachment loss than healthy subjects[20]. Several cross-sectional studies reported that chronic severe periodontitis was significantly more frequent among hemodialysis patients as compared to normal persons and periodontal disease was comparatively more severe and prevalent in CKD patients (Souza et al., 2005; Craig, 2008; Klassen & Krasko, 2002). In our study we observed that severe periodontitis was significantly more frequent among predialysis patient.

Conclusion

Chronic inflammation and constant bacterial challenge combined with compromised immune responses was accused of an extension of the inflammation from periodontal tissues into the Bloodstream, and to the subsequent systemic inflammation. The Early detection and intervention of periodontal disease, would be an appropriate strategy to facilitate overall better quality of life for CKD patients.

Abbreviation

CKD : Chronic Kidney Disease
P : Periodontitis
Mild P : Mild Periodontitis
Moderate P: Moderate Periodontitis
Severe P: Severe Periodontitis
PD : Pocket Depth
CAL : Clinical Attachment of Loss
HD : Hemodialysis

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