

PERIODONTAL CONDITIONS IN A JORDANIAN POPULATION ON RENAL DIALYSIS

¹DERAR M. AL-SEBAIE, BDS, JDB

²EMAN AL-HAMORY, BDS, JDB

³MOATH Q. ALMOMANIE, BDS, JDB

⁴THAMER M. BSOUK, BDS, JDB

ABSTRACT

The aim of this study was to evaluate the oral health status and the level of periodontal and dental health in Jordanian patients on renal dialysis.

One hundred and twenty eight patients with age range 16-85 (mean age 53.71, SD 16.52), receiving hemodialysis in Prince Rashed Bin Elhassan Hospital in the north of the Jordan formed the study group. The medical file of each patient was reviewed, the cause of renal failure was recorded and the oral cavity was examined by the same examiner for plaque deposit, gingivitis, periodontitis and dental caries using plaque and gingival index of Silliness and Loe, pocket propping depth (PPD) and decayed, missing or filled teeth (DMFT), respectively. Gingival recession was recorded by using the distance from the cement- enamel junction to the gingival margin. The condition of the oral mucosa any other oral lesion was recorded. Patients were asked if they suffer from dry mouth or urine-like smell in their breath.

The patients were divided into four groups according to their history of dialyses as follows; (period of dialyses less than one year, 1-3 years, 3-6 years and more than 6 years). There were 80 males (63.5%) and 46 females (36.5%). All subjects in this study showed moderate to severe gingivitis. GI results were in accordance with PI results for all groups. The range of pocket depths was between 2.00 and 7.33 mm, while the range of gingival recessions was between 0 and 6.00 mm. Analysis of variance revealed no statistically significant difference among the four groups on three of the clinical parameters measured. The only statistically significant difference was detected between groups on the gingival recession.

It was concluded that periodontal and dental diseases were present among the study patients receiving renal dialysis.

Key Words: Renal dialysis, periodontitis.

INTRODUCTION

Chronic renal failure is defined as the progressive usually irreversible loss of the functional capacity of the nephrons and they are no longer capable of adequately removing fluids and wastes from the body or of maintaining the proper level of certain kidney-regulated chemicals in the bloodstream, leading to an increase of serum creatinine and blood ureic nitrogen levels.^{1,2} It is caused by a number of diseases and inherited disorders but the most frequent causes of chronic renal failure are hypertension, diabetic mellitus, chronic glomerulonephritis, uropathy and auto immune disease.^{3,4} Chronic kidney failure is irreversible,

and will eventually lead to total kidney failure, also known as end-stage renal disease (ESRD). Without proper treatment intervention to remove wastes and fluids from the bloodstream, ESRD is fatal.^{5,6} It is necessary to start renal replacement therapy to avoid the serious complications which can lead to the death of the patient.⁷ There are three forms of replacement therapy: haemodialysis, peritoneal dialysis and renal transplant. Dialysis is an artificial means of removing nitrogenous and other toxic products of metabolism from blood. Dialysis is a life saving intervention for many patients that significantly reduces the mortality of this fatal disease.⁸ As the prevalence of chronic renal failure and end stage renal disease worldwide is increasing and, when coupled with improved rates of survival for renal replacement therapies, it is evident that patients with chronic renal disease will comprise

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an enlarging proportion of the dental patient population in the future.⁹ In addition, chronic renal disease and periodontitis can have significant, reciprocal effects.¹⁰ Chronic renal disease and renal replacement therapy can affect oral tissues and can greatly influence the dental management of the renal patient, while recent studies suggest that chronic adult periodontitis can contribute to overall systemic inflammatory burden and may therefore have consequences in the management of the end stage renal disease (ESRD) patient on hemodialysis (HD) maintenance therapy.¹¹ In light of the increasing number of chronic renal disease patients who will present for dental care and the effects that both conditions can have on each other persons on dialysis pose significant dental management dilemmas, and display oral manifestations with specific implications for oral health care, the most prominent oral sign found in dialyses patient is pallor of oral mucosa (sign of anemia) in addition to other signs of renal failure which include xerostomia, uremic fetor and high rate of calculus formation which is probably due to an altered serum calcium-phosphate balance.^{12,13} Patients receiving dialysis are more susceptible to opportunistic infections because of the general debilitation, depression of the immunologic response and masking of signs and symptoms of infection by drug therapy.

Significant correlation between plaque level and gingival inflammation in dialyses patient has been reported and sever gingival, periodontal, and high decayed, missed or filled teeth (DMFT) rates were observed in dialyses patient in other studies.^{14,15}

The rapid increase in incidence of renal failure and dialyses make it necessary for dental practitioners to thoroughly understand the special treatment need and considerations for such patient.¹⁶ The aim of this study was to investigate and study the oral health status and the level of periodontal and dental health in patients on renal dialyses in Jordanian population.

METHODOLOGY

One hundred and thirty nine patients with end stage renal disease receiving hemodialyses at Prince Rashed ibn Al-Hasan Hospital in the north of the Jordan formed the study group. 46 were females (36.5%) and 80 males (63.5%). Their age ranged 16-85 years (mean age was 53.71, SD 16.52). The patients gave consent to participate in the study. 13 patients were edentulous. They were excluded from the study.

The medical files of each patient was reviewed, the medical history, the cause of renal failure and the drugs taken by each patients were recorded.

The patients were divided into four groups depending on the history of dialyses;

- 1 Patients on dialyses for less than one year
- 2 On dialyses from 1-3 years
- 3 On dialyses from 3-6 years
- 4 On dialyses for more than six years.

Oral examination was carried out for each patient by the same examiner using a dental mirror explorer and periodontal probe. Oral health status, gingival and periodontal condition, color and the conditions of the mucosa, the presence of dry mouth (Xerostomia), urine like odor of the patient breath, the presence of calculus and dental carries were recorded.

The oral hygiene was evaluated using plaque index (PI) of Silness and Loe¹⁷, the gingivae was evaluated using gingival index (GI) Loe and Silness¹⁸, the periodontal situation was assessed using the propping pocket depth measuring the distance between from the margin of the bottom of the pocket, gingival recession also was recorded by measuring distance from the cemento-enamel junction to the gingival margin.

The oral mucosa was examined and the color or the presence of any inflammatory sign or ulcers was recorded and the patient were asked also if he was suffering from dry mouth or from ammonia-like oral odor or even examiner could smell this from the patient oral cavity.

Dental examination was done to look for carious missed and filled teeth using the description of the (DMFT) index.¹⁹

STATISTICAL ANALYSIS

The patient was the unit of analysis in this study. A descriptive statistical study (mean, standard deviation, frequency distributions and crosstabulation) was carried out on the measurements of variables collected. Statistically significant differences between groups were tested using the Chi-square test when concerning proportions. One way analysis of variance (ANOVA) was used to determine significant differences between the four indices taken on the four subgroups. The level of significance was set at $P < 0.05$.

RESULTS

There were 80 males (63.5%) and 46 females (36.5%). Mean age for all subjects was 53.71 years, standard deviation (SD) 16.5. Results are presented in table 1-8. (Gingival index score table 1, pocket deptes gingival recession table 3, Xerostomia table 4, uremic factor table 5, candida infection table 6, condition of oral mucosa table 7, level of significanec for all parameters table 8.

The range of pocket depths was between 2.00 and 7.33 mm, while the range of gingival recessions was between 0 and 6.00 mm.

Mean pocket depth for each subgroup showed that all subgroups had moderate periodontitis but when that added to mean gingival recession, the attachment loss was about 7mm i.e. severe periodontitis. One way analysis of variance (ANOVA) was used to determine significant differences between the four indices taken on the four subgroups. Analysis of variance revealed no statistically significant difference among the four groups on three of the clinical parameters measured $P>0.05$. The only statistically significant difference was detected between groups on the gingival recession

measured between groups $P<0.05$.

Chi square test was used to detect the minimum difference between subjects on renal dialysis for calculus, xerostomia, uremic halitosis, presence of candida, color of oral mucosa and smoking habit. The level of significance for all parameters has been summarized. There were a statistically significant differences between subjects on renal dialysis for xerostomia, uremic halitosis, presence of candida and color of oral mucosa $P<0.05$.

TABLE 1: GINGIVAL INDEX (GI) SCORES FOR SUBJECTS ON RENAL DIALYSIS

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Less than 1 year	41	2.3910	.98688	.15412	2.0796	2.7025	.33	6.83
1-3 years	38	2.2313	.76685	.12440	1.9793	2.4834	.17	3.00
3-6 years	24	1.9349	.83739	.17093	1.5813	2.2885	.53	3.38
More than 6 years	23	2.4848	.36440	.07598	2.3272	2.6424	1.34	3.00
Total	126	2.2731	.82062	.07311	2.1284	2.4178	.17	6.83

TABLE 2: POCKET DEPTH (PPD) SCORES

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Less than 1 year	41	4.9444	1.43969	.22484	4.4900	5.3988	2.00	7.33
1-3 years	38	4.3839	1.10842	.17981	4.0196	4.7483	2.33	7.33
3-6 years	24	4.5029	1.22324	.24969	3.9864	5.0194	3.00	6.83
More than 6 years	23	4.5770	1.14520	.23879	4.0817	5.0722	3.00	6.81
Total	126	4.6242	1.25995	.11225	4.4021	4.8464	2.00	7.33

TABLE 3: GINGIVAL RECESSION (GR) INDEX SCORES

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Less than 1 year	41	2.5332	1.46659	.22904	2.0703	2.9961	.00	5.67
1-3 years	38	2.2282	1.59295	.25841	1.7046	2.7517	.00	6.00
3-6 years	24	1.0485	1.04264	.21283	.6082	1.4888	.00	4.17
More than 6 years	23	1.4857	.90547	.18880	1.0941	1.8772	.00	3.67
Total	126	1.9672	1.45402	.12953	1.7108	2.2235	.00	6.00

TABLE 4: XEROSTOMIA * DURATION CROSSTABULATION

	Duration				Total
	Less than 1 year	1-3 years	3-6 years	More than 6 years	
Xerostomia normal	21	10	1	2	34
Xerostomia	20	28	23	21	92
Total	41	38	24	23	126

TABLE 5: UREMIC FOETER * DURATION CROSSTABULATION

	Duration				Total
	Less than 1 year	1-3 years	3-6 years	More than 6 years	
UFE smell free	20	9	1	1	31
Smell	21	29	23	22	95
Total	41	38	24	23	126

TABLE 6: CANDIDA * DURATION CROSSTABULATION

	Duration				Total
	Less than 1 year	1-3 years	3-6 years	More than 6 years	
Candida candida free	37	36	1	23	97
Candida present	4	2	23	0	29
Total	41	38	24	23	126

TABLE 7: ORAL MUCOSA COLOR (OMC) * DURATION CROSSTABULATION

	Duration				Total
	Less than 1 year	1-3 years	3-6 years	More than 6 years	
OMC NORMAL MUCOSA	22	13	4	3	42
PALE MUCOSA	19	25	20	20	84
Total	41	38	24	23	126

TABLE 8: THE LEVEL OF SIGNIFICANCE FOR ALL PARAMETERS

	X2 Value	P value
Calculus	4.86	0.182
Xerostomia	22.47	0.00
Uremic halitosis (UFE)	23.42	0.00
Candida	89.52	0.00
Color of oral mucosa (OM)	14.89	0.002
Smoking habit	6.73	0.081

DISCUSSION

This study showed that the prevalence of gingivitis among the renal dialysis patient was 100% and the plaque scores were in accordance with the prevalence of gingivitis. These results support the findings of other

researchers.^{13,20,21} These results also indicate that subjects on renal dialysis do not receive adequate dental and periodontal health care, which is in agreement with previous studies.^{22,23} The mean PI and GI scores for all subgroups were around 2 indicating moderate to severe gingivitis. There is a positive correlation between PI and GI scores. Supportive periodontal therapy is frequently needed for renal dialysis patients.

Mean pocket depth for all subgroups was around 4, showed that all subgroups had moderate periodontitis but when that added to mean gingival recession (around 2) the whole attachment loss becomes on average about 7mm so the case become severe periodontitis. These results were according to previous studies.^{13,23} The group DMFT index mean was 12.26; it was highest 15.00 for the first group versus lowest 8.17 for the fourth group indicating that patients on dialysis need restorative

treatment. These findings were in agreement with previous research¹⁵. Restorative treatment needs enough time to accomplish the management of high caries index. At the same time dialysis is frequent and takes long time and exhausting for the patient. This prohibited the dialysis patient from attending dental clinics.

Medically compromised patients are predisposed to dental, periodontal and oral infections.^{13,16,24} This supports the recommendations to complete all restorative, periodontal and surgical treatment for these patients. This is also supported by the study of Proctor *et al*¹².

CONCLUSION

Periodontal and dental diseases are prevalent among the renal dialysis patients. Chronic renal failure compromise general and oral health. Frequent and at short intervals dental and periodontal appointments are needed to control plaque and periodontal disease. There should be special dental and periodontal care for all renal dialysis patients based on early diagnosis.

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