Gingival health among individuals on hemodialysis in a Saudi population

Farhad Atassi*, DDS, MSc, FICOI
Abdullah R. Al-Shammery[!], BDS, MSc
Saeed Al-Ghamdi, BDS

هدفت الدراسة إلى تقييم صحة اللثة عند مرضى الغسيل الكلوي، شملت الدراسة ٩٠ مريضاً خاضعين للغسيل الكلوي. وجرى تقسيم المرضى إلى ثلاثة مجموعات: ١) المرضى الخاضعين للغسيل لأقل من سنة، ٢) من سنة إلى ثلاثة سنوات، ٣) أكثر من ثلاثة سنوات.

وقد استعملت المشعرات التالية : مشعر الفضلات، ومشعر اللويحة الجرثومية، ومشعر القلح أو الجير، ومشعر اللثة. وحسب تحليل أنوفا الإحصائي. أظهرت النتائج على أن متوسط مشعر الفضلات بلغ ١,٦٥ و ٢,٠٧ و ٢,١٥ والانحراف المعياري ٠,٦٧ و ٠,٤٧ و ٠,٤٨ للمجموعات الثلاثة على التوالي. ومتوسط اللويحة الجرثومية بلغ ١,٧٢ و ٢,١٦٠ و ٢,٢٦ والانحراف المعياري ٠,٦٤ و ٠,٣٦ و ٠,٤٢ للمجموعات الثلاثة على التوالي. كما بلغ متوسط مشعر القلح ١,٥٨ و ٢,٠٢ و ٢,٠٩ و الانحراف المعياري ٠,٥٨ و ٠,٢٨ و ٠,٣٩ للمجموعا . الثلاثة على التوالي. أما متوسط مشعر اللثة فكان ١,٤٣ و ٢,٩٧ و ٢,٠٦ والانحراف المعياري ٠,٦٧ و ٠,٣٨ و ٠,٣٥ للمجموعات الثلاثة على التوالي. ودلت النتائج وجود إصابة التهابية للثة من خفيفة إلى معتدلة بنسبة ١٠٠٪ بين مرضى الغسيل الكلوي. كما دلت على وجود اختلاف إحصائي واضح فيما يتعلق بكافة المشعرات وذلك بين المجموعة الأولى من جهة والمجموعتين الثانية والثالثة من جهة أخرى. ويمكن الاستنتاج على أن معدل التهاب اللثة بين مرضى الغسيل الكلوي يبلغ نسبة ١٠٠٪ ، ومعدل الانتشار يزداد مع شدة الإصابة الكلوية أو طول فترة الغسيل الكلوي .

The purpose of the study was to evaluate the gingival health status among patients on hemodialysis. Ninety Saudi patients on hemodialysis participated in the study, and were divided into three subgroups of those who have been on dialysis for 1) less than one year; 2) 1 to 3 years; and 3) for more than 3 years. Four indices: the debris index (DI); the calculus index (CI); the plaque index (PlI) and the gingival index (GI) were used. Data were analyzed using one way analysis of variance (ANOVA). The means of debris index were 1.65, 2.07, and 2.15, with SD± 0.67, 0.47 and 0.48 respectively for the subgroups.The means of plaque index were 1.72, 2.16 and 2.26, with SD±0.64, 0.36 and 0.42 respectively for the revealed groups. The means of calculus index were 1.58, 2.02 and 2.09, with SD± 0.58, 0.28 and 0.39 respectively for the subgroups. The means of gingival index were 1.43, 2.97 and 2.06 with SD± 0.67, 0.38 and 0.35 for the subgroups respectively. Results showed a 100% prevalence of mild to moderate gingivitis. Tukey`s post hoc test showed significant difference in all indices between the 1st and 2nd subgroups, and between the 1st and 3rd subgroups, while no significant difference was found between 2nd and 3rd subgroups. It was concluded that periodontal disease is prevalent in renal dialysis patients who showed unacceptable level of oral hygiene and which may increase with the chronicity of the illness.

Introduction

Dialysis is an artificial means of removing nitrogenous and other toxic products of metabolism from the blood. For many patients, dialysis is a life-saving intervention that has significantly reduced the mortality of this once fatal disease. Published reports estimated that up to 90% of patients receiving renal dialysis will show oral symptoms[1] which might be due to an elevated blood urea nitrogen (BUN) and creatinine, and diet restriction.[2] The most prominent oral sign found in dialysis patients is pallor of the oral mucosa, which reflects anemia, while other signs may include xerostomia, breath with urea odor and an accelerated rate of calculus formation as a result of altered serum calcium-phosphate product.[3] Patients receiving dialysis are more susceptible to infections because of general debilitation, depression of the immunologic response and masking of signs and symptoms of infection by drug therapy.[4]

The number of individuals on renal dialysis who receive renal transplants is increasing, making it advisable that a renal transplant candidate should be free from infections including oral infections or active periodontal lesion, to preempt delayed kidney transplantation.[5] Opportunistic focal infection may also develop at the site of the transplant if bacteria-inducing dental treatment is required soon after transplantation. There are few reports on the oral health, especially gingival health, in hemodialysis patients. Oshrain et al[6] reported a significant correlation between plaque levels and gingival inflammation in dialysis subjects. In another study,[7] severe gingivitis characterized by marked redness, inflammation and tendency to bleed was observed in the sample studied. Therefore, the purpose of this research was to determine the gingival health status among individuals undergoing hemodialysis dialysis.

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*Assistant Professor, Dept. of Preventive Dental Sciences;
[!] Professor, Dept. of Restorative Dental Sciences & Chairman, Saudi Board in Advanced Restorative Dentistry, College of Dentistry, King Saud University, Riyadh, KSA
Formerly Intern, College of Dentistry, King Saud University

Address reprint requests to:
Dr. Farhad Atassi
PO Box 60169
Riyadh 11545, KSA

Materials and Methods

Ninety patients undergoing renal dialysis were included in this study. The purpose of the study was explained to the patients. The patients were divided into 3 subgroups of those on renal dialysis for 1) less than one year; 2) 1 to 3 years; and 3) longer than 3 years. Two renal dialysis centers were selected namely Ibn Ibrahim Al Shaikh Dialysis Center in King Fahad hospital, Al Baha and the dialysis department in King Khalid University Hospital, Riyadh.

The clinical parameters studied were oral debris index,[8] calculus index,[8] plaque index,[9] and gingival index.[10] (Table 1)

Table 1. Description of indices used.

Debris Index[8] 0 - No debris or stain present 1 - Soft debris covering more than one third of the tooth surface, or the presence of extrinsic stains without other debris regardless of surface area covered 2 - Soft debris covering more than one third, but not more than two thirds of the exposed tooth surface 3 - Soft debris covering more than two thirds of the exposed tooth surface
Plaque Index[9] 0 - No plaque in the gingival area 1 - A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be recognized only by running a probe across the tooth surface 2 - Moderate accumulation of soft deposits within the gingival pocket and on the gingival margin and/or adjacent tooth surface, which can be seen by the naked eye 3 - Abundance of soft matter within the gingival pocket and/or on the gingival margin and adjacent tooth surface
Calculus Index[8] 0 - No calculus present 1 - Supragingival calculus covering not more than one third of the exposed tooth surface 2 - Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both 3 - Supragingival calculus covering more than two thirds of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth or both
Gingival Index[10] 0 - Normal gingiva 1 - Mild inflammation, slight change in color, slight edema; bleeding on palpation 2 - Moderate inflammation, redness, edema, and glazing, bleeding on palpation 3 - Severe inflammation, marked redness and edema, ulceration, tendency to spontaneous bleeding

Only one examiner performed the assessment on all the renal dialysis patients.

Intra-examiner reliability

A pilot study was conducted to establish intra-examiner reliability. Ten subjects who volunteered to participate were selected and examined by one examiner who used the four dental indices and recorded them on two occasions to establish intra-examiner reliability. The scores from the indices were analyzed for differences using Kappa test for correlated samples. Intra-examiner reliability indices were k=100% for DI, k=90.3% for PI, k=100% for CI and k=100% for GI respectively.

Results

The ninety participants were 53 females (58.9%) and 37 males (41.1%). The mean ages were 42.9, 46.7 and 47.2 years for the 1st, 2nd and 3rd subgroups respectively. The means of DI were 1.65, 2.07 and 2.15 respectively for the 1st, 2nd, and 3rd subgroups respectively. (Table 2) The means of PI were 1.72, 2.16 and 2.26 for the same subgroups respectively. (Table 3). The means of calculus index CI were 1.58, 2.02 and 2.09 for the same subgroups respectively. (Table 4) Finally, the means of GI were 1.42, 2.97 and 2.06 for the same subgroups respectively. (Table 5).One-way analysis of variance (ANOVA) was used to determine significant differences in the 4 indices among the 3 subgroups at 5% level. Tukey`s post hoc test was used to compare between subgroups (Table 6 & Fig. 1).

There was significant difference between subgroup 1 and subgroup 2 where p-values were 0.02, 0.001, 0.01 and 0.02 for PlI, DI, CI and GI respectively.There was significant difference between subgroup 1 and subgroup 3 where p-values were 0.001, 0.001, 0.001 and 0.02. for PlI, DI, CI and GI respectively.No significant difference was found between subgroup 2 and subgroup 3 where p-values were .737, .766, .799 and .830 for lI, DI, CI and GI respectively.

Discussion

The purpose of the study was to evaluate the gingival health of subjects on renal dialysis. The study did not include any invasive technique that might lead to contamination of these patients, since they require special consideration, most

Table 2. Descriptive statistics for debris index scores for individuals on renal dialysis (N =90).

Patients' category (years)	N	Mean	SD	95% confidences Interval for mean		Range	
				Lower bound	Upper bound	Min	Max
< 1	30	1.6500	.6786	1.3966	1.9034	.33	2.83
1-3	30	2.0667	.4767	1.8887	2.2447	1.77	2.83
> 3	30	2.1500	.4822	1.9700	2.3300	1.73	2.83
Total	90	1.9556	.5901	1.8320	2.0791	.33	2.83

Table 3. Descriptive statistics for plaque index scores for individuals on renal dialysis (N=90).

Patients' category (years)	N	Mean	SD	95% confidences Interval for mean		Range	
				Lower bound	Upper bound	Min	Max
< 1	30	1.7167	.6435	1.4764	1.9570	.50	2.83
1-3	30	2.1611	.3622	2.0259	2.2964	1.67	3.00
> 3	30	2.2556	.4215	2.0982	2.4129	1.33	3.oo
Total	90	2.0444	.5398	1.9314	2.1575	.50	3.00

Table 4. Descriptive statistics for calculus index scores for individuals on renal dialysis (N=90).

Patients' category (years)	N	Mean	SD	95% confidences Interval for mean		Range	
				Lower bound	Upper bound	Min	Max
< 1	30	1.5778	.5819	1.3605	1.7951	.50	2.50
1-3	30	2.0167	.2882	1.9091	2.1243	1.50	2.50
> 3	30	2.0889	.3908	1.9430	2.2348	1.17	2.67
Total	90	1.8944	.4886	1.7921	2.9968	.50	2.67

importantly with regard to excessive bleeding, risk of infection and medication used.[11] Bleeding can be a significant problem in patients receiving dialy sis due to their low hematocrit level, and also platelet disorders involving abnormal platelet aggregation.[12] Radiographs were not available for this examination.

The selection of a conventional sample without any control population depends on following rationalities:

1. Age and sex matched subjects are difficult to select from general population having no systemic disease with similar level of periodontal status or oral hygiene.

Table 5. Descriptive statistics for gingival index scores for individuals on renal dialysis (N=90).

Patients' category (years)	N	Mean	SD	95% confidences Interval for mean		Range	
				Lower bound	Upper bound	Min	Max
< 1	30	1.4278	.6776	1.1748	1.6808	.00	2.50
1-3	30	2.9667	.3801	1.8248	2.1086	1.33	2.83
> 3	30	2.0556	.3565	1.9224	2.1887	1.33	2.67
Total	90	1.8167	.5620	1.6990	1.9344	.00	2.83

Table 6. Tukey`s post hoc test to compare subgroups.

	P-Value			
	Plaque index	Debris index	Calculus index	Gingival index
Group 1 vs. 2	0.02	<0.001	0.01	0.02
Group 1 vs. 3	< 0.001	< 0.001	< 0.001	0.02
Group 2 vs. 3	.737	.766	.799	.830

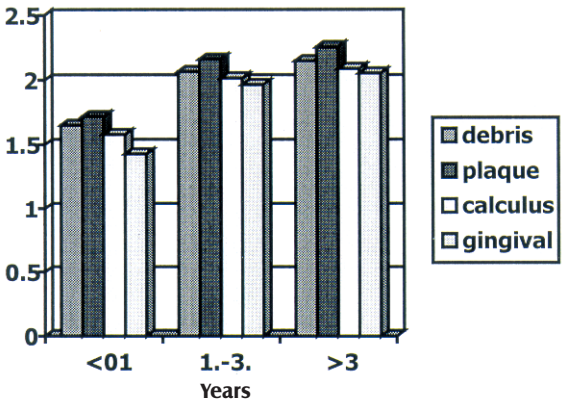

Fig. 1. The mean scores of debris, plaque, calculus, and gingival indices among the three subgroups.

2. It is a cross sectional study to find out the gingival health level of subjects undergoing hemodialysis.

3. Control group will not be free from selection bias as selection of the selected population may not be representative.

The moderate number of patients was due to the fact that other medical centers did not allow us

to have access to the patients for the study purpose.

The renal dialysis sample studied showed a 100% prevalence of mild to moderate gingivitis which is greater than the prevalence of periodontal disease (85%) found in general population.[13] This finding is in agreement with other studies,[6,7,13] and indicate that those individuals do not receive adequate periodontal care, which is in agreement with previous findings.[13,14]

Both plaque and debris indices revealed unacceptable level of oral hygiene among subjects on hemodialysis. This is in agreement with, and support the findings of Bottomley et al[14] who suggested that a stringent continued care program should be established to prevent oral disease from progressing undetected.

The debris index revealed that comprehensive oral hygiene instruction is required to improve oral self-care behaviors and prevent the initiation and progression of future dental disease. However, no intervention has been implemented to educate this group or motivate them to an acceptable oral health status. Eigner et al[15] recommended that demonstration of brushing and flossing, nutritional counseling and the use of topical fluorides are necessary in conjunction with professional care.

There is a positive correlation between the presence of calculus and the prevalence of gingivitis.[16] Calculus is always covered with a non-mineralized layer of plaque.[17] The calculus index in this study revealed that scaling and root planning is required to eliminate the bacteria deposit. Epstein et al[18] reported that calculus in dialysis patient was of greater thickness than in those individuals not medically compromised. High urea levels may be a factor in heavy calculus formation and should be a consideration in determining the regularity of periodontal maintenance therapy.[19]

The patients were divided into three groups based on how long they have been on hemodialysis to see if there is any effect of hemodialysis duration. Tukey`s post hoc test showed a significant difference between the 1st and 2nd subgroups, and between the 1st and 3rd subgroups, while no significant difference was found between 2nd and 3rd subgroups. That may be explained on the basis of chronic nature of the illness. Patients are preoccupied with their main disease and tend to neglect preventive measures, in addition to the psychological changes due to toxic, metabolic and degenerative changes.[20] The severe stress of frustrating dietary and drinking restrictions were found to contribute to anxiety reactions or depression.[5]

Conclusions

1. Results of the study showed a 100% prevalence of mild to moderate gingivitis among the studied population.
2. Individuals on hemodialysis showed a low level of oral hygiene as demonstrated by plaque and debris indices.
3. Tukey`s Post Hoc test showed significant effect of the duration of patients on dialysis.

Recommendations

1. Subjects on hemodialysis should receive initial comprehensive oral examination with oral hygiene instructions.
2. All patients should receive periodic supportive periodontal care.
3. The oral health maintenance should be reinforced by by the dialysis team. Members of the team may require some further training to perform this role adequately.

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