



**EVALUATING DENTAL HEALTH OF PATIENTS UNDERGOING HEMODIALYSIS BY  
ASSESSING THE DECAY, MISSING, FILLED TEETH INDEX AND RUSSELL'S  
PERIODONTAL INDEX**

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### INTRODUCTION

Kidneys are the major functional units of the Human Body. Dysregulated kidney function can influence the morbidity and mortality of the patient. Chronic Renal failure is one such condition which causes debilitation of the life of the patient due to immunosuppression and psychological depression in these patients. Da Silva et al(1995)<sup>[1]</sup> proposed that emotional and psychological load may influence the immune system, increasing the host susceptibility and therefore the risk of developing disease. CRF is an irreversible deterioration in renal function which classically develops over a period of years due to reduction in functional nephrons.<sup>[2]</sup> Hemodialysis is the immediate treatment option for patients with chronic renal failure. Undergoing hemodialysis twice or thrice per week affects the routine lifestyle of the patient thereby lack of interest in oral hygiene maintenance. Immunosuppression could cause change in the oral flora, destruction of periodontal structures, oral ulceration and much more. These oral manifestations can in turn produce bacteremia which could prove detrimental for the health of the CRF patients undergoing hemodialysis. This article showcases a study done to evaluate the relationship between the oral health and hemodialysis.

### AIMS AND OBJECTIVES

- To determine the oral health status of patients undergoing hemodialysis by assessing the periodontal index and DMFT index.
- To compare the prevalence of dental caries and periodontitis in patients undergoing hemodialysis and normal control group.
- To compare the prevalence of dental caries and periodontitis among the diabetic and non-diabetic patients undergoing hemodialysis.

### Subjects and Methods

A cross-sectional study was conducted among two groups: patients with CRF (dialysis group) and healthy subjects (control group) attending the dialysis unit. The study group was matched with control group. Both the groups were age and sex matched.

All the patients gave informed consent to participate in this study. Their identity is kept confidential throughout this study.

### Sample Size

A total of 55 subjects in each group; (65% male and 35% female subjects) were included in the study.

### Inclusion Criteria

- Patients undergoing hemodialysis for a minimum of 3 months.
- Patients undergoing hemodialysis between the age group of 20yrs to 70yrs.

### Exclusion Criteria

- Patients who are not willing to participate in this study.
- Patients who are critically ill.
- Patients with bleeding tendencies.
- Patients with history of smoking.
- History of periodontal therapy within 6 months.
- History of receiving antibiotic therapy within a period of 6 months.
- Patients on hemodialysis for less than 3 months.

A case preforma was prepared with the demographic data of the patient and the oral health status was recorded. The clinical examination was done for the study group at the dialysis unit. The medical data were retrieved from patient files and the medication history as well as history of diabetes, hypertension and non dental prosthetic devices were also recorded. The examination was carried out in artificial light with the use of a mouth mirror and WHO periodontal probe. After explaining the study design to the participants, the oral health was

assessed by the decayed, missing and filled teeth index and Russell's periodontal index.

### Russells's Perodontal Index

This was developed for epidemiological purposes and assumes a progression of gingivitis to pocket formation leading to advanced destruction.

### Scoring and Criteria for Russell's periodontal index

0 – Negative. There is neither overt inflammation in the investing tissues nor loss of function due to destruction of supporting structures.

1 – Mild Gingivitis. There is an overt area of inflammation in the free gingiva which does not circumscribe the tooth.

2—Gingivitis. Inflammation completely circumscribes the tooth but there is no apparent break in epithelial attachment.

6 – Gingivitis with Pocket formation. The epithelial attachment has been broken and there is pocket (not merely a deepened gingival crevice due to swelling in the free gingiva). There is no interference with masticatory function, tooth is firm in its socket and has drifted.

8 – Advanced destruction with loss of masticatory function .The tooth may be loose; may have drifted, may sound dull on percussion with a metallic instrument. May be depressible in its socket. Scoring for each tooth is carried out and the scores are totaled and divided by the number of teeth present.

### Inference of Scores

0-0.2 Clinically normal gingival tissue

0.3 – 0.9 Significant Gingivitis

0.7- 1.9 Incipient destructive disease.

1.6- 3.0 Established destructive periodontitis.

3.8- 8.0 Terminal stages of periodontal disease.

### Advantages of Russell's Periodontal Index

➤ Simple

➤ Non-invasive

➤ No special equipment<sup>[3]</sup>

### RESULTS

#### Comparison between patients undergoing dialysis and control

1. Patients undergoing hemodialysis

2. Normal Control patients

**Table. 1. Group statistics of Comparison between patients undergoing hemodialysis and normal control patients.**

Group Statistics					
	Dialysis	N	Mean	Std. Deviation	Std. Error Mean
Decay	1	55	2.60	2.069	.279
	2	55	1.69	1.643	.222
Missing	1	55	4.69	5.524	.745
	2	55	1.69	2.449	.330
Filled	1	55	.00	.000	.000
	2	54	.09	.401	.055
PerioInd	1	55	1.42	.574	.077
	2	55	1.15	.870	.117
Total Dmft	1	55	7.29	5.766	.777
	2	55	3.47	3.202	.432

**Table. 2. Independent sample tests of comparison between patients undergoing hemodialysis and normal control patients.**

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
										Lower	Upper
DECAY	Equal variances assumed	2.270	.135	2.552	108	.012	.909	.356	.203	1.615	
	Equal variances not assumed			2.552	102.721	.012	.909	.356	.203	1.616	
MISSING	Equal variances assumed	14.796	.000	3.682	108	.000	3.000	.815	1.385	4.615	
	Equal variances not assumed			3.682	74.431	.000	3.000	.815	1.377	4.623	
FILLED	Equal variances assumed	12.953	.000	-1.711	107	.090	-.093	.054	-.200	.015	

	Equal variances not assumed			-1.695	53.000	.096	-.093	.055	-.202	.017
PerioInd	Equal variances assumed	14.393	.000	1.908	108	.059	.268	.141	-.010	.547
	Equal variances not assumed			1.908	93.470	.059	.268	.141	-.011	.547
TotalDMF	Equal variances assumed	9.729	.002	4.293	108	.000	3.818	.889	2.055	5.581
	Equal variances not assumed			4.293	84.416	.000	3.818	.889	2.050	5.587

**Comparison based on years of dialysis**

1 - <2 yr

2 - >2 yr

**Table 3. Group statistics of comparison based on years of hemodialysis.**

Group Statistics					
	Years	N	Mean	Std. Deviation	Std. Error Mean
DECAYED	1	35	2.66	2.071	.350
	2	20	2.70	2.342	.524
MISSING	1	35	4.11	4.619	.781
	2	20	5.85	6.930	1.550
FILLED	1	35	.00	.000 <sup>a</sup>	.000
	2	20	.00	.000 <sup>a</sup>	.000
PerioInd	1	35	1.49	.557	.094
	2	20	1.26	.569	.127
Total DMFT	1	35	6.77	5.024	.849
	2	20	8.55	6.962	1.557

a. t cannot be computed because the standard deviations of both groups are 0.

**Table 4. Independent sample tests of comparison based on years of hemodialysis.**

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DECAYED	Equal variances assumed	.724	.399	-.070	53	.944	-.043	.609	-1.264	1.178
	Equal variances not assumed			-.068	35.789	.946	-.043	.630	-1.321	1.235
MISSING	Equal variances assumed	.370	.546	-1.114	53	.270	-1.736	1.558	-4.861	1.390
	Equal variances not assumed			-1.000	28.834	.326	-1.736	1.735	-5.286	1.814
PerioInd	Equal variances assumed	.419	.520	1.488	53	.143	.234	.157	-.081	.550
	Equal variances not assumed			1.480	38.996	.147	.234	.158	-.086	.554
Total DMF	Equal variances assumed	.032	.859	-1.095	53	.278	-1.779	1.624	-5.036	1.479
	Equal variances not assumed			-1.003	30.481	.324	-1.779	1.773	-5.398	1.841

**Comparison between ages of patients**

1- Age <40

2- Age >40

Table 5. Group statistics on ages of patients undergoing hemodialysis.

Group Statistics					
	Ageless40	N	Mean	Std. Deviation	Std. Error Mean
DECAYED	1	12	1.75	2.261	.653
	2	43	2.81	2.003	.305
MISSING	1	12	1.50	3.317	.957
	2	43	5.40	5.762	.879
FILLED	1	12	.00	.000 <sup>a</sup>	.000
	2	43	.00	.000 <sup>a</sup>	.000
PerioInd	1	12	.80	.687	.198
	2	43	1.58	.427	.065
Total DMF	1	12	3.25	4.393	1.268
	2	43	8.21	5.776	.881

a. t cannot be computed because the standard deviations of both groups are 0.

Table 6. Independent sample tests on ages of patients undergoing hemodialysis.

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DECAYED	Equal variances assumed	.001	.973	-1.582	53	.119	-1.064	.672	-2.412	.285
	Equal variances not assumed			-1.476	16.142	.159	-1.064	.721	-2.591	.463
MISSING	Equal variances assumed	2.548	.116	-2.231	53	.030	-3.895	1.746	-7.397	-.394
	Equal variances not assumed			-2.998	31.483	.005	-3.895	1.299	-6.544	-1.247
PerioInd	Equal variances assumed	3.770	.058	-4.843	53	.000	-.778	.161	-1.101	-.456
	Equal variances not assumed			-3.729	13.457	.002	-.778	.209	-1.228	-.329
Total DMF	Equal variances assumed	.576	.451	-2.753	53	.008	-4.959	1.801	-8.572	-1.346
	Equal variances not assumed			-3.212	22.786	.004	-4.959	1.544	-8.155	-1.764

## Comparison based on presence of diabetes

1-Diabetes Present

2- Diabetes absent

Table 7. Group statistics on diabetic and non diabetic patients undergoing hemodialysis.

Group Statistics					
	Diabetes	N	Mean	Std. Deviation	Std. Error Mean
DECAYED	1	24	3.00	2.341	.478
	2	31	2.35	2.090	.375
MISSING	1	24	5.42	6.814	1.391
	2	31	3.32	4.012	.720
FILLED	1	24	.00	.000 <sup>a</sup>	.000
	2	31	.00	.000 <sup>a</sup>	.000
Perio Ind	1	24	1.59	.591	.121
	2	31	1.21	.602	.108
Total DMF	1	24	8.42	6.613	1.350
	2	31	5.68	4.743	.852

a. t cannot be computed because the standard deviations of both groups are 0.

Table. 8. Independent sample tests on diabetic and non diabetic patients undergoing hemodialysis.

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DECAYED	Equal variances assumed	.090	.766	1.077	53	.286	.645	.599	-.556	1.846
	Equal variances not assumed			1.062	46.564	.294	.645	.608	-.578	1.868
MISSING	Equal variances assumed	.919	.342	1.424	53	.160	2.094	1.471	-.856	5.044
	Equal variances not assumed			1.337	35.064	.190	2.094	1.566	-1.086	5.274
PerioInd	Equal variances assumed	.220	.641	2.339	53	.023	.380	.162	.054	.706
	Equal variances not assumed			2.345	50.027	.023	.380	.162	.054	.705
Total DMF	Equal variances assumed	.123	.727	1.789	53	.079	2.739	1.531	-.332	5.810

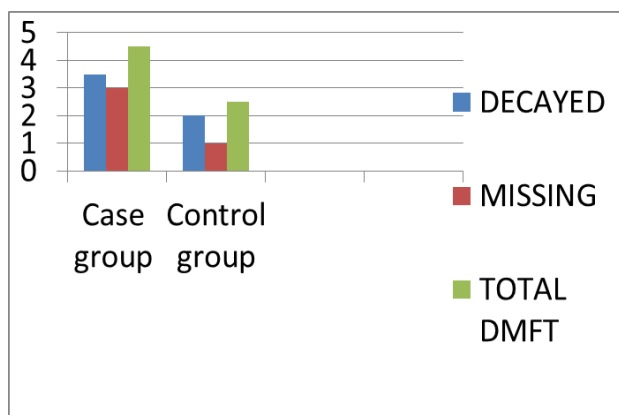


Figure. 1. A comparative graph on decayed, missing and total DMFT between case group and control group.

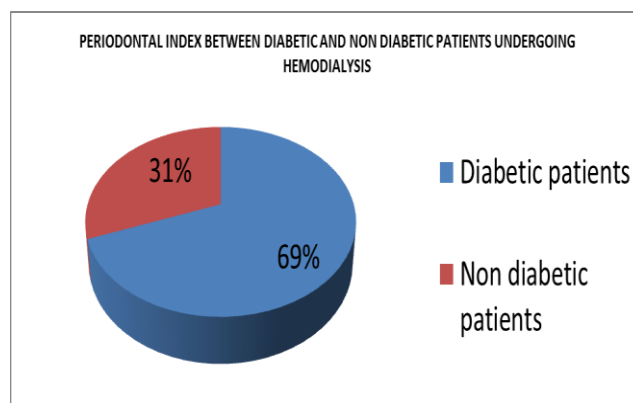


Figure. 3. A comparative pie chart of periodontal index between diabetic and non diabetic patients undergoing hemodialysis.

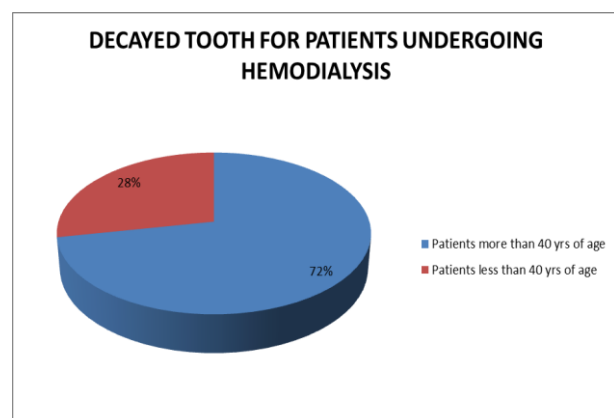


Figure. 2. A comparative pie chart for decayed tooth for patients undergoing hemodialysis between patients more than 40yrs of age and less than 40 yrs of age.

## DISCUSSION

### Comparison of DMFT score between patients undergoing hemodialysis and normal control group.

In the present study DMFT score demonstrated a significant difference between the two groups. It is because of increased prevalence of caries which can be correlated to poor oral hygiene, diminished saliva production, and an increase in the number of cariogenic Streptococcus mutans. It is in accordance to the study conducted by Lingam amara Swapna et al<sup>[4]</sup> and in contradiction to the study conducted by De Rossi SS, Glick M and Sobrado et al<sup>[5]</sup> (2007) where he reported that the number of decayed teeth was lower in the patients than in the controls.

### Comparison of Periodontal index between patients undergoing hemodialysis and normal control group.

In our study there was no significant difference in the periodontal index between the hemodialysis group and matched controls which is in agreement to the study conducted by Marakoglu et al<sup>[6]</sup> where he reported that although patients receiving hemodialysis have been suggested to present a certain degree of immunosuppression, chronic renal failure does not seem to be an additional risk factor for more severe periodontal destruction. The present study is also in accordance to the study conducted by Renata S Brotto et al<sup>[7]</sup> where he assessed 60 healthy non-smokers (30 with & 30 without ) periodontal disease for markers of kidney functions and found that none of the markers revealed significant difference between control and test group , hence concluded that severe periodontal disease is not associated with alterations in kidney functions and the present study is in contradiction to the study conducted by Carl W. et al and Khocht .A, Browski A. et al, Nandhini Manjunath.<sup>[8]</sup> This might be because all these studies utilized CPITN Index to analyze the periodontal status whereas we have used Russel's periodontal index.

### Comparison of PI between diabetic and non diabetic individuals undergoing hemodialysis.

The present study reveals a significant difference in PI when compared between the diabetic and non-diabetic undergoing hemodialysis. It is in agreement to the study conducted by Eun- Kyong Kim et al.<sup>[9]</sup> wherein he found a significant association between Diabetes and periodontitis. And also in accordance to the study conducted by Mealey BL<sup>[10]</sup> in which he proposed that the risk of periodontitis is increased by approximately threefold in diabetic patients when compared to non diabetic patients.

### Comparison DMFT score between diabetic and non diabetic individuals undergoing hemodialysis.

There was no significant difference between these two groups which is in contradiction to the study done by Chuang SF(2005).<sup>[11]</sup> The insignificant difference in the present study could be due to the presence of dryness of mouth and shift in oral microbial flora in both the groups attributing to the underlying pathology (renal disease)

### Comparison of PI & DMFT score based on age in patients undergoing hemodialysis.

There was an increase in PI & DMFT score with increasing age. This is in accordance to the study conducted by Tollefsen et al<sup>[12]</sup> whose study revealed that older hemodialysis patients experienced severe periodontal disease and in the present study there was no significant correlation regarding PI in patients with hemodialysis when compared to healthy controls whereas there is increase in severity of periodontal disease with age in hemodialysis group which could be because of shift in the microbial flora of plaque from predominant actinobacillus to porphyromonas gingivalis

with advancing age as proposed by Rodenburg et al.1990.<sup>[13]</sup>

### CONCLUSION

As there was significant difference in the PI index only between diabetic and non-diabetic patients undergoing hemodialysis ,there is a need for further research with larger sample size to determine whether the increase in PI index in patients undergoing hemodialysis is attributed to the renal disease as such or is it because of the influence of Diabetes which is usually found associated with Chronic Renal Failure. In the present study, attrition and abrasion of teeth in patients undergoing hemodialysis were also found to be high due to acidic nature of the saliva and high buffering capacity of saliva in these patients. So, in future a bigger study including multiple parameters is to be done to evaluate the actual oral presentation of chronic renal failure.

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