

ORIGINAL ARTICLE

PREVALENCE OF DENTAL AND PERIODONTAL STATUS AND ASSOCIATION WITH LENGTH OF TIME SINCE BEGINNING DIALYSIS

Sumit Goyal¹, Simarpreet Singh², Jatinder Singh³, Anmol Mathur⁴, Diljot Kaur Makkar⁵, Puneet Kaur¹

¹Postgraduate Student, ²Professor and HOD, ⁴Reader, ⁵Senior Lecturer, Department of Public Health Dentistry, Surendera Dental College and Research Institute, Sri Ganganagar, Rajasthan, India, ³Department of Public Health Dentistry, Adesh Institute of Dental Sciences and Research Institute, Bathinda, Punjab, India

ABSTRACT:

Objective: Among all the systemic disorders, diseases of the renal system pose a major cause of morbidity and mortality worldwide. The present study aims to establish the multivariate relationship of socio demographic conditions, state of dental health, periodontal health among patients in relation to duration of hemodialysis (HD).

Method: A cross-sectional study, using a self-administrated structured questionnaire was conducted among haemodialysis patients. A self-structured questionnaire in English language was designed to record the patient's sociodemographic data, duration of dialysis, smoking habit and tooth cleaning habits, medication history and other medical condition. Dental and periodontal status was also recorded. **Results:** A total of 133 patients were registered for the study. Of these patients, the one undergoing haemodialysis for less than 1 years were 53 whereas the one undergoing HD for 1-3 years and for more than 3 years were 47 and 33 respectively. The difference in mean values of the periodontal indices when compared among three groups were statistically significant. A higher prevalence of decayed teeth ($p < 0.001$) and larger DMFT index ($p < 0.01$) was found to be significantly correlated with duration of haemodialysis. **Conclusion:** Within the limits of this study, it was concluded that subjects who were being treated with HD for more than 3 years had a poorer periodontal health and a higher DMFT index score, suggesting that the length of time on HD could negatively affect the oral health status of these individuals.

Key Words- Hemodialysis, endstage renal disease, periodontitis, dmft

Corresponding author: Dr. Sumit Goyal, Department of Public Health Dentistry, Surendera Dental College and Research Institute, Sri Ganganagar, Rajasthan, India, Email: phdsdc.research@gmail.com

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INTRODUCTION

With the advancement in technology and medicine, the oral health care professionals have to attain holistic treatment approach towards the patients with complex medical problems. Among all the systemic disorders, diseases of the renal system pose a major cause of morbidity and mortality worldwide. End stage renal disease is one of the most common problems associated with renal system and haemodialysis is the preferred treatment.¹ Haemodialysis is an artificial means of removing nitrogenous and other toxic products of metabolisms from the blood. The

number of patients with kidney failure, who require dialysis, is growing by 10 to 15% annually.² These patients represents a compromised population that is in need of comprehensive medical as well as dental care and treatment, since these patients have both systemic and oral manifestation.³

As survival has improved, it is necessary to focus on prevention in oral health of these patients, to control risks of oral infections that could predispose to septicaemia, endocarditis and endarteritis possible vascular access. These patients appear predisposed to a variety of dental problems such as gingivitis, periodontitis and high DMFT rates.^{4,5} It

has been reported that periodontal disease/ or poor oral hygiene increases the rate of bacteraemia during dental procedures⁷. Such bacteraemia might present a potential risk for patients prone to infection, including dialysis patients. Chen et al speculated that early diagnosis and treatment of periodontal disease might reduce the high burden of cardiovascular disease in haemodialysis patients.⁶ However, studies about the prevalence of oral lesions in dialysis patients are still scarce. Dental professionals must be aware of the most frequent oral manifestations of dialysis patients to ensure correct management of such patients. The present study will allow us to establish the multivariate relationship of socio demographic conditions, state of dental health, periodontal health among patients in relation to duration of hemodialysis.

MATERIALS AND METHODS

A cross-sectional study, using a self-administrated structured questionnaire was conducted among haemodialysis patients in Sri Ganganagar city from February-June 2015. The study was approved by the ethical Committee of Surendera Dental College and Research Institute, Sri Ganganagar. The sampling frame comprised of 164 patients undergoing hemodialysis at various dialysis centre of the Sri Ganganagar city. Subjects undergoing haemodialysis, who gave the consent and with age more than 16 years were included in the study. The patients refusing consent, under the age of 16 years, and who underwent transplantation were excluded from the study. The final sample was 133 with a response rate of 81.1%. Of these total patients, the one undergoing haemodialysis for less than 1 years were 53 whereas the one undergoing HD for 1-3 years and for more than 3 years were 47 and 33 respectively. A self-structured questionnaire in English language was designed to record the patient's sociodemographic data, duration of dialysis, smoking habit and tooth cleaning habits, medication history including the use of any anticoagulants, corticosteroids, antihypertensive and immunosuppressive drugs. History of diabetes, hypertension, anaemia, heart disease, and any other disorders were also recorded. The questionnaire was viewed by three public health dentist as well as two urologists to ensure its suitability for the present study. The questionnaire was pretested on a group of ten patients to check the feasibility as well as face validity and the appropriate modifications was made. The reliability of the questionnaire was evaluated by Cronbach's coefficient alpha to measure the internal consistency and test-retest method to examine the stability of the

questionnaire. The alpha coefficient of 0.79 was considered adequate. Test-retest reliability was measured by having the same set of respondents to complete a questionnaire at two different points of time within which there was no change of the constructs of interest. Intraclass correlation coefficient (ICC) with 95% confidence interval was used for assessing the reliability. ICC measures the strength of agreement between repeated measurements. The value of the ICC was 0.72. An ICC 0.4–0.75 was an indication of fair to good reliability. The questionnaire was personally administered and the patients were explained regarding the motive of the study and how to complete the questionnaire. It was emphasized that the confidentiality of the responses made by them would be strictly maintained.

Each participant underwent a WHO type IV⁷ examination using mouth mirrors and WHO (clinical) probe at the bedside while the patient attended the hemodialysis clinic. Clinical examination was performed with help of the following indices.

1. For assessing the thickness of plaque, Silness and Loe⁸ Plaque index (PI) (1964) was used. After the teeth were dried, the microbial dental plaque was scraped by dental explorer and evaluated by the unaided eye.
2. The periodontal condition was examined using the probing pocket depth (PPD) to measure the distance between the bottom of the pocket and the margin of the gingiva from the six sites of each tooth (mesiobuccal, midbuccal, distobuccal, distolingual, midlingual and mesiolingual).
3. For evaluating gingival status, Loe and Silness Gingival Index (GI) of (1963)⁹ was used
4. The criteria used for the recording of decayed (D), missing (M), and filled (F) components were according to the rules of DMFT¹⁰ index (1997 modifications).
5. Evaluation of the periodontal status was done using community periodontal index (CPI).¹¹

STATISTICAL ANALYSIS

A descriptive analysis that included mean and standard deviation for each clinical parameter was carried out for all groups according to the length of time the subjects had been on HD. The Kolmogorov–Smirnov test was applied to test for normal distribution of data, and Levene's test was used to verify homogeneity of variances. The chi-square test was used to determine associations between group and categorical variables. The ANOVA test was used to verify statistically

significant differences among the groups. Spearman and Pearson’s correlation coefficients were calculated to evaluate the relationship between length of time on dialysis and the clinical parameter values. The level of significance was accepted as $p \leq 0.05$. For statistical analysis, SPSS 17.0 for Windows was used (SPSS Inc., Chicago, IL, USA).

RESULTS

A total of 133 patients were registered for the study, of these patients, the one undergoing haemodialysis for Less than 1 years of HD were 53 whereas the

one undergoing HD for 1-3 years and for more than 3 years were 47 and 33 respectively.

Table 1 represents the demographical data of subjects with respect to duration of hemodialysis. No statistically significant differences between the three groups were found with regard to age, gender, educational level, medical conditions (DM, hypertension, IHD, anaemia etc), tooth brushing frequency, use of dental floss, medications (corticosteroids, antihypertensive, anticoagulants, immunosuppressants), smoking habit and the frequency of dental visits.

Table 1: Demographical data of subjects on hemodialysis

Characteristic	Less than 1 years of HD (n=53)	1-3 years of HD (n=47)	More than 3 years of HD (n=33)	p value
Age (years)				
20-39	31	25	14	0.35
40-79	22	22	19	
Gender				
Male	34	27	21	0.76
Female	19	20	12	
Educational level				
Uneducated	14	17	18	0.11
Secondary School	19	16	6	
Undergraduate & post-graduate	20	14	9	
Other medical conditions				
DM	7	5	11	0.68
Hypertension	22	24	14	
IHD	1	1	1	
Anaemia	3	6	2	
Any other	4	2	4	
Medication				
Anticoagulant	12	7	3	0.09
Corticosteroid	8	9	4	
Immunosuppressive	12	8	2	
Antihypertensive	21	23	24	
Smoking habit				
Current	19	21	16	0.28
Former	14	12	3	
Never	20	14	14	
Brushing frequency				
Daily	32	31	17	0.54
Sometimes	13	11	7	
Never	8	5	9	
Flossing frequency				
Once daily	4	7	2	0.46
More than once weekly but not daily	6	5	7	
Never	43	35	24	
Frequency of dental visits				
More than once annually	12	7	8	0.56
Every 1–2 years	5	8	4	
Every 2–5 years	9	13	9	
Greater than 5-year intervals	27	19	12	

Table 2: Decayed, missing, filled index values of subjects according to duration of hemodialysis

Characteristic	Less than 1 years of HD	1-3 years of HD	More than 3 years of HD	p value
	mean±SD	mean±SD	mean±SD	
Decayed teeth	1.96±1.72	3.02±2.18	5.64±3.91	0.0001*
Missing teeth	3.08±1.99	3.88±3.14	4.30±3.18	0.11
Filled teeth	2.20±1.09	2.98±2.01	2.54±1.83	0.07
DMFT	7.04±5.97	9.88±7.92	12.48±10.71	0.01*

Table 3: Data regarding periodontal indices (GI, PPD, GR, CAL, BOP and PI) based on the duration of haemodialysis

Characteristic	Less than 1 years of HD	1-3 years of HD	More than 3 years of HD	p value
	Mean±SD	Mean±SD	Mean±SD	
GI	1.04±0.57	2.01±1.38	2.58±1.89	0.0001*
PPD	1.14±0.82	1.84±0.93	2.23±1.17	0.0001*
GR	0.41±0.28	0.64±0.47	1.11±0.86	0.001*
CAL	2.06±1.32	2.71±1.76	3.37±2.28	0.004*
BOP	2.13±1.72	2.74±1.91	3.12±2.90	0.10
PII	1.32±0.67	2.16±1.12	2.96±1.87	0.0001*

* - significant results; PPD- probing pocket depth; CAL- clinical attachment level; PII- plaque index; GI- gingival index; BOP- bleeding on probing; GR- gingival recession.

Table 4: The Pearson Correlation coefficients between time on hemodialysis and Decayed, PD, CAL, PI, GI, and BOP

Time on HD	Decayed	PPD	CAL	PII	GI	BOP	GR
R	0.27	0.58	0.60	0.47	0.54	0.61	0.58
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

HD, group receiving HD therapy; r, correlation coefficient; decayed teeth; PPD, probing pocket depth; CAL, clinical attachment level; PII, plaque index; GI, gingival index; BOP, bleeding on probing; GR, gingival recession.

An evaluation of table 2 shows that group with more than three years on dialysis had a statistically significantly higher prevalence of decayed teeth ($p < 0.001$) and larger DMFT index ($p < 0.01$)

Table 3 compares the mean values for the periodontal indices that included gingival inflammation (GI), probing pocket depth (PPD), gingival recession (GR), clinical attachment level (CAL), bleeding on probing (BOP), plaque index (PII). The mean values were statistically significant for all the periodontal indices, except for bleeding on probing, when compared among three groups. The poor periodontal health is associated with the duration of haemodialysis.

Table 4 shows that the length of time the subjects were on dialysis was statistically correlated to Decayed, PD, CAL, PII, GI, and BOP and there was a strong correlation between length of time on HD and Decayed ($r = 0.27$, $p < 0.001$), PPD ($r = 0.58$, $p < 0.001$), CAL ($r = 0.60$, $p < 0.001$), PII ($r = 0.47$, $p < 0.001$), GI ($r = 0.54$, $p < 0.001$), BOP ($r = 0.61$, $p < 0.001$) and GR ($r = 0.58$, $p < 0.001$).

DISCUSSION

It is well documented that systemic conditions may affect the oral cavity; in contrast to the oral conditions affecting the systemic health remains speculative. Oral health care is integral to comprehensive treatment. The possibility that mortality and morbidity from systemic disease may be reduced by improving periodontal health needs to be examined more closely. Renal dialysis and transplantation are listed among the medical conditions in which oral health care is

fundamental.¹² End stage renal disease (ESRD) encompasses a wide range of metabolic disorders affecting every system of the body leading to a very immunocompromised situation. The incidence of ESRD continues to rise worldwide and in India, a conservative estimate of ESRD burden, based on a population of 1.1 billion is that 1,650,000-2,200,000 people develop ESRD annually and as a consequence, increasing number of individuals with such disease will probably continue to require oral health care.¹³ The susceptibility of oral diseases (esp. periodontal diseases) varies among people and is not even, as various factors such as host response, pathogenic flora, age, gender, education, and the frequency of dental visits influences oral health and as well as systemic health.

The present study compares the dental and periodontal status of 133 subjects with ESRD by the length of time they had been on HD. Our results suggest direct relationship of poor dental status with that of increase in duration of HD. These results are in agreement with the findings of Sekiguchi RT et al¹⁴, Al-Wahadni and Al- Omari¹⁵ who suggested that it could be related to hyposalivation induced by the HD therapy. Saliva plays an important role in protecting the teeth from caries by removing microorganisms and cariogenic dietary components from the mouth. It has been suggested by Epstein¹⁶ et al and Jaffe¹⁷ et al that the caries activity in patients on dialysis is lower, as an increased urea concentration in saliva leads to higher pH levels. Higher salivary urea levels could potentially protect the teeth from demineralization but on the contrary enhance calculus formation in dialysis patients.¹⁸

Our results suggests direct relationship of poor oral health with that of increase in duration of HD that is subjects who have been undergoing HD for more than 3 years had deeper probing depths, more attachment loss, more recession, more bleeding on probing and more plaque deposits, which suggests that the longer a person was on HD, the more likely it could have a negative effect on oral health. The mean values for PD and CAL were statistically significantly higher in Group with >3 years. These data were in agreement with the reports from Sekiguchi RT et.al¹⁴ Duran and Erdemir¹⁹ and Cengiz et al²⁰ who found a positive correlation between length of time their subjects had been on HD and decrease in oral health status

A strong correlation between the number of teeth with bleeding and the number of teeth covered with dental plaque and calculus was found. This is in agreement with previous studies by Bots CP²¹ et al and Oshrain HI²² et al on healthy individuals

An improvement in oral hygiene might reduce the amount of dental plaque and calculus, resulting in a reduction of the number of elements with bleeding. However, it should be taken into account that medication of HD patients, such as anti-coagulant therapy, might mask the effect of an improvement of oral health measures.

CONCLUSION

Within the limits of the study, it was concluded that subjects who were being treated with HD for more than 3 years had a poorer periodontal health and a higher DMFT index score, suggesting that the length of time on HD could negatively affect the oral health status of these individuals. Thus, awareness must be raised among dialysis patients, the nephrologists and the dentists about the need for primary dental prevention. All the dental professionals must be acquainted with the treatment priorities, operative concerns and precautions to be taken in the patients afflicted from ESRD.

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