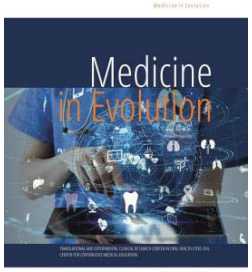
Oral health of hemodialysis patients compared to healthy individuals



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Abstract

Aim and objectives: The aim was to evaluate the oral health status of hemodialysis patients and compare it to individuals with no kidney disease. Materials and Methods: A cross-sectional study was conducted on 217 hemodialysis patients and 50 controls, in Bucharest. Demographic data, DMFT index, Silness and Löe plaque index, clinical attachment level and periodontal pocket depth were recorded. The data was analyzed using SPSS (16.0). Results: There were significant differences between the two groups regarding missing teeth - 11.7±8.7 for dialysis patients and 9.2±8.0 for controls and for the Silness and Löe plaque index - 1.4±1.3 in dialysis patients and 0.8±0.6 in controls. Severe periodontal disease was more prevalent in the hemodialysis group, 33.5% compared to 11.4% in controls. Conclusion: Oral health related to missing teeth, severe periodontal disease and oral hygiene is significantly more precarious for patients undergoing hemodialysis.

Keywords: Renal insufficiency, haemodialysis, oral health, periodontal disease

INTRODUCTION

A large number of studies performed worldwide during the last 25 years on chronic kidney disease (CKD) and end stage renal disease (ESRD) patients reported a diminished oral health status for this population [1-7]. These studies found that periodontal disease, especially in severe forms, is more frequent in ESRD patients [2,4], leading to increased tooth loss and diminished oral health related quality of life.

Malnutrition and inflammation, which are frequently present in hemodialysis (HD) patients, are considered indicators of poor prognostic for survival [6, 8]. Oral infections, especially periodontal disease, can contribute to malnutrition and inflammation in these patients [3], having a potentially negative influence on the metabolic disorders and survival of these patients [5, 6].

Aim and objectives

The aim of the study was to evaluate the oral health status of HD patients and compare it to individuals with no kidney disease.

MATERIALS AND METHODS

A cross-sectional study was conducted on patients with end-stage renal insufficiency from two hemodialysis centers in Bucharest – Fresenius Nephrocare Dialysis Centre and IHS Sf. Pantelimon Dialysis Centre - in 2011 and 2012, respectively. All patients treated in the two centers, who gave their informed consent, were included in the study. The study was approved by the Ethics Committee of the Carol Davila University of Medicine and Pharmacy in Bucharest.

The data was gathered by a single person, through an interview and a dental examination, during the dialysis session.

Demographical data and data regarding the educational level and the smoking habit were obtained through an interview of the patient. Clinical data included: the DMFT index, the plaque index according to Silness and Loe, the total number of functional teeth, the clinical attachment level (CAL), the periodontal pocket depth (PPD). Periodontal measurements were done using the periodontal probe recommended by the World Health Organisation (WHO). The severity of the periodontal disease was considered in accordance to the evaluation system proposed by the Centre for Disease control (CDC) and the American Academy of Periodontology in 2003 [9]: severe periodontal disease – 2 or more approximal sites with CAL>=6 mm and 1 or more approximal sites with PPD>=5 mm, on different teeth; moderate periodontal disease - 2 or more approximal sites with CAL>=4 mm or 2 or more approximal sites with PPD>=5, on different teeth.

Statistical analysis was performed using the 16.0 version of the SPSS. A p value of 0.5 or less was considered statistically significant.

RESULTS

Dialysis group

The total number of patients was 217 of which 55.3% (120) were men. The mean age of the group was 59.2 ± 12.4 years. There were 82.5 % (179) subjects living in an urban environment. Among the subjects, 23% (50) had higher education and 46.5% (101) had secondary education. Regarding the smoking habit, 81% (177) didn't smoke, 1.4% (3) smoke 2 packets a day and 6% (13) smoke 1 packet per day. The primary renal disease was represented by chronic glomerulopathies for 29% of the subjects and diabetes for only 12%.

Control group

There were 50 individuals in the control group, of which 42% (21) were men. The mean age of the group was 60 ± 15 years. There were 86% (43) controls living in an urban area. Within this group, 36% (18) had higher education and 42% (21) had secondary education. Among the subjects 36% (18) smoked, with 10% (5) smoking 1 packet a day.

Analysis showed no statistically significant differences between the dialysis and control groups regarding mean age, gender distribution, living environment, education or smoking habit.

Comparison between dialysis patients and controls

Data regarding the dental and oral hygiene status is available in Table 1. Dialysis patients had statistically significant more missing teeth, less fillings and functional remaining teeth and poorer oral hygiene than controls.

Edentulous mandibular ridge class I and II Kennedy and edentulous maxillary ridge class I Kennedy are statistically significant ($p<0.01$ for Pearson χ^2) more frequent in dialysis patients.

Table 1. Dental and oral hygiene status: comparison between dialysis patients and controls (means±SD)

	Dialysis group	**Control group**	**Test Mann-Whitney**
Caries - D	1.8±2.4	1.5±2.2	p=0.294
Missing teeth - M	11.7±8.7	9.2±8.0	**p=0.050**
Fillings - F	3.4±4.6	6.0±4.8	**p<0.001**
DMFT index	16.9±8.4	16.7±7.5	p=0.766
Functional remaining teeth	11.7±9.4	19.6±8.6	**p=0.050**
Silness and Loe plaque index	1.4±1.3	0.8±0.6	**p<0.000**

Periodontal markers and disease were assessed only for individuals with more than 4 remaining teeth, namely on 86.6% (188) of the dialysis patients and on 88% (44) of the controls. Table 2 contains data related to the periodontal status.

Table 2. Periodontal status: comparison between dialysis patients and controls

	Dialysis group	**Control group**	**p**
Mean PPD	2.6±0.9	2.2±0.8	**p=0.018***
Max PPD	4.6±1.5	4.0±1.4	**p=0.014***
Mean CAL	3.5±1.4	2.8±1.1	**p=0.001***
Max CAL	6.6±2.3	5.2±1.7	**p=0.001***
No/mild periodontal disease	13.8%	31.8%	**p<0.001****
Severe periodontal disease	33.5%	11.4%	**p<0.001****
Moderate/severe periodontal disease (<51 years old)	68%	31%	**p=0.018*****
Moderate/severe periodontal disease (>65 years old)	96%	77%	**p= 0.048*****

* Test Mann-Whitney; **Test t Student for percentage comparison; *** Test χ^2 Pearson.

The severity of periodontal disease is also different between the two groups. Severe periodontal disease is statistically significant more frequent in dialysis patients ($p<0.001$ fort Mann-Whitney test). To further investigate the distribution of periodontal disease between the groups we performed an analysis on 3 age intervals: younger than 51 years, between 51-65 years and older than 65 years. The difference between dialysis patients and controls is statistically significant for the age segments younger than 51 ($p= 0.018$, for Pearson χ^2) and older than 65 ($p= 0.048$, for Pearson χ^2).

The relative risk (odds ratio) regarding periodontal disease was performed: the risk of having moderate/severe periodontal disease is approx. 3 time higher (odds ratio=2.9, with

1.4-6.2 95% confidence interval) for the dialysis group when compared to controls. Also, a loglinear model was performed to check whether having periodontal disease is influenced by factors (gender, age, place of residence) other than being on haemodialysis. The analysis showed that the only significant interaction was between the variables „periodontal disease" and „being on haemodialysis", emphasising that the higher prevalence of periodontal disease among haemodialysis patients is not significantly influenced by age, gender or place of residence but only by having terminal renal insufficiency.

DISCUSSIONS

This study found severe periodontal disease is prevalent in 33.5% of the dialysis patients which is higher than the approx. 18% prevalence reported by the World Health Organisation for the European region 2022 [10] and higher than in the individuals in the control group. These findings are in accordance with most of the studies performed on the dialysis population around the world which concluded that periodontal disease is more prevalent in HD patients than in the general population [1, 2, 5]. Moreover, oral hygiene is also more precarious within the ESRD individuals which could lead to the further aggravation of the periodontal disease and increased tooth loss.

The percentage of dialysis patients with total edentulism or fewer than 4 remaining teeth was 13.4% is similar to the one reported by Gurkan et al among Turkish HD patients [7]. This study found that the number of functional remaining teeth is significantly lower in HD patients; also, terminal edentulism (class I and II Kennedy) is significantly more prevalent in dialysis patients. This could be interpreted as a consequence of severe forms of periodontal disease and could have a negative impact on the nutrition status of the HD patient (as mastication is impaired) and on the oral health related quality of life.

Periodontal disease can be prevented by practicing good oral hygiene, eating a healthy diet, and not smoking. If periodontal disease does develop, its progression can be slowed or stopped with proper dental treatment, regular checkups, and continued education on oral hygiene [9]. The present study showed that periodontal health is affected at an early age in the HD population, as significantly more HD patients younger than 51 years old had moderate/severe periodontal disease when compared to same age group controls. As most studies report higher prevalence of severe periodontal disease among HD patients the dental professionals should take the proper steps in providing correct dental care for this population and efficient education towards correct oral hygiene habits.

CONCLUSIONS

Oral health regarding number of missing teeth, oral hygiene and the prevalence of moderate and severe periodontal disease is significantly higher in patients with terminal renal insufficiency treated by haemodialysis than in controls. Also, the risk (odds ratio) of having moderate/severe periodontal disease is 3 times higher for haemodialysis patients than for individuals with no renal disease.

There is a need for effective management of the periodontal disease among the haemodialysis patients regarding efficient treatment, regular recalls and education regarding correct oral hygiene.

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