

ON THE PERIODONTAL STATUS AND ORAL HYGIENE IN CHRONIC KIDNEY DISEASE PATIENTS

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Abstract

The purpose of the present study was to assess the local periodontal status in haemodialysis patients and to correlate the findings with the quality and quantity of oral hygiene and smoking status. Each patient was clinically examined and filled in a questionnaire regarding the oral hygiene habits and smoker status. The subjects presented mean PI values of $58.00 \pm 20.7\%$ and $63.5 \pm 16.4\%$ bleeding areas; the mean periodontal pocket number was of 77 ± 23 , the clinical attachment loss - 4.93 ± 1.13 mm and periodontal probing depth - 4.36 ± 0.59 mm. A high number of heavy smokers (29 ± 1.34) was recorded; the smoking status was positively correlated with pocket depth and attachment loss. Also, a high number of patients accused the sensation of xerostomia. The long-term effective plaque control measures are a necessity for the CKD patient. A better understanding of the systemic and oral abnormalities in individuals with renal disease will help dentists and oral healthcare workers to render efficient oral care and plan preventive regimens tailored to individual needs.

Keywords: *periodontal status, oral hygiene, smoking, chronic kidney disease, haemodialysis.*

1. INTRODUCTION

Numerous medical conditions can influence the oral health of patients, among which chronic kidney disease (CKD) is increasing worldwide [1].

CKD is accompanied by a progressive and irreversible decline in the total number of functioning nephrons, which causes a decline in the glomerular filtration rate. Severe clinical and laboratory changes, related to the inability of the kidney to excrete metabolites and perform endocrine functions, are registered [2].

Chronic kidney disease can induce a wide spectrum of oral manifestations in the hard and soft tissues, including dental calculus [3], dry mouth [4], poor oral hygiene and uremic stomatitis, and may also cause changes in the salivary composition and flow rate [5].

The characteristic gingival and periodontal lesions are the result of biofilm-induced, orchestrated inflammatory responses involving the innate and adaptive arms of the immune system. Inflammation limited to the gingiva is the outcome of a well-balanced symbiosis between biofilms and the host tissues, while periodontitis is the result of the breakdown of this symbiosis [6,7]. Moreover, it may be speculated that even the most common forms of periodontal diseases are merely analogous phenotypes of different pathogenetic pathways, initiated by biofilm products, of which only a few lead to tissue destruction in susceptible hosts.

In relation with such bacterial burden, various local and systemic factors are manifesting, which enhance the bacterial activity and possibly interfere with the host response to bacterial aggression [8,9]. Poor oral hygiene, dental calculus, smoking can represent important local risk factors, while chronic kidney disease, by its complications and characteristics, is a well-known systemic unbalancing factor.

The purpose of the present study was to assess the local periodontal status in haemodialysis patients and to correlate the findings with the

quality and quantity of oral hygiene and smoking status.

2. MATERIALS AND METHODS

The study was conducted in the "C.I.Parhon" Hospital of Iași, Nephrology Section, in collaboration with the Periodontology Clinic of the "Grigore T. Popa" UMPH - Iași.

The test group included thirty-six patients with chronic periodontitis and chronic kidney disease. All patients had ages between 32 and 58 years.

The exclusion criteria were represented by:

- Unfavourable systemic diseases (rheumatic fever or heart conditions which require prophylactic therapy with antibiotics)
- Pregnancy
- Women with hormonal substitution therapy or oral contraceptives
- Patients with steroidal or non-steroidal anti-inflammatory drug therapy (in the last 3 months) or antibiotics (in the last 6 months)
- Smoking
- Patients who underwent periodontal treatment in the last 6 months.

In order to assess the degree of metabolic control and to establish the evolution stage of CKD and of the periodontal disease, a rigorous clinical examination was conducted, completed by laboratory investigations and specialized inter-clinical consultations. A research sheet was filled in for each patient.

Data regarding the history and evolution of CKD were obtained from the anamnesis and the nephrology clinical hospital sheet of the patient.

Before any type of investigation, the informed consent was obtained from the patients/parents/tutors and also from the specialty doctors who took care of the hospitalized patients.

For periodontal recording, all 4 surfaces of the tooth were examined and the oral cavity was divided into 4 quadrants.

The periodontal disease indexes were the following:

- Plaque index (PI)
- Papillary bleeding index (PBI)

- Clinical attachment loss, measured by periodontal probing and radiologic examination (CAL)
- Periodontal pocket depth (PPD)

Each patient filled in a standard questionnaire regarding the oral hygiene habits and smoker status.

The Chi-square test was conducted to assess if a group is established inside or outside the reference interval for a certain variable, according to the frequency of patients in each category.

3. RESULTS

Gender distribution in the study group was of 20 male and 16 female subjects, with a mean age of 46 ± 6 years.

The subjects presented mean PI values of $58.00 \pm 20.7\%$ and $63.5 \pm 16.4\%$ bleeding areas; the mean periodontal pocket number was of 77 ± 23 , clinical attachment loss of 4.93 ± 1.13 mm and periodontal probing depth of 4.36 ± 0.59 mm (Table 1).

The PPD values were classified as follows: <3 mm (superficial), $3-5$ mm (moderate) and ≥ 6 mm (deep); the classes presented a high variance between groups and only the test group presented deep periodontal pockets.

Table 1. Periodontal parameters in the study group

Parameter	Mean \pm standard deviation
No. of periodontal pockets >4 mm	77.08 ± 23.23
Pocket depth (mm)	4.36 ± 0.59
Attachment loss (mm)	4.93 ± 1.13
Gingival recession (mm)	0.56 ± 0.88
Plaque index (%)	58.04 ± 20.70
Bleeding index (%)	63.57 ± 16.39
Calculus index	61.30 ± 23.40

A high number of heavy smokers (29 ± 1.34) was recorded; the smoking status was positively correlated with pocket depth and attachment loss. Also, a high number of patients accused the sensation of xerostomia (dry mouth) (Table 2).

The mean value for the frequency of tooth brushing was of 0.76 ± 0.2 , which is a relatively low value, correlated with the plaque index, bleeding index and pocket depth. Most of the subjects used manual tooth brushes whose usage time frame highly exceeded the normal standard time of three months.

Table 2. Questionnaire data for the study group

Item	Mean \pm standard deviation	
Smokers	29 \pm 1.34	
No. of cigarettes/day	16 \pm 2.45	
Xerostomia	28.65 \pm 2.11	
No. of tooth brushings/day	0.76 \pm 0.2	
Tooth brush type	Manual	32 \pm 1.23
	Electric	0.2 \pm 0.34
Time of tooth brush usage (months/tooth brush)	9.87 \pm 1.32	
Supplementary oral hygiene measures	7.54 \pm 1.76	

4. DISCUSSION

The development and progression of the periodontal disease in an individual are "personalized" by a number of endogenous and exogenous factors. Assessment, knowledge and proper management of these factors facilitate prevention of the disease or its containment in the case of a manifest periodontal condition.

The risk factors for periodontal disease may be local and systemic. Among the local ones, we can count a poor oral hygiene, carious lesions, malocclusion, absent teeth which have not been replaced, parafunctions, oral breathing, smoking, iatrogenies, etc [9].

The systemic factors can be divided into physiologic factors (puberty, pregnancy, menopause) and general pathologic factors, which include systemic diseases, such as diabetes, cardiovascular diseases, atherosclerosis etc. Among the last ones, the chronic kidney disease plays an important and very complex role.

A common oral symptom of CKD is the sensation of dry mouth, which may be caused by restricted fluid intake (necessary to accommodate the reduced excretory capacity of the kidney), adverse effects of drug therapy, and a low salivary flow rate [10]. In our study, a high number of subjects presented xerostomia.

Gingival inflammation has been reported to be due to plaque accumulation and poor oral hygiene [11]. Attention has been given to general medical care and prolonged hospitalization as causes of high plaque scores in these patients, findings also common for our study.

Calculus has an important effect on gingival and periodontal disease incidence. Patients with CKD demonstrated an elevated level of calculus, our results being supported by literature data [4]. Elevated salivary pH, decreased salivary magnesium, and high levels of salivary urea and phosphorus lead to precipitation of calcium-phosphorus and calcium oxalate, and thus to dental calculus formation [12,13].

Medical management of renal disease depends on its stage and on the clinical status of the patient. Subjects with renal disease undergoing hemodialysis require special consideration as to the risk of excessive bleeding or infection and medications. The bleeding tendency in these patients is attributed to the use of anticoagulants and maintenance of vascular access.

Elective dental procedures are recommended on the day after dialysis, when the circulating toxins have been eliminated, the intravascular volume is high, and the products of heparin metabolism are in an ideal state [10]. At this time, the patient is best able to tolerate the dental treatment. The anticoagulant effects of heparin used during dialysis do not produce residual bleeding abnormalities because they last only 3-4 h post-infusion [14]. Arterio-venous shunts should not be jeopardized, and the affected arm should never be used for intravenous or intramuscular injection.

Long-term effective plaque control measures are a necessity for the CKD patient. A better understanding of the systemic and oral abnormalities in individuals with renal disease will help dentists and oral healthcare workers to render efficient oral care and plan preventive regimens tailored to individual needs. Having in

mind that the signs and symptoms of the renal disease can be observed in the oral cavity, the dentist can play an important role in the diagnosis and treatment of these patients.

Early diagnosis and treatment of oral disease are absolutely necessary and will minimize the need for extensive dental care. Patients and guardians should be informed on the role of oral hygiene in reducing the risks of oral infections, septicemia and endocarditis.

5. CONCLUSIONS

The periodontal status in chronic kidney disease patients who undergo haemodialysis presents severe changes, manifested by a high degree of periodontal tissue loss, accompanied by increased values of plaque and calculus indexes. These data correlate to a poor oral hygiene control and also to a heavy smoking status. The role of the dental specialist is of utmost importance in the management of the haemodialysis patient.

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