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Relationship between Chronic Kidney Disease and Oral Health

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Abstract The article describes the prevalence and intensity of dental diseases in patients with CKD in Uzbekistan. The results obtained after the use of standard dental treatment are presented: data on the intensity and prevalence of caries, the dynamics of the hygienic state, periodontal status and the state of the oral mucosa, assessment of the fillings state in patients with CKD.

Keywords Caries, Prevalence, Intensity, Non-carious lesions, Periodontal disease, Oral mucosa, Dentistry, Chronic kidney disease, CKD

1. Introduction

Almost all chronic diseases of the body are associated with poor oral health, which leads to the need for better dental care. This is especially evident in patients with chronic kidney disease, where oral disease is a potential cause of deterioration in their already fragile health. [18,19].

Existing data on the prevalence and severity of oral disease in patients with chronic kidney disease are limited to small samples. Studies show various cases of oral diseases in such patients. However, based on this meager data, it is estimated that almost 90% of patients with chronic kidney disease exhibit some oral disease symptoms, especially gingival hyperplasia, xerostomia, and changes in salivation and salivary composition [4].

Patients with chronic kidney disease require special attention from the dentist due to multiple manifestations in the oral cavity, side effects and treatment of the underlying disease [4].

The need to study the manifestation of CKD in the oral cavity in patients in Uzbekistan was the purpose of this study.

2. Study Materials and Methods

The study involved 100 people, including 68 patients with CKD, of which 15 patients received hemodialysis. 32 practically healthy people made up the control group. The age of the patients was 45-56 years. Men - 58, women - 42 people. The study took place in 2020-2022. on the basis of the Samarkand regional multidisciplinary center and third clinic of the Tashkent Medical Academy.

The patients were divided into the following groups:

1. A group of persons without pathology of the urinary system - 32 people (group A);
2. Patients with chronic kidney disease who are not on hemodialysis treatment - 53 people (group B);
3. Patients with chronic kidney disease undergoing hemodialysis treatment - 15 people (group B).

Table 1. Examined patients with CKD, depending on the disease stage [21]

CKD stages	Patient numbers, n=68
Stage 1: Normal GFR (>90 ml/min/1.73 m²) with signs of nephropathy.	14
Stage 2: GFR 60-89 ml/min/1.73 m².	13
Stage 3a: 45-59 ml/min/1.73 m²	9
Stage 3b: 30-44 ml/min/1.73 m²	8
Stage 4: GFR 15-29 ml/min/1.73 m² (pre-dialysis stage)	9
Stage 5: GFR <15 ml/min/1.73 m² (dialysis stage)	15

Dental status was assessed using a clinical examination of the oral cavity: patient complaints were collected, the state of hard dental tissues (presence of plaque, carious spots and cavities, non-carious lesions), periodontal disease (tooth mobility, bleeding, presence of pathological pockets), the state of oral mucosa were identified. For examination, a set of dental instruments was used: a mirror, tweezers, a graduated probe.

To assess the prevalence and intensity of periodontal diseases, the need for treatment of periodontal diseases, the CPITN index was used.

All groups underwent dental treatment according to the recommended protocols. Modern composite materials

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were used in the treatment of caries and non-carious lesions of hard dental tissues, modern filling and medication preparations in the treatment of complications of caries and periodontal diseases and oral mucosa.

In the treatment of periodontal diseases, taking into account their course and severity, as well as to prevent their recurrence, professional hygiene was carried out every six months. Treatment and prophylactic manipulations for the treatment and prevention of diseases of the oral mucosa were carried out.

After 6 and 12 months, the safety of fillings, the effectiveness of endodontic treatment, and the hygienic status of patients were checked.

Patients with CKD are prone to developing oral lesions due to the pathological process or therapy, or both. Oral lesions and past caries are unconventional risk factors for the progression of CKD.

Table 2. The volume of therapeutic and preventive dental care for the examined patients

Performed medical and hygienic dental procedures	Patients		
	Group A, n=32	Group B, n=53	Group C, n=15
Treatment of uncomplicated caries	16 teeth	36 teeth	15 teeth
Treatment of non-carious lesions	6 teeth	11 teeth	8 teeth
Endodontic treatment of pulpitis	12 teeth	17 teeth	5 teeth
Endodontic treatment of periodontitis	6 teeth	10 teeth	4 teeth
Removal	6 teeth	13 teeth	6 teeth
Treatment of inflammatory periodontal diseases	11 people	11 people	9 people
Professional oral hygiene	32 people	53 people	15 people
Treatment of the oral mucosa diseases	5 people	12 people	12 people

3. Dental Status Study Results

Group A patients were treated for carious teeth, non-carious lesions, endodontic treatment and extraction of non-treatable teeth. In total, 22 teeth were treated for carious and non-carious lesions in this group, 18 teeth were treated endodontically for pulpitis and periodontitis, and 6 teeth were removed (the main reason was complications of pulpitis and periodontitis - 33.33%). At the initial examination, the number of filled teeth was 3.21±0.24, when examined after 6 months, the number of filled teeth increased to 3.64±0.33, after 12 months - 3.68±0.43. The number of teeth affected by the carious process decreased from 1.59±0.13 at the first examination to 1.28±0.13 at the examination a year later (reduction by 24%). The increase in the prevalence of caries for 1 year is 2.8%.

In this group, the "P" component is predominant: 3.21±0.24-3.68±0.43, against "C" - 1.19±0.14-1.59±0.13 and "U" - 1.16±0.11-1.24±0.18. We attribute this to the medical and hygienic measures taken.

Assessment of the state of seals after six months revealed their safety in 98.1% of cases, after a year - in 95.7%.

The radiological method revealed the absence of periapical lesions in endodontically treated teeth in 97.3% after 6 months and 95.2% after 12 months.

Table 3. Complaints analysis and objective examination indicators of patients with CKD

Manifestations of CKD in the oral cavity	Frequency of occurrence, %		P
	Group B	Group C	
Bleeding gums	87,9	88,1	<0,001
Xerostomia	44,8	34,0	<0,01
Burning mucous	30,4	48,3	<0,001
Difficulties in eating	27,0	63,0	>0,1
Bad breath	35,2	17,2	<0,001
Bad taste in the mouth	27,6	13,4	<0,01
Gingival recession (exposing the necks of the teeth)	63,0	100,0	<0,001
Large amount of soft plaque	89,0	97,0	>0,1
Large amount of dental plaque	92,0	62,5	<0,01
Swelling of the cervical gums and interdental papillae, their friability and hyperemia	62,1	100,0	<0,001
Prolonged healing of lesions	32,0	93,0	<0,001
Parageusia	28,6	34,0	<0,01
Pallor	75,9	37,0	<0,001
Plaque on the tongue	10,3	13,3	>0,1
Depapilated tongue	3,3	1	<0,01
Petechiae SOPR	13,8	23,0	<0,001
Pigmentation on SOPR	27,6	14,3	<0,01
Candidiasis	3,4	0	<0,001
Ulceration	7	10,3	>0,1
Uremic stomatitis	2	0	<0,01
Pathological abrasion	37,9	44,7	<0,001

Table 4. Change in the prevalence (%) and intensity of caries in group A

Examination	Prevalence	Intensity (CPU) (M±m)	C (M±m)	P (M±m)	U (M±m)
Initial Examination	60,8	5,96±0,31	1,59±0,13	3,21±0,24	1,16±0,11
Examination after 6 months	62,4	6,01±0,42	1,19±0,14	3,64±0,33	1,18±0,16
Examination after 12 months	63,6	6,2±0,41	1,28±0,13	3,68±0,43	1,24±0,18
P<0,001					

Table 5. The reason for teeth extraction in the group A

Teeth extraction reason	Complications of pulpitis and periodontitis	Periodontal disease (periodontitis and periodontal disease)	For other indications
	2 teeth (33,33%)	2 teeth (33,33%)	2 teeth (33,33%)

Table 6. Change in the prevalence (%) and intensity of dental caries in group B patients

Inspection	Prevalence	Intensity (КПУ) (M±m)	C (M±m)	P (M±m)	U (M±m)
Initial inspection	65,0	6,37±0,29	1,27±0,17	3,89±0,35	1,27±0,12
Review after 6 months	70,0	6,43±0,36	1,34±0,16	3,94±0,53	1,32±0,15
Review after 12 months	70,2	6,6±0,43	1,7±0,15	3,43±0,33	1,24±0,15
P<0,001					

Group B patients underwent treatment of carious teeth, endodontic treatment and extraction of non-treatable teeth. In total, 47 teeth were treated for carious and non-carious lesions in this group, 27 teeth were endodontically treated for pulpitis and periodontitis, and 13 teeth were removed (the main cause was periodontal disease - 46.15%). At the initial examination, the number of filled teeth was 3.43±0.33, when examined after 6 months, the number of filled teeth increased to 3.89±0.35, after 12 months - 3.94±0.53. The number of teeth affected by the carious process increased from 1.27 ± 0.17 at the first examination to 1.7 ± 0.15 at the examination a year later (an increase of 33.8%). The increase in the prevalence of caries for 1 year is 5.2%.

In this group, also, the component "P" is predominant: 3.43±0.33-3.89±0.35 (with a reduction in a year by 13.4%), against "C" - 1.27±0, 17-1.7±0.15 (increase in a year by 33.8%) and "U" - 1.24±0.15-1.32±0.15. An assessment of the condition of the fillings after six months revealed their safety in 87.2% of cases, after a year - in 81.0%.

X-ray showed no periapical lesions in endodontically treated teeth in 89.1% at 6 months and 77.1% at 12 months.

Table 7. Reasons for teeth extraction in group B

Teeth extraction reasons	Complications of pulpitis and periodontitis	Periodontal disease (periodontitis and periodontal disease)	For other indications
	4 teeth (30,76%)	6 teeth (46,15%)	3 teeth (23,08%)

Table 8. Change in the prevalence (%) and intensity of dental caries in group B patients

Inspection	Prevalence	Intensity (CPU) (M±m)	C (M±m)	P (M±m)	U (M±m)
Initial inspection	71,5	7,0±0,29	1,4±0,17	4,28±0,35	1,32±0,12
Review after 6 months	74,1	7,07±0,36	1,5±0,16	4,33±0,53	1,24±0,15
Review after 12 months	76,1	7,26±0,43	1,87±0,15	3,77±0,33	1,62±0,15
P<0,001					

Group B patients underwent treatment of carious teeth, endodontic treatment and extraction of non-treatable teeth. In total, 23 teeth were treated for carious and non-carious lesions in this group, 9 teeth were treated endodontically for pulpitis and periodontitis, and 6 teeth were removed (the main cause was periodontal disease - 50.0%). At the initial examination, the number of filled teeth was 4.28±0.35, when examined after 6 months, the number of filled teeth increased to 4.33±0.53, after 12 months - 43.77±0.33. The number of teeth affected by the carious process increased from 1.4±0.17 at the first examination to 1.87±0.15 at the examination a year later (an increase of 33.57%). The increase in the prevalence of caries for 1 year is 4.6%.

And in this group, the “P” component prevails: 3.77 ± 0.33- 4.28 ± 0.35 (with a reduction in a year by 13.5%), against “C” - 1.4 ± 0.17- 1.87±0.15 (increase in a year by 33.6%) and "U" - 1.24±0.15-1.62±0.15 (increase by 30.6%).

Assessment of the state of seals after six months revealed their safety in 78.6% of cases, after a year - in 72.3%.

X-ray showed no periapical lesion in endodontically treated teeth in 78.2% at 6 months and 74.4% at 12 months.

Table 9. Reasons for teeth extraction in group B

Teeth extraction reasons	Complications of pulpitis and periodontitis	Periodontal disease (periodontitis and periodontal disease)	For other indications
	2 teeth (33,33%)	3 teeth (50,0%)	1 tooth (16,67%)

Prevalence of non-carious lesions of the teeth

Table 10. Pathological abrasion prevalence by degree

Pathological tooth wear	Group A	Group B	Group C	x^2	P
Missing	19 (59,37%)	12 (22,64%)	3 (20,0%)	11,87	<0,001
I degree	10 (31,25%)	15 (28,3%)	9 (60,0%)	4,34	0,026
II degree	3(9,37%)	19(35,85%)	2(13,3%)	0,81	>0,09
III degree	0 (0%)	7 (13,2%)	1 (6,67%)	0,34	>0,08

Non-carious enamel lesions (wedge-shaped defects and erosion) in group A occur in 32.1% of cases, in patients of group B - in 21.3% of cases, in group C - in 47.4%, (p = 0.049).

Erosions of hard tissues of teeth in patients with CKD occur in 25.4% of cases, and among healthy individuals - in 9.5% of cases (p=0.078). In patients of group C, erosion of hard tissues of teeth is observed in 35.4% of cases (p=0.067), and in group B - in 19.3% of cases. In patients with CKD, non-carious lesions are located on the labial / buccal and lingual sides, the depth almost reaches the pulp chamber (its translucence is observed).

Wedge-shaped defects are found in 28.2% of cases in patients with CKD and in 25.3% of group A (p>0.1). In group B, wedge-shaped defects occur in 17.2% of cases, which is significantly less than among healthy individuals (p=0.023). In the group of patients receiving hemodialysis, this indicator is 37.2% of observations (p>0.1). In patients with CKD, a combination of wedge-shaped defects and erosions is very often observed (86.3% of cases).

Dynamics of the hygienic state of the oral cavity in patients with CKD

During the initial examination, an unsatisfactory (high OHI-S index) hygienic condition was revealed in all groups: in healthy individuals, this indicator was 1.81 ± 0.12, in patients of group B - 2.3 ± 0.18, in group C - 2.52±0.23 (p<0.001).

Table 11. Changes in the hygienic index OHI-S in the examined patients

Inspection	Group A	Group B	Group C
Initial inspection	1,81±0,12* **	2,3±0,18	2,52±0,23
Review in a week	0,7±0,14* **	1,2±0,23	1,35±0,31
Review after 6 months	0,83±0,29 * **	1,3±0,3	1,5±0,19
Review after 12 months	0,97±0,12 * **	1,8±0,16	2,1±0,17

* statistically significant differences according to Student's t-test (p<0.001) between stages

** statistically significant differences according to Student's t-test (p<0.001) between groups

When studying a week after hygiene measures (cleaning soft and hard dental deposits, AirFlow, polishing teeth, teaching brushing techniques) in healthy individuals, the index value significantly (p<0.001) decreased (to 0.7 ± 0.14) and corresponded to a satisfactory level of hygiene. In group B, the index was 1.2±0.23 (p<0.001), and in group C it was 1.35±0.31 (p<0.001), which also corresponded to the average level of hygiene.

Examination six months after hygiene measures revealed the presence of plaque on all teeth. The OHI-S indices in healthy individuals were 1.13±0.29, in group B - 1.3±0.3, in group C - 1.5±0.19 (p<0.001).

A year later, in the group of people without CKD, the index value became 1.15±0.12, in group B - 1.8±0.16, in group C - 2.1±0.17 (p<0.001).

Studying the condition of the periodontium

In CKD patients, inflammatory processes of periodontal tissues are common. Their occurrence is shown in Table 12.

According to the data obtained, periodontal diseases are more common among patients with CKD than in patients of group A (p<0.007). The prevalence of periodontal disease in patients with CKD is 94.34% in group B and 93.33% in group C, and among healthy individuals - 46.88%. At the same time, in the group of patients receiving hemodialysis, inflammatory processes in the periodontium proceed to a slightly milder degree than among those who do not receive, however, severe periodontitis is observed among them 2.67 times more often (p = 0.014). Among persons of group B, gingivitis occurs in 11.3% of cases, mild periodontitis in 43.4%, moderate severity in 26.4%, and severe severity in 7.5%. In group B: gingivitis - 13.33% of cases, mild periodontitis 33.33%, moderate periodontitis - 26.66%, severe periodontitis - 20.0%.

Objectively, periodontal diseases in the presence of CKD are inactive - there is no exudation, the gums are dense, pale, which is due to a decrease in the activity of immunity in patients. Often, radiographic and clinical presentations do not match.

Gingival recession in examined individuals; met quite often: in 63.0% of cases in group B, in 100.0% in group C (p=0.02). Gingival recession is the result of dystrophic processes in the periodontium.

When evaluating the periodontal index CPITN, the prevalence and intensity of individual signs of periodontal pathology (bleeding, tartar, periodontal pocket) was established, and, depending on this, the need for periodontal care of the examined patients was determined. The results of this study are presented in table 13.

Patients with CKD to a greater extent (94.34% in group B and 93.33% in group C) need to improve individual and professional oral hygiene (p = 0.034), to eliminate factors contributing to plaque retention, also up to 33 .33% of cases in the course of curettage.

Table 12. Prevalence of inflammatory periodontal disease

Periodontal disease	Group A	Group B	Group C	x^2	P
Healthy periodontium	17 (53,12%)	3 (5,66%)	1 (6, 67%)	6,91	<0,078
Gingivitis	10 (31,25%)	6 (11,32%)	3 (20,0%)	1,54	>0,1
Mild periodontitis	6 (18,75%)	23 (43,4%)	5 (33,33%)	4,67	=0,026
Moderate periodontitis	4 (12,5%)	14 (26,4%)	4 (26,66%)	1,49	>0,1
Severe periodontitis	2 (6,25%)	4 (7,5%)	3 (20,0%)	0,08	>0,1

Table 13. Study results of the periodontium state (CPITN)

Scores	Признак	Group A, n=32	Group B, n=53	Group C, n=15	x^2	P
0	no disease	17 (53,12%)	3 (5,66%)	1 (6, 67%)	0,009	>0,008
1	Bleeding when inserting the probe, no tartar, no pocket	10 (31,25%)	6 (11,32%)	3 (20,0%)	0,64	>0,10
2	Phenomena of inflammation of the gingival edema, tartar, no periodontal pocket	6 (18,75%)	23 (43,4%)	5 (33,33%)	5,45	=0,013
3	Periodontal	4 (12,5%)	14 (26,4%)	4 (26,66%)	0,81	>0,10
4	pocket deep	2 (6,25%)	4 (7,5%)	3 (20,0%)	0,43	>0,009

Differences in the prevalence and intensity of individual signs of periodontal pathology (bleeding, tartar, periodontal pocket) were revealed (p=0.076). Periodontal pockets with a depth of 3.5 mm and deeper were more often observed in group B.

The degree of tooth mobility in patients with CKD does not differ (p>0.1). An increase in the degree of tooth mobility was found among patients whose total protein content in the blood is below 60 g/l (p=0.045).

Inflammatory lesions of the periodontium in patients with CKD occur against the background of dystrophic phenomena, which are significantly more common in patients receiving hemodialysis (p=0.027). Signs of periodontal disease are found in 37% of cases in patients with CKD and in 56% of cases in patients of group B. Deterioration of the hygienic state of the oral cavity aggravates the degree of inflammation (p=0.004). Increased blood creatinine leads to the development of osteodystrophic phenomena and dystrophy in periodontal tissues (p=0.03).

4. Study of Dental Status Discussion Results

We found that in all groups of patients with CKD, the prevalence and intensity of caries were higher than in individuals without urological diseases.

Our data indicate that all patients with CKD have an unsatisfactory hygienic level of the oral cavity, which coincides with the data of studies by many authors.

As a result, after the preventive measures taken a year later, the prevalence of caries in group A was 63.6% (an increase of 2.8% compared with the initial examination), the intensity of caries changed this period of time from 5.96 ± 0.31 to 6.2 ±0.41 (p<0.01), the increase in caries was 4.02%;. Examination after 12 months revealed the number of carious teeth equal to an average of 1.28±0.13.

When examined after a year of patients in group B, the increase in the prevalence of caries was 5.2%, with an intensity of 6.6 ± 0.43, the increase in the intensity of caries was 3.6%.

In group B, the increase in the prevalence of caries after 12 months was 5.4%. The intensity was 7.26±0.43, the increase in the intensity of caries was 3.71%.

Minor changes in the prevalence and intensity of dental caries clearly demonstrate that in patients with CKD these indicators are greatly affected by an increased level of urea in saliva, even despite a decrease in the mineralizing properties of the oral fluid and a deterioration in oral hygiene.

So, if during the examination a week after cleaning in group B the hygienic index was detected at the level of 1.2 ± 0.23 (during the initial examination, before cleaning - 2.3 ± 0.18), then after 12 months it was 1.8 ±0.16 (increase by 50%).

We can observe similar results in group B. During the initial examination, the hygienic index was 2.52±0.23, a week after cleaning - 1.35±0.35, and a year later it increased to 2.1±0.17 (increase by 55.55%).

While in group A, the hygiene index increased by 38.5% - from 0.7±0.14 a week after cleaning to 0.97±0.12 a year later.

Deterioration of the hygienic state in groups with CKD after a year is the result of a deterioration in the processes of natural self-purification, a decrease in the activity of local immunity. In this regard, we believe that doctors should motivate patients to perform individual hygiene procedures.

Abnormal wear of hard dental tissues (about 80% of patients with CKD) may be associated with uremia, which usually occurs in patients with CKD. It has been suggested that hypocalcemia secondary to chronic kidney disease, which contributes to renal osteodystrophy, is one of the causes of non-carious lesions of dental hard tissues [25].

Hyperpigmentation (27.6% and 14.3% in groups B and C) is likely to be associated with deficiency of beta-melanocyte-stimulating hormone secreted by the kidneys. As a result, excess melanin is deposited in the basal layer of the oral epithelium [23].

Swelling and pastosity of the gums (62.1 and 100% in groups B and C, respectively) can be caused by drugs taken by patients, which can be divided into three main groups: anticonvulsants, immunosuppressants, and calcium channel blockers. However, the exact cause of drug-induced gingival hyperplasia is unknown; however, the condition is believed to be associated with some risk factors that contribute to gingival inflammation, such as poor oral hygiene, presence of plaque, dose and duration of the drug used [24].

High levels of urea (16.34±0.88 and 27.24±0.83 mmol/l in groups B and C), dimethyl- and trimethylamines, and low levels of zinc may be associated with reduced taste perception in patients with uremia [25]. An increased concentration of urea, which is cleaved by salivary urease into ammonia and carbon dioxide, gives a sensation of a metallic, unpleasant aftertaste [25]. The mechanisms underlying the changes in taste perception in patients with uremia are unknown, but they are probably related to the influence of uremic toxins on the central nervous system and peripheral nervous system (taste buds) [14]. Bleeding gums were observed in 87.9% and 88.1% of patients with CKD and were associated with poor oral hygiene and periodontal inflammation [15].

Burning sensation in the mouth, which was significantly higher in patients with CKD (30.4% in group B and 48.3% in group C), was associated with dry mouth, peripheral nerve damage from urinary toxins, and drug effects [3,16].

Complaints of xerostomia in patients with CKD (44.8 and 34.0% in groups B and C, respectively) are associated with fluid restriction, electrolyte imbalance, use of certain drugs such as furosemide and hydrochlorothiazide (antihypertensive drugs), mouth breathing, alteration of the glands (atrophy of the parenchyma of the small salivary glands), leading to a decrease in the secretion of saliva [20].

Halitosis was reported by 35.2% and 17.2% of participants in this study (groups B and C, respectively). The uremic malodor or halitosis reported by patients with CKD is an ammoniacal odor that is caused by a high concentration of urea in saliva and is broken down to ammonia [22]. This is due to the reduced function of the kidneys to remove urea from the body, therefore, the concentration of urea in the blood (uremia) increases, as well as in saliva. In addition, patients with CKD often neglected oral hygiene [20].

Pallor of the OM (75.9 and 37.0% in groups B and C), petechiae (13.8 and 23.0%) may be associated with anemia, be the result of anticoagulant therapy and/or platelet dysfunction [26].

The prevalence of periodontitis (31.2 and 47.0% in groups B and C) in this patient population is increasing, most likely due to immunosuppression in uremia. This suppresses the inflammatory reaction of the gums during the accumulation of plaque [1]. Periodontitis is associated with elevated values of other components of the acute phase of inflammation, including lower concentrations of high-density lipoproteins [12,13], elevated levels of low-density lipoproteins [14-16] and neutrophils [17]. Inflammatory lesions of the periodontium in patients with CKD occur against the background of dystrophic phenomena, which are significantly more common in patients receiving hemodialysis (p=0.027). Signs of periodontal disease are found in 37% of cases in patients with CKD and in 56% of cases in patients of group B.

Deterioration of the hygienic status of the oral cavity affects the severity of inflammation (p=0.004). Elevated blood creatinine leads to the development of osteodystrophic phenomena and dystrophy in periodontal tissues. (p=0.03).

Chronic kidney disease and periodontal disease are also associated with common risk factors such as diabetes mellitus [2], age and tobacco smoking [6]. Periodontal disease is thought to be a non-traditional risk factor for chronic kidney disease due to systemic changes caused by periodontal inflammation. Due to the periodontogenic presence of bacteria, inflammatory mediators such as interleukin-1, interleukin-6, prostaglandin 2, and tumor necrosis factor-alpha are locally produced, and their antigens can enter the bloodstream [9]. Studies have shown that compared with healthy people, patients with periodontitis may have elevated levels of C-reactive protein and, as a result, a mild systemic acute-phase inflammatory reaction. There seems to be a mutual influence between periodontopathies and chronic kidney disease. Because affected periodontal tissue is susceptible to chronic inflammation, it is likely that oral bacteria may influence the course of chronic kidney disease. In patients with chronic kidney disease, a greater number of periodontal red complex bacteria (P. gingivalis, T. forsythia, T. denticola) and C. albicans, as well as significant destruction of periodontal tissue [18], as well as a greater number of periodontal bacteria (P. gingivalis, T. forsythia, P. intermedia and P. nigrescens, A. actonomycemconcomitans) in periodontal pockets in these patients [19]. Therefore, regular assessment and prevention of periodontitis are of particular importance for patients with chronic kidney disease.

The lesions detected in uremic stomatitis (2% in group B) were very painful and were most often localized on the lower surface of the tongue (81%). It manifested itself in the form of a gray pseudomembrane covering painful spots of erythema or red ulcers with a "purulent" cover.

Studies on the condition of the periodontium in patients with CKD indicate poor oral hygiene (in patients with CKD of both groups, a large amount of soft and hard plaque

was found) and gingivitis [4,6-10]. This is probably a consequence of a pronounced uremic syndrome associated with impaired immune function, as well as altered activity of lymphocytes and monocytes [11].

The results obtained give us reason to assert that there is a need to develop a scheme for more effective treatment of dental diseases in patients with CKD, for which our study will continue.

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