COMPARATIVE ANALYSIS OF THE REPRESENTATION OF XEROSTOMIA AND UREMIC FETOR IN PATIENTS WITH CHRONIC KIDNEY DISEASE AND DIABETES MELLITUS AND BETOR PATIENTS WITH CHRONIC MELLITUS

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Abstract: CKD represents a clinical syndrome of progressive and irreversible damage to the kidney tissue with the inability to perform the excretory, endocrine and metabolic function of the kidneys. In developed countries, the most common cause of CKD is diabetes mellitus, hypertension and glomerular diseases, while in underdeveloped countries bacterial, parasitic diseases, calculosis and tuberculosis dominate. The treatment of this category of patients is quite different and depends on the type and degree of renal function damage. The most common modality is still hemodialysis. Other treatment modalities are peritoneal dialysis and kidney transplantation. Patients with CKD are often diagnosed with halitosis or uremic fetor, which is present in about one-third of patients undergoing hemodialysis. Xerostomia is a condition of dry mouth, which is present in many patients with chronic renal failure. This condition negatively affects the quality of life of patients. In patients with end-stage renal disease and diabetes mellitus, the presence of signs, symptoms, and oral lesions is significantly higher than in those without diabetes mellitus. Purpose: The purpose of this research is to determine whether patients with diabetes mellitus as the leading cause of CKD development, and the cause of greater systemic inflammation, have more pronounced symptoms of xerostomia and uremic fetor than the group without diabetes mellitus. Methods: The studied sample included a total of 75 adult patients with CKD stage 5, on a regular hemodialysis program for more than 6 months. All patients were divided into two groups: patients with diabetes mellitus and patients without diabetes mellitus as a primary disease that led to the development of end-stage renal disease. All subjects underwent a dental clinical examination with a previous history. Results: From the obtained results we can conclude that xerostomia was more often registered in the patients of the group with diabetes mellitus with a statistically significant difference in the distribution between the groups with and without diabetes mellitus.Most patients from both groups had uremic fetor, but without a statistically significant difference between the groups with and without diabetes mellitus. Conclusions: That is, diabetes as the main disease that contributed to the development of CKD is also the reason for the more frequent occurrence of xerostomia in these patients.
Keywords: diabetes, xerostomia, uremic fetor, kidney disease.

1. INTRODUCTION

CKD is a clinical syndrome of progressive and irreversible damage to the kidney tissue with the inability to perform the excretory, endocrine and metabolic function of the kidneys. Current international recommendations define CKD as impairment of kidney function with a drop in glomerular filtration rate (GFR) below 60 mL/min/1.73 m2, albuminuria of at least 30 mg per 24 hours, and/or markers of renal damage (hematuria, structural abnormalities) that persist longer than three months (KDIGO 2013).

In developed countries, the most common cause of CKD is diabetes mellitus (45%), hypertension (27%) and glomerular diseases, while in underdeveloped countries bacterial, parasitic diseases, calculosis and tuberculosis dominate. The treatment of this category of patients is quite different and depends on the type and degree of renal function damage. The most common modality is still hemodialysis. Other treatment modalities are peritoneal dialysis and kidney transplantation (Ferguson et al., 2015).

Published research indicates that more than 850 million individuals worldwide have some degree of kidney disease, but most often they are diagnosed with end-stage renal disease (Kovesdy 2022; Jager et al, 2019).

CKD is a global economic and health problem with a constantly growing trend. According to the World Health Organization (WHO), in 2012 CKD was the 14th leading cause of death, responsible for 1.5% of all deaths worldwide with an incidence of 12.2 deaths per 100,000 people (Elshahat et al., 2020).

According to Center for Disease Control (CDC) estimates, about 13.1% of people over 20 years of age in the United States (US) have some degree of CKD (stage 1 to 4), of which at least 65% are in stage 3 or 4. In the last two decades, the prevalence of CKD stage 5 in the United States has increased by more than 80% (from 800 to 1,400 persons per million) (Goldman et al. 2020).

Chronic kidney disease also affects oral tissues and can lead to gingival hyperplasia, xerostomia, and changes in salivary composition and flow rate (Gavalda et al., 1999).

Patients with CKD are often diagnosed with halitosis or uremic fetor, which is present in about one-third of patients undergoing hemodialysis. Halitosis is usually accompanied by a metallic taste in the mouth. The composition of the saliva is changed, so besides urea, other changes in the composition of the saliva can be noted, such as increased concentrations of phosphates and proteins. In this context, changes in saliva pH have been recorded (Antoniades et al., 2006).

Xerostomia is a condition of dry mouth, which is present in many patients with chronic renal failure. This condition negatively affects the quality of life of patients. This is a complex problem that dentists often face. Xerostomia as a symptom can be a consequence of reduced saliva flow. Sometimes this condition can be a consequence of the use of drugs and develop as a secondary drug effect. In addition to this knowledge, there is a wealth of scientific data confirming that xerostomia occurs in patients diagnosed with end-stage renal disease and undergoing hemodialysis as a result of reduced salivary gland function, or from drugs used in the treatment of kidney disease (Guggenheimer & Moore, 2003).

In patients with end-stage renal disease and diabetes mellitus, the presence of signs, symptoms, and oral lesions is significantly higher than in those without diabetes mellitus. The high frequency of uremic fetor, xerostomia, fissured tongue and candidiasis may represent warning signs of undiagnosed advanced renal disease in other diabetic patients (De la Rosa et al. 2006).

2. MATERIALS AND METHODS

The studied sample included a total of 75 adult patients with CKD stage 5, on a regular hemodialysis program for more than 6 months. All patients were divided into two groups: patients with diabetes mellitus and patients without diabetes mellitus as an underlying disease that led to the development of end-stage renal disease. In addition to the medical anamnestic and clinical procedure, all subjects who were part of the study underwent a dental clinical examination with previous anamnesis. The purpose of this research is to determine whether patients with diabetes mellitus as the leading cause of CKD development, and the cause of greater systemic inflammation, have more pronounced symptoms of xerostomia and uremic fetor than the group without diabetes mellitus.

3. RESULTS

Dry mouth, i.e. xerostomia, was more often registered in patients from the group with diabetes mellitus – 22 (75.86 %) vs 5 (10.87 %). A statistically significant difference in the distribution of patients with and without xerostomia between the groups with and without diabetes mellitus was confirmed for $p < 0.0001$.

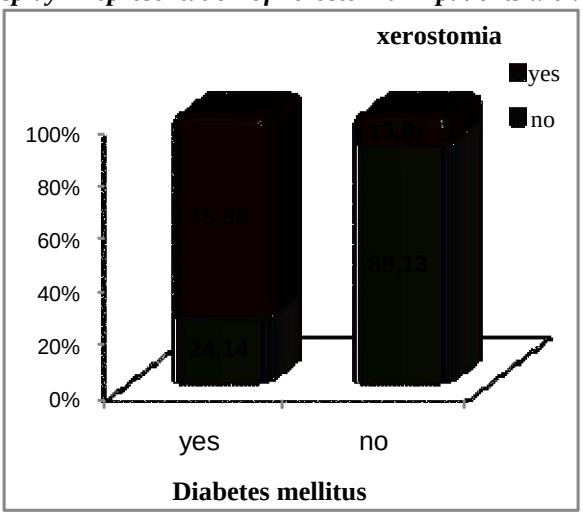
Most patients from both groups had uremic fetor, and there was no statistically significant difference between the groups – 23 (79.31 %) and 41 (89.13 %) patients, respectively, with and without diabetes mellitus, $p = 0.24$ (table 1 , chart 1a).

Table 1. Prevalence of xerostomia and diabetes mellitus in the group with/without DM

variable		**Basic disease**			p – value
		n	**DM** n (%)	**Others** n (%)	
Xerostomia	yes	27	22 (75,86)	5 (10,87)	$X^2 = 32,6$
	no	48	7 (24,14)	41 (89,13)	***p = 0,000000
Uremic fetor	yes	64	23 (79,31)	41 (89,13)	$X^2 = 1,4$
	no	11	6 (20,69)	5 (10,87)	p = 0,24

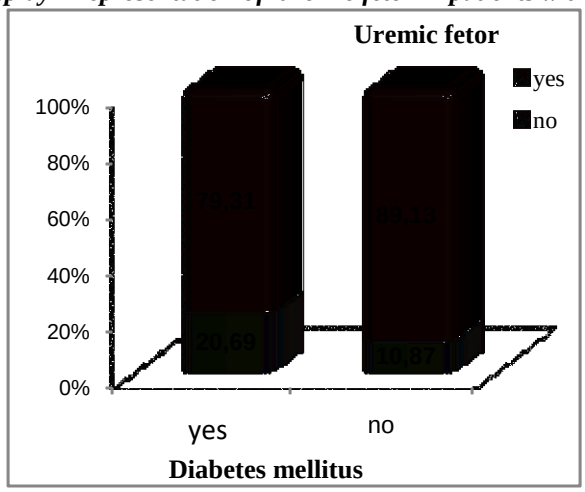
DM (diabetes mellitus)
X2 (Pearson Chi-square)
***p < 0.0001
Source:Author

Chart 1a. Display – representation of xerostomia in patients with/without DM



Source:Author

Chart 1b. Display – representation of uremic fetor in patients with/without DM



Source:Author

4. DISCUSSION

Dry mouth, i.e. xerostomia, was more often registered in patients from the group with diabetes mellitus – 22 (75.86 %) vs 5 (10.87 %). A statistically significant difference in the distribution of patients with and without xerostomia between the groups with and without diabetes mellitus was confirmed for $p < 0.0001$ (De la Rosa et al. 2006).

Patients with diabetes mellitus reported dry mouth significantly more often than patients without diabetes. The study by Swapna et al. showed the presence of xerostomia in both groups with and without diabetes but without significant statistical difference. This is contrary to previous research data according to which dry mouth was more in the group with diabetes than without diabetes, as well as in our study (Swapna et al. 2013, Swapna et al. 2017).

According to the study by Swapna et al., there are several risk factors for the occurrence of xerostomia in patients on a chronic hemodialysis program, such as: reduced salivary flow that may be caused by a direct effect of uremic toxins on the salivary glands, chemical inflammation, chronic dehydration and mouth breathing.

The most common oral change in dialysis patients is xerostomia, i.e. subjective feeling of dry mouth, followed by a change in taste and inflammation in the mouth (Dembowska et al. 2023).

Most patients from both groups had uremic fetor, and without a statistically significant difference between the groups – 23 (79.31 %) and 41 (89.13 %) patients, respectively, with and without diabetes mellitus, p = 0.24, which coincides with and with Murali's study.
Patients from the diabetic group have a significantly higher presence of uremia, xerostomia, change in taste and gingival inflammation than the non-diabetic group (Dande et al. 2018, Chuang et al. 2005).

5. CONCLUSIONS

Xerostomia was more often registered in the patients of the group with diabetes mellitus with a statistically significant difference in the distribution between the groups with and without diabetes mellitus. Most patients from both groups had uremic fetor, but without a statistically significant difference between the groups with and without diabetes mellitus. That is, diabetes as the main disease that contributed to the development of CKD is also the reason for the more frequent occurrence of xerostomia in these patients.

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