

Bone-Dental Changes – secretory IgA (sIgA) and Halitosis in Bulgarian Patients with Chronic Kidney Disease and Secondary Hyperparathyroidism

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Abstract: Chronic Kidney Disease (CKD) is a damaging condition lasting three or more months at a time. It is marked by structural and functional damage to the kidneys leading to a reduced glomerular filtration. The increased relative share of patients with Chronic Kidney Disease is being linked to the rise of frequency of diabetes mellitus and arterial hypertension.

Secondary hyperparathyroidism is a very early violation of CKD, wherein establishes hyperphosphatemia, elevated levels of PTH, hypertrophy of the parathyroid glands. This condition is associated with high morbidity and mortality, an increased cardiovascular risk, loss of bone.

- bone demineralization
- reduced trabecular spaces
- reduced thickness of the cortical bone

Bone demineralization may lead to rapid bone change, including in the maxillofacial area (10)(12)

Heavily delayed and unequal accumulation of tartar in the HD patients is probably due to high levels of nitrogen-containing fractions in the saliva as well as chemical trauma to the oral mucosa.

The saliva detects sIgA antibodies that are natural and reactive against various saprophytic bacteria. These antibodies can control oral microflora by limiting microbial adhesion to oral mucosa and teeth.

The urea released into the oral cavity is hydrolysed to ammonia, which is responsible for the bitter taste of the mouth (feto-uremicus) and the alkaline pH of the saliva. (14)

In our study were including 70 patients - 32 men (45.71%) and 38 women (54.29%), mean age 58.9 (SD = 14.46) were examined in the Dialysis Clinic. All of them were quantified sIgA and the degree of halitosis on a particular scale. The most common oral changes affecting the hard and soft tissues in patients in final stages of CKD are presented, along with the possibilities for early diagnostics and adequate therapeutic behaviour.

Keywords - : halitosis, oral changes, chronic haemodialysis, secondary hyperparathyroidism, sIgA

Date of Submission: 20-03-2018

Date of acceptance: 06-04-2018

I. Introduction

Chronic kidney disease (CKD) is of high social significance, which presents a vital health and social issue, influencing the quality of life of the patients. The terminal stage of CKD requires kidney – replacement treatment – peritoneal dialysis, hemodialysis or kidney transplantation. The prolonged dialysis treatment, the patient's dependence on hemodialysis procedure, the following a strict diet as well as the restricted social contacts, all these factors cause a difficult professional realization of the patients and reflect on their mental stability (5)

It is assumed that the disturbance of the calcium and potassium metabolism in the Secondary hyperparathyroidism are the reason also for the calcification of the soft tissues and in the vascular system prevailing from 50% to 80%. (7) In the saliva is found sIgA antibodies that are natural and reactive against various saprophytic bacteria. These antibodies can control the oral microflora by limiting microbial adhesion to the oral mucosa and the teeth.

Halitosis is a widespread disorder of oral health among the general population, it is more common in women. In a study in 2014, Villa A. et al. (15) found that in children, halitosis is the result of poor oral hygiene, with specific factors such as food and spices.

In some cases there is a significant increase in the size of the jaw bone (macrognathia) in patients on long-term renal replacement therapy, which leads to facial deformities. (1)

II. Material And Methods

Participation in the study involved 70 patients in end-stage chronic renal disease on chronic dialysis treatment with bone-mineral disorders, with varying duration of dialysis treatment 32 man (45,71%) and 38 woman (54,29%) middle-aged 58.9 (SD=14,46). All of them were quantified sIgA in unstimulated saliva by the radial immunodiffusion method (Mancini method). The objective finding to measure bad breath was recorded with apparatus HC-212SF FitScan Breath Checker на Tanita Corporation (USA), using a certain scale.

The supernatants were stored at -70 ° C until use. On the day of the assay, all samples were centrifuged for 15 minutes at 10,000 g.

III. Results And Discussion

Unpleasant breath of the mouth /halitosis/ is one of the relatively common oral manifestations in end-stage CKD patients on chronic dialysis that is associated with the underlying disease or is the result of its treatment. (3) In the objective study of /foetor ex ore / halitosis is the most commonly obtained result (41,43%). No statistically significant difference was found in the sex distribution.

Halitosis can be classified as: true halitosis, pseudohalitosis and halitophobia. True halitosis is subclassified into physiological halitosis and pathological halitosis. Pathological halitosis itself is subdivided into oral and extraoral. Patients diagnosed with pseudohalitosis and halitophobia usually. (4)

The most common orofacial issues associated with patients with CKD:

- Gingival hyperplasia (fig 1)
- Generalized catharal gingivitis
- Inflammation of the oral mucose membrane
- Pale oral mucose membrane, caused by anemic syndrome
- Xerostomia
- Violated/altered taste
- Uremic breath – uremic glossitis – it is observed dry and furred tongue with brownish coating in the middle
- Uremic stomatitis
- Heavily participated and uneven tartar (fig 2)
- Delayed tooth growth
- Enamel hypoplasia
- Low cavity frequency
- Loss of teeth



Fig 1. In patients on a continuous renal replacement therapy is observed significant enlargement of the size of the jaw bones (macrogathia), which leads to facial deformations.



Fig 2. Increased participation of tartar in comparison with healthy individuals, probably caused by high levels of urea and potassium in the saliva, as well as due to the large quantities potassium carbonate which they intake.

In the studies, the level of sIgA was compared in 45 patients with chronic dialysis and 45 control patients with no common disease, and significant differences were found. Higher measured values of sIgA were established in patients with chronic renal disease on hemodialysis.(6)

In a retrospective study conducted in Finland, serum concentrations of sIgA were studied in chronic dialysis patients with secondary hyperparathyroidism and in patients after kidney transplantation. The authors found that the sIgA concentration was highest at the hemodialysis stage and a decrease in values was observed after renal transplantation. (9) (13)

According to them, this is probably related to immunosuppressive therapy and decreased plasma urea. For females, the mean value of sIgA was significantly higher than that found in males ($p = 0.004$). (2)

Mean values of sIgA of the patients were determined from the clinical group $161,46 \pm 105,76$ mg/l.

There was no statistically significant difference ($p = 0.063$), relative to age at sIgA - the mean values of sIgA for both age groups were respectively $40,56 \pm 2,43$ и $31,47 \pm 1,98$. / Fig.3/.

The results showed that in hemodialysis patients with a duration of more than 5 years, sIgA values - $207,53 \pm 104,92$ were significantly higher, compared to patients with a substitution treatment period of up to 5 years - $117,94 \pm 87,53$. (8)

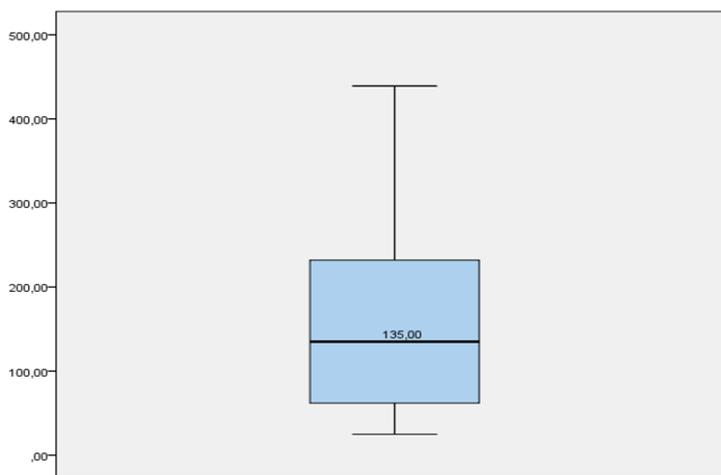


Fig.3 The graphical distribution of sIgA values in the clinical group

IV. Conclusion

Saliva is a suitable secretion for the study of important biological parameters. Our results indicate that saliva is particularly suitable for patients with CKD for the study of sIgA, which has a key role in oral immunity. In renal patients of female sex, sIgA is significantly increased. Studies have shown a tendency to increase sIgA in younger patients. Values of sIgA increase significantly in patients undergoing chronic dialysis over 5 years and with secondary hyperparathyroidism. (11)

The relatively high incidence and wide variety of oral changes covering almost all areas of dental pathology in CKD patients, make the dental practitioner's efforts timely for early diagnosis and timely

treatment. This requires an interdisciplinary approach and active collaboration with nephrologists, radiologists, personal doctors. In 90% of the patients on HD treatment oral signs and symptoms can appear, affecting the soft and hard teeth tissues, which are related to the main disease and require a precise and professional dental treatment. There is relatively high frequency and large variety of oral changes, related to almost all areas of dental pathology in patients with CKD, resulting in prompt efforts of the dental doctors for an early diagnose.

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Sv. Staykova Bone-Dental Changes – Siga And Halitosis In Bulgarian Patients With Chronic Kidney Disease And Secondary Hyperparathyroidism."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 3, 2018, pp 70-73.