

INVOLVEMENT OF LOCAL IMMUNE FACTORS IN THE DEVELOPMENT OF ORAL DISEASES IN PATIENTS WITH CHRONIC KIDNEY FAILURE

Khusanbaeva F.A.

PhD, assistant Department of Hospital Orthopedic Dentistry, Tashkent State Dental Institute. <https://orcid.org/0009-0003-1698-944X>

ABSTRACT

Often systemic diseases show their first signs in the oral cavity. Dental diseases in patients with various stages of chronic renal failure are currently the most thoroughly studied. The conducted clinical and laboratory study showed that lactoferrin plays a role in the development of oral diseases. Dental diseases, particularly inflammatory periodontal diseases, become more severe if a person has other diseases. Oral changes are often caused by diseases of the urinary system.

Key words: chronic kidney failure, periodontitis, lactoferrin, chronic kidney disease.

For citation:

Khusanbaeva F.A. Involvement of local immune factors in the development of oral diseases in patients with chronic kidney failure. *Integrative dentistry and maxillofacial surgery*. 2023;2(3):134–138.

<https://doi.org/10.57231/j.idmfs.2023.2.3.018>

ВЛИЯНИЕ МЕСТНЫХ ФАКТОРОВ ИММУННОЙ СИСТЕМЫ НА РАЗВИТИЕ ЗАБОЛЕВАНИЙ ПОЛОСТИ РТА У ПАЦИЕНТОВ С ХРОНИЧЕСКОЙ ПОЧЕЧНОЙ НЕДОСТАТОЧНОСТЬЮ

Хусанбаева Ф.А.

PhD, ассистент кафедры госпитальной ортопедической стоматологии, Ташкентский государственный стоматологический институт. <https://orcid.org/0009-0003-1698-944X>

АННОТАЦИЯ

Часто системные заболевания проявляют первые признаки в полости рта. Стоматологические заболевания у пациентов с различными стадиями хронической почечной недостаточности в настоящее время наиболее тщательно изучены. Проведенное клинико-лабораторное исследование показало, что лактоферрин играет определенную роль в развитии заболеваний полости рта. Стоматологические заболевания, в частности воспалительные заболевания пародонта, становятся более тяжелыми, если у человека есть другие заболевания. Изменения в полости рта часто вызваны заболеваниями мочевыделительной системы.

Ключевые слова: хроническая почечная недостаточность, пародонтит, лактоферрин, хронические болезни почек.

Для цитирования:

Хусанбаева Ф.А. Влияние местных факторов иммунной системы на развитие заболеваний полости рта у пациентов с хронической почечной недостаточностью. *Интегративная стоматология и челюстно-лицевая хирургия*. 2023;2(3):134–138.

<https://doi.org/10.57231/j.idmfs.2023.2.3.018>

THE RELEVANCE OF RESEARCH

Dental diseases, particularly inflammatory periodontal diseases, become more severe if a person has other diseases [1]. Oral changes are often caused by diseases of the urinary system. Researchers have found an early diagnosis of severe periodontitis. In chronic kidney failure

(CKF), inflammatory processes in periodontal tissues do not cause hyperemia [2]. At the same time, very few studies have characterized the oral health of patients with CKD [3, 4, 5], in which a wide range of oral mucosal diseases have been reported, which are probably related to local immunity problems [3, 6].

In patients with CKD, immune disorders and the development of infectious complications strongly influence their immediate and long-term prognosis of the disease. Thus, it is very important to anticipate their occurrence [1, 7]. Researchers have noted various changes in the immune status in the oral cavity in CKD. These changes are associated with activation of the effectors of innate immunity, as demonstrated by an increase in absorptive activity and oxygen-dependent metabolism; a decrease in the number of activated lymphocytes, NK cells, T lymphocytes and their subpopulations in peripheral blood; an increase in the content of immunoglobulins of types A, M and G; and a decrease in the activity of lysozyme in mixed saliva [7,8]. The biological and diagnostic functions of lactoferrin, as well as its content, have been studied in detail, since it is the main component of local immunity, affecting the complement system and phagocytic activity of neutrophils [9; 10]. Lactoferrin has been detected in synovium, liquor, sweat, and other biological fluids [11-16]. Oral lactoferrin has not been found to play an important role in local immunity in CKD.

THE PURPOSE of this study is to investigate whether lactoferrin can contribute to oral diseases in patients with CKD.

MATERIALS AND METHODS

40 patients with chronic kidney failure (CKF), 40 patients with chronic kidney disease (CKD) without signs of chronic failure and 10 patients without any renal pathology (control group) participated in the nephrology department of the clinic of Samarkand State Medical University. A nephrologist diagnosed chronic renal failure according to standard clinical and laboratory criteria. Dental examination consisted of collecting complaints, performing objective examination, and determining lactoferrin in saliva. Saliva was obtained in a standardized way on an empty stomach. Solid-phase heterogeneous ELISA analysis using the reagent kit "Lactoferrin - ELISA - BEST" was used to determine the level of lactoferrin. Albumin and urea concentrations were also determined using a unified colorimetric method using "Albumin-Novo" and "Urea-Novo" reagent kits.

RESULTS

The following symptoms were found during the examination of patients with CKD (Table 1): bleeding gums, dryness in the oral cavity, difficulty in eating, burning mucous membranes, halitosis, bare tooth necks at the "S", a large amount of soft dental plaque, stones in the supra- and sub-gingival teeth, pastosity and swelling of the papillary and marginal gingiva, hyperemia.

When examining patients with CKF, it was found that they complained of oral pain, deterioration of taste, dryness in the oral cavity and problems with eating due to missing teeth (Table 2). Even with minor mechanical trauma to the oral cavity, all patients in this group had a problem with wound healing. Objective examination showed swelling, pastosity, papillary and marginal gingiva, bare tooth necks on S-T in 85%, large amount of soft plaque over and under gingival tartar in 95%. The gingiva is 87,5% whitish in color and dry.

The amount of oral fluid, immunity and microflora show that the oral ecology has changed as a result of each of the symptoms noted.

Lactoferrin levels in oral fluid were not significantly different in all three patient groups ($5100 \pm 14,4$ mg/L vs $4828,6 \pm 186,9$ mg/L in controls and $4371,7 \pm 244,4$ at $p > 0,05$). Nevertheless, it should be borne in mind that the concentration of substances in the studied biosubstrate depends on the rate of salivary secretion, which in the control group averaged 5 ml, in the group with CKD was equal to 3 ml, and in the group with CKF was equal to 1 ml. Recalculation of albumin content to determine lactoferrin levels was performed.

In this case, the lactoferrin concentration was $25289,8 \pm 5260,8$ mg/g albumin (control), $8343,4 \pm 2573,1$ mg/g albumin in the CKF group and $22676 \pm 4021,1$ mg/g albumin in the CKD group, the latter being significant at $p < 0,05$.

CONCLUSIONS

1. Oral clinical manifestations are significantly different between patients with chronic kidney disease and those with chronic renal failure. Patients with chronic kidney disease are dominated by signs associated with impaired oral ecology, and patients with chronic renal

failure are dominated by signs associated with impaired oral soft tissue regeneration.

2. Lactoferrin indices are altered in chronic renal failure, indicating a decrease in local immunity in the oral cavity and the development

of periodontal tissue destruction. These changes indicate the need for preventive and therapeutic measures in the oral cavity before deciding how to treat the underlying disease.

Table 1**Analysis of complaints and results of examination of patients with CKD**

Oral complaints and objective changes in patients with CKD.	Frequency of occurrence
bleeding gums, large amounts of soft plaque	80,6%
dry mouth	48,3%
difficulty eating, burning mucous membranes	3,2%
Halitosis gingiva, pastosity, hyperemia	87%
Bare tooth necks 1/2,	63%
over, under-gingival tartar	92%
swelling of papillary and marginal gingiva, pastosity, hyperemia	78%

Table 2**Analysis of complaints and objective indicators of examination of patients with CKD**

Complaints and objective changes in the oral cavity in patients with CKF	Frequency of occurrence
bleeding gums, a large amount of soft plaque	97%
sensation of dryness in the oral cavity	89%
difficulty in eating, burning mucosa	62,5%
feeling of halitosis	96%
Bareness of the necks of the teeth 1/2-1/3	85%
over, under-gingival tartar	95%
Swelling of papillary and marginal gingiva, whiteness	87,5%
Difficult wound healing	100%

Table 3**Immunologic indices of oral fluid in patients with CKF and CKD**

Parameters	Control group	CKF	CKD
Lactoferrin mg/l	4828,6±186,9	5100±14,4	4371,7±244,4
Albumin g/l	0,6±0,3	1,8±0,7	0,44±0,12
Lactoferrin/albumin mg/l	25289,8±5260,8	8343,4±2573,1	22676±4021,1

ETHICAL STATEMENT AND CONSENT TO PARTICIPATION

The study was conducted in accordance with the local ethical committee.

CONFLICT OF INTERESTS

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

SOURCES OF FUNDING

The authors state that there is no external funding for the study.

AVAILABILITY OF DATA AND MATERIALS

All data generated or analysed during this study are included in this published article.

AUTHORS' CONTRIBUTIONS

All authors contributed to the design and interpretation of the study and to further drafts. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All applicable international, national and/or institutional ethical guidelines have been followed.

CONSENT FOR PUBLICATION

Not applicable.

PUBLISHER'S NOTE

Journal of *"Integrative dentistry and maxillofacial surgery"* remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Article received on 21.09.2023

Accepted for publication on 25.10.2023

КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов.

ИСТОЧНИКИ ФИНАНСИРОВАНИЯ

Авторы заявляют об отсутствии финансирования при проведении исследования.

ДОСТУПНОСТЬ ДАННЫХ И МАТЕРИАЛОВ

Все данные, полученные или проанализированные в ходе этого исследования, включены в настоящую опубликованную статью.

ВКЛАД ОТДЕЛЬНЫХ АВТОРОВ

Все авторы внесли свой вклад в подготовку исследования и толкование его результатов, а также в подготовку последующих редакций. Все авторы прочитали и одобрили итоговый вариант рукописи.

ЭТИЧЕСКОЕ ОДОБРЕНИЕ И СОГЛАСИЕ НА УЧАСТИЕ

Были соблюдены все применимые международные, национальные и/или институциональные руководящие этические принципы.

СОГЛАСИЕ НА ПУБЛИКАЦИЮ

Не применимо.

ПРИМЕЧАНИЕ ИЗДАТЕЛЯ

Журнал *"Интегративная стоматология и челюстно-лицевая хирургия"* сохраняет нейтралитет в отношении юрисдикционных претензий по опубликованным картам и указаниям институциональной принадлежности.

Статья получена 21.09.2023 г.

Принята к публикации 25.10.2023 г.

ЛИТЕРАТУРА / REFERENCES

- Орехова, Л.Ю. Состояние полости рта у больных бронхиальной астмой с разными клинико-патогенетическими вариантами // Л.Ю. Орехова, А.Ф. Долгодворов, В.Ю. Крылова // Пародонтология. – 2011. – № 2(59). [Orekhova, L.Yu. Sostoyanie polosti rta u bolnikh bronkhialnoy astmoy s raznymi kliniko-patogeneticheskimi variantami / L.Yu. Orekhova, A.F. Dolgodvorov, V.Yu. Krihlova // Parodontologiya. – 2011. – № 2(59)].
- Ящук, Е.В. Состояние полости рта у больных с терминальной стадией хронической почечной недостаточности, находящихся на диализной терапии: автореф. дис. ... канд. мед. наук. – СПб. [Э/р]. – Р/д [Yashuk, E.V. Sostoyanie polosti rta u bolnikh s terminalnoy stadiy khronicheskoy pochechnoy nedostatochnosti, nakhodyashikhsya na dializnoy terapii: avtoref. dis. ... kand. med. nauk. – SPb. [Eh/r]. – R/d: <http://www.dissercat.com/> 2009.
- Орехов, Д.Ю. Клинико-биохимическое обоснование оказания стоматологической помощи пациентам, получающим гемодиализ: автореф. дис. ... канд. мед. наук. – М. [Э/р]. Р/д [Orekhov, D.Yu. Kliniko-biokhimicheskoe obosnovanie okazaniya stomatologicheskoy pomothi pacientam, poluchayuthim gemodializ: avtoref. dis. ... kand. med. nauk. – M. [Eh/r]. R/d: <http://www.dissercat.com/> 2009.
- Томилина, Н.А. Нефрология в г. Москве: история, современное состояние и перспективы развития // Доклад: на 2 региональной конференции РДО «Нефрология и диализ в Москве». – М., 2009. [Tomilina, N.A. Nefrologiya v g. Moskve: istoriya, sovremennoe sostoyanie i perspektivih razvitiya // Doklad: na 2 regional'noy konferencii RDO «Nefrologiya i dializ v Moskve». – M., 2009].
- Улитовский, С.Б., Индивидуальная гигиена полости рта: учеб. пособ. – СПб., 2005. [Ulitskiy, S.B., Individual'naya gigiena polosti rta: ucheb. posob. – SPb., 2005].
- Гажва, С.И. Влияние хронической болезни почек на состояние слизистой оболочки полости рта / С.И. Гажва, В.Е. Загайнов, Н.А. Иголкина, К.С. Липатов, М.С. Муртазалиева // Современные проблемы науки и образования. – 2013. – № 2. [Gazhva, S.I. Vliyanie khronicheskoy bolezni pochek na sostoyanie slizistoy bolochki polosti rta / S.I. Gazhva, V.E. Zagayjnov, N.A. Igol'kina, K.S. Lipatov, M.S. Murtazalieva // Sovremenniye problemih nauki i obrozovaniya. – 2013. – № 2].
- Осиков, М.В. Уровень эритропоэтина и иммунный статус организма у больных хронической почечной недостаточностью, находящихся на гемодиализе / М.В. Осиков, Л.Ф. Телешева, Ю.И. Агеев, А.А. Федосов // Современные проблемы науки и образования. – 2013. – № 4 [Э/р]. [Osikov, M.V. Urovenj ehritropoehtina i immunnihy status organizma u boljnihkh khronicheskoy pochec hnoy nedostatochnostyu, nakhodyathikhsya na gemodialize / M.V. Osikov, L.F. Telesheva, Yu.I. Ageev, A.A. Fedosov // Sovremenniye problemih nauki i obrazovaniya. – 2013. – № 4 [Eh/r]. – R/d: www.science-education.ru/110-9973
- Панкова, С.Н. Течение пародонтита у больных с хронической патологией почек и обоснование метода лечения [Э/р]. [Pankova, S.N. Tehenie parodontita u boljnihkh s khronicheskoy patologiejy pochek i obosnovanie metoda lecheniya [Eh/r]. – R/d: <http://medical-diss.com/> 1993
- Lactoferrin – a multifunctional protein with antimicrobial properties / S. Farnaud, R.W. Evans // Mol. Immunol. – 2003; 40.
- Bactericidal domain of lactoferrin: detection, quantitation and characterization of lactoferrin in serum by SELDI affinity mass spectrometry / H. Kuwata, T.T. Yip, C.L. Yip. et al. // Biochem. Biophys. Res. Commun, 1998; 245.
- Lactoferrin: molecular structure and biological function / B. Lonnerdal, S. Iyer // Annu Rev Nutr, 1995; 15.
- Lactoferrin in gastrointestinal disease / T. Hayakawa, C.X. Jin, S.B. Ko, M. Kitagawa, H. Ishiguro // Intern. Med. 2009; 48.
- A critical review of the roles of host lactoferrin in immunity / D. Legrand, J.A. Mazurier // Biometals. 2010; 23; Expanding the adipokine network in cartilage: identification and regulation of novel factors in human and murine chondrocytes / H.M. Choi, Y.A. Lee, H.I. Yang et al. // Int. J. Rheum. Dis., 2011; 14.
- An antimicrobial protein, lactoferrin exists in the sweat: proteomic analysis of sweat / J.H. Park, G.T. Park, I.H. Cho. et al. // Exp. Dermatol, 2011.
- Neutrophil lactoferrin content in vilar infection / R.D. Bayens, W.R. Bezwoda, N. Mansoor // J. Amer. Clin. Path., 1988; 89.
- Diverse Influences of Dietary Factors on Cancer in Asia / M. A. Moore // Asian Pacific Journal Cancer Preventetion, 2009; 10.