

UDC:616.728.4.616.72-002-053.7:612.017.1-08
DOI: 10.24061/2413-4260. XV.1.55.2025.18

SYSTEMIC AND LOCAL IMMUNOGLOBULIN STATUS IN PATIENTS WITH ARTHROSO-ARTHRITIS

**B. Khamdamov¹, U. Nabiyeva², F. Khamroyev³,
G. Rasulov⁴, A. Khamdamov¹, S. Davlatov¹,
I. Khamdamov¹**

Bukhara State Medical Institute named after Abu Ali ibn Sino¹,
Institute of Human Immunology and Genomics²,
U. K. Kurbanov Republican Children's Psychoneurological
Hospital³,
National Centre for Rehabilitation of Disabled Persons and
Prosthetics⁴

Summary.

Although the development of osteoarthritis (OA) does not affect life expectancy, it is one of the leading causes of premature disability after ischemic heart disease and the most common indication for joint arthroplasty. However, the influence of the state of local immunity on the course and outcome of OA remains unknown.

The aim was to study the systemic and local (in synovial fluid) Immunoglobulin status in patients with osteoarthritis as a function of patient age.

Materials and methods. 96 patients with osteoarthritis who underwent inpatient treatment at the clinic of the National Centre for Rehabilitation and Prosthetics of Persons with Disabilities under the National Agency for Social Protection under the President of the Republic of Uzbekistan were examined.

Results and conclusions. The level of total immunoglobulins A, M, G in the synovial fluid of OA patients was higher compared to the control group. The level of IgE in the synovial fluid of group 1 patients is 1.38 times higher than in the control group, while in group 2 patients this difference is 2.21 times. And as we see the production of sIgA is more pronounced in OA patients of group 2, in which this index is significantly higher than the control group in 2.41 times ($P < 0.05$), while in group 1 patients it is higher only in 1.43 times. Thus, the results of our studies have shown that humoral immunoreactivity is more pronounced at the local level especially in middle-aged patients with osteoarthritis, apparently causing a more protracted and recurrent course of the disease.

Conclusions. Thus, the results of our studies have shown that humoral immunoreactivity is more pronounced at the local level especially in middle-aged patients with osteoarthritis, apparently causing a more protracted and recurrent course of the disease.

Keywords: Osteoarthritis; Synovial Fluid; Immune Parameters; Immunoglobulins.

Introduction

Osteoarthritis (OA) is the most common joint disease with clinical symptoms, according to a systematic analysis conducted by the Global Burden of Disease Study in 2021, 595 million people worldwide will suffer from OA in 2020, corresponding to 7.6% of the population, with a 132.2% increase in the incidence of osteoarthritis compared to 1990 data [1, 2]. Although OA does not affect life prognosis, it is one of the leading causes of premature disability and disability, second only to coronary heart disease, and the most frequent indication for joint replacement. According to expert forecasts, compared to 2020, by 2050, the number of knee joint OA cases will increase by 75%, hand – by 49%, hip joint – by 79% and OA of other localization – by 95% [3, 4, 5].

For many years, OA was considered as a degenerative joint disease associated with the natural aging processes of the human body. However, this opinion is currently undergoing a serious revision, as the diagnosed 'rejuvenation' of the disease cannot but cause anxiety and caution, and creates prerequisites for a more multifaceted study of the OA problem [6, 7].

In recent years, researchers have started to pay attention to the problem of disorders and regulation of immune mechanisms observed in OA. There appeared information about the activation of chondrocytes in cartilage tissue with the release of proinflammatory cytokines, metalloproteinases

[8, 9]. However, the results of studies on the characterization of immune status in synovial fluid, which is one of the main organ-specific components of the joint that determine its functional state, are still few and rather contradictory. However, it is especially the local, in particular humoral immune status that determines the course and prognosis of the inflammatory process in a joint [10, 11, 12].

The aim was to study the systemic and local (in synovial fluid) immunoglobulin status in patients with osteoarthritis depending on the age of the patients.

Materials and methods. We examined 96 OA patients who underwent inpatient treatment in the clinic of the National Centre for Rehabilitation and Prosthetics of Persons with Disabilities at the National Agency for Social Protection under the President of the Republic of Uzbekistan in 2022-2023. All 96 examined patients were divided into 2 study groups, according to the age criterion, as the main purpose of the work was to identify the features of OA course in young patients, and for comparison we took middle-aged OA patients. Thus, the 1st group included 52 young-aged patients (from 18 to 44 years old), who made 54.2% of the total number of examined patients, the 2nd group accordingly included 44 middle-aged patients (from 45 to 59 years old), whose number made 45.8% of the total number of patients included in the study. The subject of the

study was blood serum and synovial fluid of OA patients of different ages. The levels of total immunoglobulins A, M, G, E and secretory immunoglobulin A in blood serum and synovial fluid were determined by solid-phase enzyme-linked immunosorbent assay.

Results and conclusions. The analysis of the obtained parameters showed that the level of total immunoglobulins A, M, G in the blood serum of OA patients did not have reliable differences from the parameters of the control group and even tended to a slight decrease.

It is noteworthy that the level of total immunoglobulins A, M, G in synovial fluid of OA patients was higher

compared to the control group. Moreover if the indices of total immunoglobulins A, M, G in synovial fluid of OA patients of young age had only an unreliable tendency to increase in comparison with the indices of the control group, In the group of middle-aged patients these differences had a reliable character and the level of total IgA was higher than the control indices in 1,36 times, the level of total IgM – in 1,97 times, and the level of total IgG – in 2,41 times.

Of greater interest was the comparative analysis of immunoglobulin E (IgE) and secretory immunoglobulin A (sIgA) values in serum and in synovial fluid of OA patients, as more locally acting immunoglobulins (Fig.1 and Fig.2).

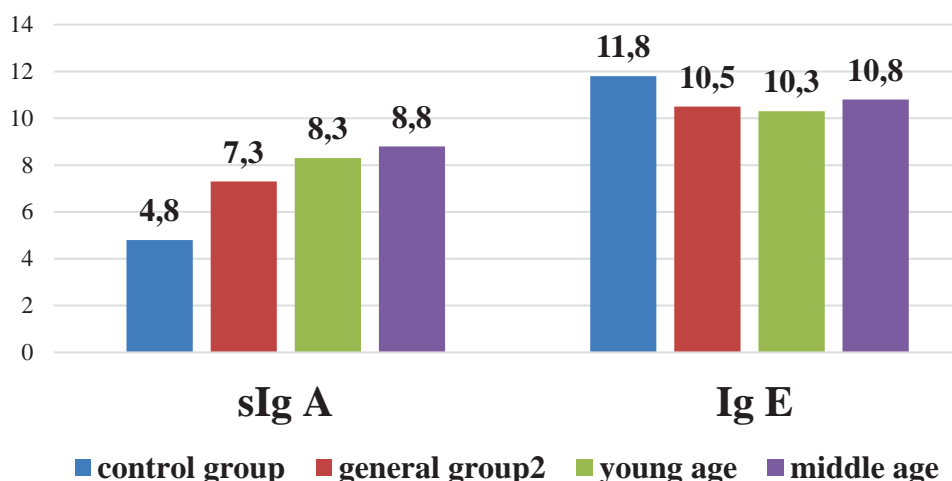


Fig. 1. Levels of sIgA and IgE in the serum of OA patients depending on age.

It was revealed that in serum of patients both in the total sample and in separate age groups IgE had no reliable differences from the control group (Fig.1), but when analyzing its level in synovial fluid reliable differences were revealed (Fig.2), which is natural, as IgE is more cytophilic than other immunoglobulins. IgE attaching its Fc-fragment to receptors of mast cells, basophils and eosinophils, and upon binding to antigens causes mast cell degranulation and release of histamine granules and other mediators. Mediators on the one hand attract to the focus of degranulation and mobilize eosinophils and

some other cells, and on the other hand change capillary permeability and create conditions for the entry of antibodies and effector cells into the tissues, thus leading to the development of hypersensitivity of immediate type. As we see, the level of IgE in the synovial fluid of group 1 patients is 1.38 times higher than in the control group, while in group 2 patients this difference is 2.21 times (Fig.2). This suggests that in middle-aged patients, the development of inflammatory phenomena in the joint is to a greater extent due to the mechanisms of immediate hypersensitivity.

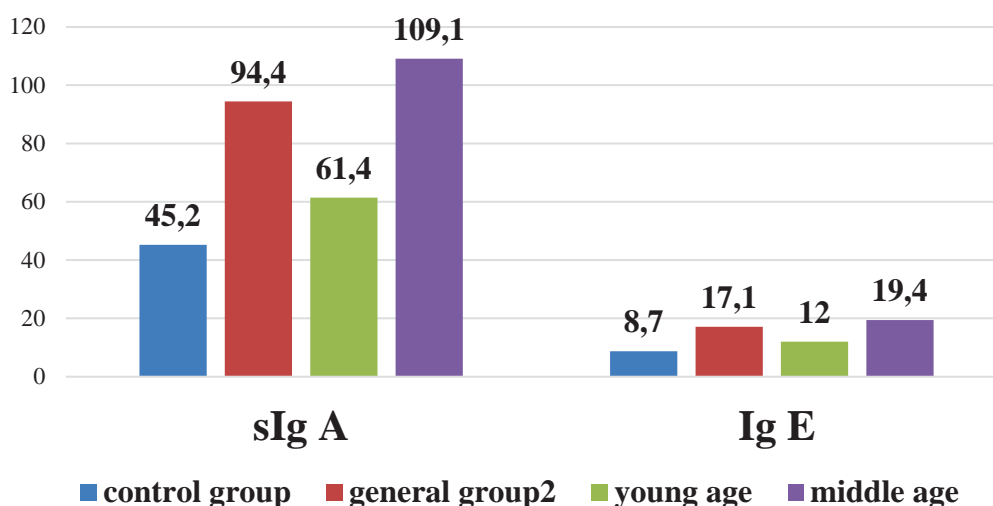


Fig. 2. Level of sIgA and IgE in synovial fluid of OA patients depending on age

Secretory immunoglobulin A (sIgA) acts as a local specific immune defense and plays an important role in local homeostasis. sIgA is active against a variety of antigens and prevents their penetration through mucous membranes into deeper tissues. Secretory immunoglobulin A is produced by B-lymphocytes located near mucosal cells, and then transported and released through specific cellular mechanisms of epithelial cells into the intracavitary secretion, so the study of local sIgA can assess the immune defense of both local and systemic plan. And as we see

sIgA production is more expressed in OA patients of group 2, in which this index is reliably higher than in the control group in 2,41 times ($P < 0,05$), while in patients of group 1 it is higher only in 1,43 times.

Conclusions. Thus, the results of our studies have shown that humoral immunoreactivity is more pronounced at the local level especially in middle-aged patients with osteoarthritis, apparently causing a more protracted and recurrent course of the disease.

References:

1. Reckinger K. Schmerztherapie bei Arthritis und Arthrose – Nur ein ganzheitlicher Ansatz führt zum Erfolg. Notfall & Hausarztmedizin. 2009;35(12):589-94. DOI: <http://doi.org/10.1055/s-0029-1246300>
2. Chow YY, Chin KY. The Role of Inflammation in the Pathogenesis of Osteoarthritis. Mediators Inflamm. 2020;2020:8293921. DOI: <http://doi.org/10.1155/2020/8293921> PMID: 32189997; PMCID: PMC7072120.
3. Wright HL, Lyon M, Chapman EA, Moots RJ, Edwards SW. Rheumatoid Arthritis Synovial Fluid Neutrophils Drive Inflammation Through Production of Chemokines, Reactive Oxygen Species, and Neutrophil Extracellular Traps. Front Immunol. 2021;11:584116. DOI: <http://doi.org/10.3389/fimmu.2020.584116> PMID: 33469455; PMCID: PMC7813679.
4. Iolascon G, Gimigliano F, Moretti A, De Sire A, Migliore A, Brandi ML, et al. Early osteoarthritis: How to define, diagnose, and manage. A systematic review. Eur Ger Med. 2017;8(5-6):383-96. DOI: <https://doi.org/10.1016/j.eurger.2017.07.008>
5. Kapoor M, Martel-Pelletier J, Lajeunesse D, Pelletier JP, Fahmi H. Role of proinflammatory cytokines in the pathophysiology of osteoarthritis. Nat Rev Rheumatol. 2011;7(1):33-42. DOI: <http://doi.org/10.1038/nrrheum.2010.196> PMID: 21119608.
6. Sandomirski A, Johanson J, Lohmann C, Lietz J. Endoprothetik des oberen Sprunggelenks. Z Rheumatol. 2023;82:852-8. DOI: <https://doi.org/10.1007/s00393-023-01422-6>
7. Papenhoff MC, Habig K, Schmitz C, Lundin S, Schreier D, Tineghe Jet al. Complex Regional Pain Syndrome (CRPS). Z Orthop Unfall 2023;161(03):337-52. DOI: <http://doi.org/10.1055/a-1898-2454>
8. Laube W. Primär chronisch degenerative Erkrankungen: ein Lifestyle-Produkt. In: Schmerztherapie ohne Medikamente. Springer, Berlin, Heidelberg; 2022. p. 3-21. https://doi.org/10.1007/978-3-662-63846-0_1
9. St-Pierre A, Desrosiers V, Dufresne F, Blier PU. Anti-Inflammatory Properties of Glucosamine Used in Combination with Plants Extracts on Adjuvant Arthritis Rat. Arch Microbiol Immunol. 2023;7:362-71. DOI: <http://doi.org/10.26502/ami.936500133>
10. Riewruja K, Phakham S, Sompolpong P, Reantragoon R, Tanavalee A, Ngarmukos S, et al. Cytokine Profiling and Intra-Articular Injection of Autologous Platelet-Rich Plasma in Knee Osteoarthritis. Int J Mol Sci. 2022;23(2):890. DOI: <http://doi.org/10.3390/ijms23020890> PMID: 35055075; PMCID: PMC8779764.
11. Sittl R. Mechanismen-orientierte medikamentöse Schmerztherapie bei älteren Patienten. Osteologie. 2024;33(01):25-31. DOI: <http://doi.org/10.1055/a-2229-4201>
12. Singh H, Knapik DM, Polce EM, Eikani CK, Bjornstad AH, Gursoy S, et al. Relative Efficacy of Intra-articular Injections in the Treatment of Knee Osteoarthritis: A Systematic Review and Network Meta-analysis. Am J Sports Med. 2022;50(11):3140-8. DOI: <http://doi.org/10.1177/03635465211029659> PMID: 34403285.

СИСТЕМНИЙ І ЛОКАЛЬНИЙ ІМУНОГЛОБУЛІНОВИЙ СТАТУС У ХВОРИХ З АРТРОЗО-АРТРИТАМИ

Б. З. Хамдамов¹, У. П. Набієва², Ф. Ш. Хамроев³, Г. М. Расулов⁴, А. Б. Хамдамов¹, С. С. Давлатов¹, І.Б.Хамдамов

1 – Бухарський державний медичний інститут імені Абу Алі ібн Сіно

2 – Інститут імунології та геноміки людини

3 – Республіканська дитяча психоневрологічна лікарня імені У. К. Курбанова

4 – Національний центр реабілітації інвалідів та протезування

Резюме.

Хоча розвиток артрозо-артритів не впливає на життєвий прогноз, але це захворювання є однією з основних причин передчасної втрати працездатності та інвалідності, поступаючи у цьому відношенні лише ішемічної хвороби серця, і найчастішим показанням для ендопротезування суглобів. Проте залишається нерозкритим вплив стану місцевого імунітету протягом та результат артрозо-артритів.

Метою було вивчення системного та локального (у синовіальній рідині) статусу імуноглобулінів у хворих з артрозо-артритами залежно від віку хворих.

Матеріали та методи. Було обстежено 96 хворих з артрозо-артритами, які проходили стаціонарне лікування в клініці Національного центру реабілітації та протезування осіб з інвалідністю при Національному агентстві соціального захисту при Президентів Республіці Узбекистан.

Результати та висновки. Рівень сумарних імуноглобулінів А, М, G у синовіальній рідині хворих на артрозо-артрити був вищим порівняно з показниками контрольної групи. Рівень IgE у синовіальній рідині хворих 1 групи у 1,38 разів перевищував показники контрольної групи, у той час як у хворих 2 групи ця різниця дорівнювала у 2,21 рази. Було відзначено, що продукція sIgA більш виражена у хворих на артрозо-артрити 2 групи, у яких цей показник був достовірно вищим за показники контрольної групи – у 2,41 рази ($p < 0,05$), у той час як у хворих 1 групи він був вищим тільки у 1,43 рази. Таким чином, результати наших досліджень показали, що гуморальна імунореактивність більш виражена на локальному рівні особливо у хворих на артрозо-артрити середнього віку, мабуть цим можна пояснити і більш затяжний та рецидивуючий характер перебігу захворювання.

Висновки. Таким чином, результати наших досліджень показали, що гуморальна імунореактивність більш виражена на локальному рівні особливо у хворих на артрозо-артрити середнього віку, мабуть і зумовлюючи більш затяжний і рецидивний перебіг захворювання.

Ключові слова: артрозо-артрит; синовіальна рідина; імунологічні показники; імуноглобуліни.

Contact information:

Bakhtiyor Khamdamov – head of department of the Faculty and Hospital Surgery. DSc, professor. Bukhara State Medical Institute named after Abu Ali ibn Sino (Bukhara, Uzbekistan).

e-mail: dr.hamdamov@mail.ru

ORCID ID: <https://orcid.org/0000-0003-3569-6688>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57221665311>

Umida Nabiyeva – head of the laboratory of Autoimmune conditions, Doctor of Medical Sciences, senior researcher, Institute of Immunology and Human Genomics of the Academy of Sciences (Tashkent, Uzbekistan)

e-mail: doc.umida@gmail.com

ORCID ID: <https://orcid.org/0000-0002-0436-6590>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57194157209>

Farkhod Khamroyev – deputy chief physician, Doctor of Medical Sciences, Republican Children's Neuropsychiatric Hospital named after U. K. Kurbanov (Tashkent, Uzbekistan)

e-mail: rdpm@mail.ru

ORCID ID: <https://orcid.org/0000-0002-5292-1982>

Ganisher Rasulov – resident doctor, National Center for Rehabilitation and Prosthetics of Persons with Disabilities (Tashkent, Uzbekistan)

e-mail: grasulov1979@gmail.com

ORCID ID: <https://orcid.org/0009-0003-0507-5984>

Alisherjon Khamdamov – assistant of department of the Faculty and Hospital Surgery. DSc, professor. Bukhara State Medical Institute named after Abu Ali ibn Sino (Bukhara, Uzbekistan)

e-mail: dr.alyowa@gmail.com

ORCID ID: <https://orcid.org/0000-0001-6614-4806>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57221665699>

Salim Davlatov – DSc, associate professor of the Department of Faculty and Hospital Surgery. Bukhara State Medical Institute named after Abu Ali ibn Sino (Bukhara, Uzbekistan)

e-mail: pro.ilmiy@bsmi.uz

ORCID ID: <https://orcid.org/0000-0002-3268-7156>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57219956374>

Ilkhomjon Khamdamov – associate professor at the Department of Surgical Diseases in Family Medicine. Candidate of Medical Sciences, Associate Professor. Bukhara State Medical Institute named after Abu Ali ibn Sino (Bukhara, Uzbekistan)

e-mail: mr.ilyuwa@mail.ru

ORCID ID: <https://orcid.org/0000-0001-5104-8571>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=58914842300>

Контактна інформація:

Хамдамов Бахтиёр Зарифович – заведующий кафедрой факультетской и госпитальной хирургии. Доктор медицинских наук, профессор. Бухарский государственный медицинский институт имени Абу Али ибн Сино (Бухара, Узбекистан)

ORCID ID: <https://orcid.org/0000-0003-3569-6688>

e-mail: dr.hamdamov@mail.ru

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57221665311>

Набиева Умида Пулатджановна – заведующая лаборатории аутоиммунных состояний, доктор медицинских наук, старший научный сотрудник, Институт иммунологии и геномики человека Академии наук (Ташкент, Узбекистан)

ORCID ID: <https://orcid.org/0000-0002-0436-6590>

e-mail: doc.umida@gmail.com

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57194157209>

Хамроев Фарход Шарофович – заместитель главного врача, доктор медицинских наук, Республиканская детская психоневрологическая больница имени У. К. Курбанова (Ташкент, Узбекистан)

e-mail: rdpm@mail.ru

ORCID ID: <https://orcid.org/0000-0002-5292-1982>

Расулов Ганишер Мухаммадиевич – врач ординатор, Национальный центр реабилитации и протезирования лиц с инвалидностью (Ташкент, Узбекистан)

e-mail: grasulov1979@gmail.com **ORCID ID:** <https://orcid.org/0009-0003-0507-5984>

Хамдамов Алишержон Бахтиёрович – ассистент кафедры факультетской и госпитальной хирургии. Бухарский государственный медицинский институт имени Абу Али ибн Сино. (Бухара, Узбекистан)

e-mail: dr.alyowa@gmail.com

ORCID ID: <https://orcid.org/0000-0001-6614-4806>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57221665699>

Давлатов Салим Сулаймонович – доктор медицинских наук, доцент кафедры факультетской и госпитальной хирургии Бухарского государственного медицинского института имени Абу Али ибн Сино. Бухара, Узбекистан.

e-mail: pro.ilmiy@bsmi.uz

ORCID ID: <https://orcid.org/0000-0002-3268-7156>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57219956374>

Хамдамов Илхомжон Бахтиёрович – доцент кафедры хирургических болезней в семейной медицине. Кандидат медицинских наук, доцент. Бухарский государственный медицинский институт имени Абу Али ибн Сино. Бухара, Узбекистан.

ORCID ID: <https://orcid.org/0000-0001-5104-8571>

e-mail: mr.ilyuwa@mail.ru

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=58914842300>

Received for editorial office on 07/02/2025

Signed for printing on 20/03/2025

