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И ФИЗИОЛОГИЯ КОРОНАВИРУСА
COVID -19»

Ташкент, 20 май 2022 г.

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Ўзбекистон Республикаси санитария эпидемиология фаровонлиги ва аҳоли саломатлигини сақлаш хизмати.

m:anvar.shukurov@ssv.uz

Функционал овқатланиш ва функционал маҳсулотлар ишлаб чиқаришнинг замонавий жиҳатлари, жисмоний, рухий ва ижтимоий фаровонлик ҳолатини сақлашда озик-овқатнинг аҳамияти ва касалликларнинг олдини олиш, одамларнинг соғлиғи ва ҳаёт сифатини яхшилаш, шу жумладан турли хил касалликларга чалинганларнинг аҳамияти ҳақида умумий маълумот келтирилган. Мувозанатли овқатланиш ва маҳсулотларнинг озукавий қиймати нуқтаи назаридан уларнинг хавфсизлигини таъминлайдиган функционал маҳсулотларни ишлаб чиқариш шартлари ва усуллари аниқланди.

Калит сўзлар: функционал овқатланиш, функционал маҳсулотлар, ингредиент, озука моддалар.

SUMMARY THE ROLE OF FUNCTIONAL NUTRITION IN MAINTAINING PUBLIC HEALTH

Shukurov Anvar Nazhmiddinovich

The Service of Sanitary and Epidemiological Welfare and Public Health of the Republic of Uzbekistan.

A review is presented on modern aspects of functional nutrition and the production of functional products, the concept of the importance of food in maintaining the state of physical, mental and social well-being and the ability to prevent diseases, improving the health and quality of life of people, including those suffering from various diseases, is argued. The conditions and methods for the production of functional products that ensure their safety from the standpoint of a balanced diet and nutritional value of products are determined.

Key words: functional nutrition, functional foods, ingredients, nutrients.

УДК: 616.72-002.77-08

INFLUENCE OF POST-COVID-19 INFECTION ON THE LEVEL OF INTERLEUKIN-17 IN PATIENTS WITH ANKYLOSING SPONDYLITIS

**Abdurakhmanova Nargiza Mirza-Baxtiyarxonovna^{1*}, Ahmedov
Khalmurad Sadullaevich¹, Razzakova Feruza Sayfiyevna²**

Tashkent Medical Academy¹

National University of Uzbekistan named after Mirza Ulugbek, Tashkent²

**e-mail: abdurakhmanova.nargiza@yandex.ru*

A new coronavirus infection, which gave rise to a pandemic in 2020, spread rapidly, struck the whole world with a high contagiousness of the disease,

a variety of mutant strains, a polymorphic clinical picture, as well as damage to various organs and systems [1,13]. The disease is characterized not only by damage to the lungs, but also by the involvement of other organs and systems of the body, including the osteoarticular system, in the pathological process [3, 14].

Ankylosing spondylitis (AS) is an autoimmune disease closely associated with HLA-B27 that affects the spine, sacroiliac joints, and peripheral joints and ultimately leads to ankylosing and disability in patients [9, 10, 17].

Over the past two to three decades, advances in immunological research have led to increased understanding of the pathogenesis of AS, repeatedly emphasizing a key role in cytokine dysregulation and hyperproduction [9, 19]. There are a lot of works devoted to the pro-inflammatory cytokine - tumor necrosis factor (TNF- α), scientists have revealed its direct involvement in the pathogenesis of AS, and its inhibitors have begun to be widely used in the treatment of AS [4, 10]. But a decade later, other cytokines such as interleukin 17 (IL-17), interleukin-23 (IL-23) were also identified, which play a direct role in the development of the disease [5, 8, 16, 18].

IL-17 was first described in 1993 in connection with the study of its effect on the production of IL-6 and IL-8 in rheumatoid arthritis [6, 20]. The IL -17 family of cytokines consists of 6 proteins (from IL - 17 A to IL - 17 F) and 5 receptors (from IL - 17 RA to IL - 17 RE) [4, 8]. IL-17 is mainly produced by T-helper cells 17 (TH17) cells, but can also be produced by other cells [20]. IL-17 affects various cells such as endothelial cells, fibroblasts, macrophages, osteoblasts, which in turn lead to inflammatory responses and bone formation [15]. The convincing effect of IL-17 in the pathogenesis of AS was the high efficiency of monoclonal antibodies blocking interleukin-17 in the treatment of AS [11, 18, 20, 21, 23].

Given the similar immune mechanisms in the pathogenesis of development COVID -19 and AS and the study of the level of IL-17 in the combination of both pathologies is of particular interest.

Materials and methods of research:

In the period from 2020-2022, in the Tashkent City Clinical Hospital №3 and the Multidisciplinary Clinic of the Tashkent Medical Academy, 188 patients with a diagnosis of (AS) were examined, of which there were 152 men , 36 women, the average duration of the disease was 8.8 ± 2.4 years. The control group consisted of 40 healthy volunteers of the appropriate middle age. The diagnosis was made according to the modified New York criteria for the diagnosis of AS. The patients were divided into two groups: group I - 72 patients with AS who had undergone COVID -19 and group II - 116 patients with AS who did not have a past infection with COVID -19. The mean age of patients in group I was 43.2 ± 13.3 years and in group II 39.5 ± 8.3 years. The axial form occurred in 53.7%, the peripheral form of AS in 46.3% of patients. The activity of the disease was studied using the BASDAI and ASDAS scales , the pain syndrome was

assessed using the visual analogue scale (VAS). All patients underwent in-depth clinical, laboratory and immunological studies, including IL-17A. All patients underwent PCR, as well as tests for the presence of antibodies to COVID-19.

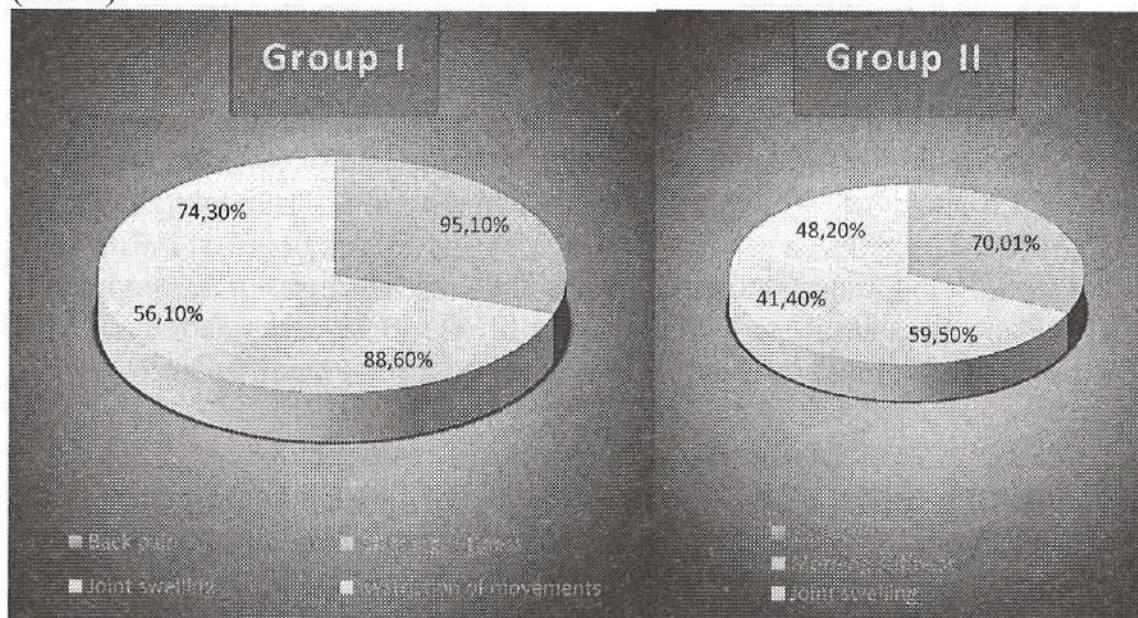
To measure the content of IL-17A in the obtained samples of patient sera, an ELISA method was used using Elabscience (USA) according to the instructions attached to the kit.

Statistical processing of the study results was carried out using Microsoft applications office Excel 2013, "Statistics" on a personal computer.

Research results:

Clinical studies have shown that the majority of AS patients have experienced COVID -19 asymptomatic or oligosymptomatic with a mild or moderate form of the disease, while not one patient received vaccination against coronavirus infection due to a relative contraindication for AS. Studies of both groups showed the presence of both axial and peripheral forms of joint damage.

The main complaints of patients in both groups were such as morning stiffness, which was observed in 88.6% of patients in group I and 59.5% of patients in group II ; back pain was noted by 95.1% of patients of group I and 70.01% of patients of group II ; joint swelling in 56.1% of group I , in 41.4% of group II ; restriction of movements in 74.3% of group I , in 48.2% of group II (Pic. 1).



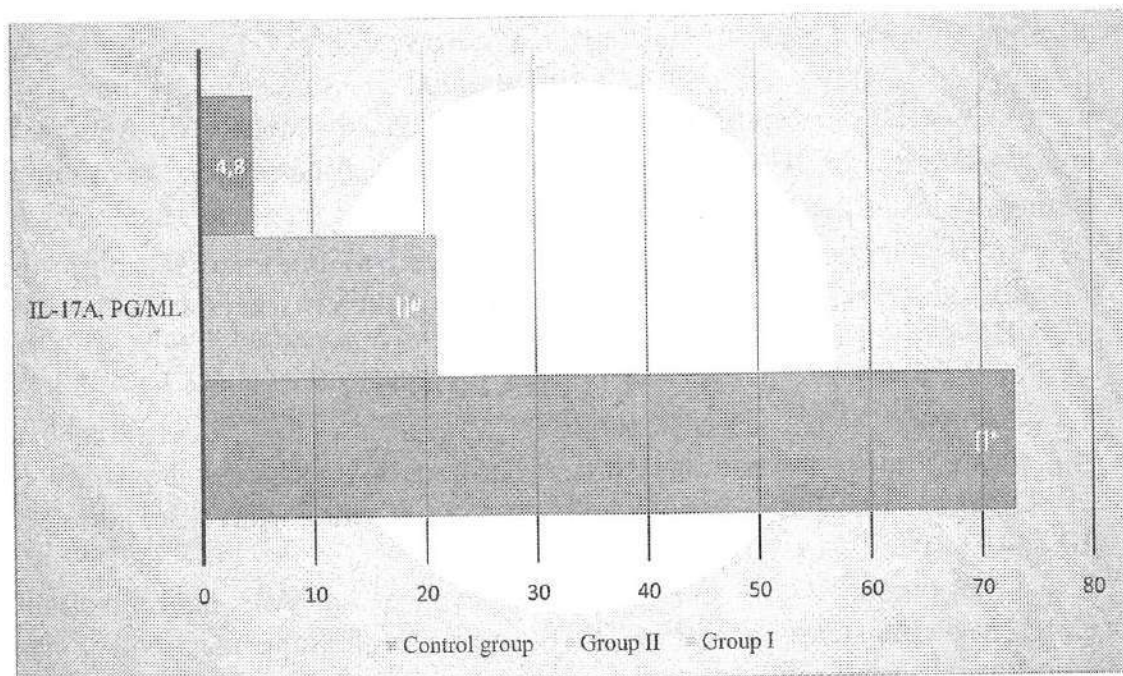
Pic.1 The main complaints of patients in the study groups.

And following the intensity of the pain syndrome according to VAS was 8.8 ± 1.3 in group I and 6.2 ± 0.9 in group II ($p < 0.05$). The study of AS activity using the BASDAI scale showed a high level of 6.6 ± 1.1 points in group I and an average of 4.3 ± 0.8 points in group II ($p < 0.05$). And the study of activity on the ASDAS scale showed a high level of activity of 5.01 ± 1.5 points in group I and the middle one - 3.1 ± 1.02 scores ($p < 0.05$) in group II, which indicates a

very high activity of the pathological process in group I and high activity in group II.

Painful entheses index - MASES was 11.6 ± 3.1 in group I and 6.9 ± 1.5 points in group II. As can be seen from the data in the main group, the number of painful entheses was higher than in the comparison group.

The study of the concentration of IL-17A in blood serum showed significantly high numbers in group I (73.08 ± 11.38 pg/ml; $p < 0.001^*$) relative to group II (21.12 ± 9.8 pg/ml; $p < 0.001^\#$) and the control group (4.8 ± 1.25 pg/ml), which indicates a more pronounced and persistent inflammatory process against the background of the transferred COVID-19 (Pic. 2).



Pic.2 Concentration of IL-17A in the studied groups

(Significant differences in indicators : * - in relation to the control group; # between groups I and II).

Discussion:

Severe acute respiratory syndrome coronavirus infection 2 (SARS - CoV - 2) causes cytokine-mediated inflammation leading to multiple clinical manifestations in COVID -19 [13]. According to the latest studies by foreign authors (2022), an increase in IL-17A is associated with the severe course of COVID -19 and the triggering mechanism for the emergence of a "cytokine storm" due to the presence of viral mimicry with this cytokine [22]. IL-17 also plays a key role in the pathogenesis of AS, having a high correlation with disease activity and progression [2,7,12]. Studies of how this cytokine changes with a combination of two pathologies and how it affects the clinical picture of both diseases aroused our special interest.

Our work presents data on the concentration of IL-17 in patients with AS in the post- COVID period and its effect on the clinical course of the disease. In patients with AS in the post- COVID period, very high concentrations of IL-17 were observed, which affected the clinical picture of the disease, i.e. coronavirus infection contributed to the increase in disease activity. The most interesting fact was the absence of a severe course of COVID-19, which, apparently, was associated with the presence of taking basic drugs. In the comparison group, an increase in IL-17A was also found, which is typical for AS, but the cytokine titer was two times lower than in the first group. If we compare the clinical and functional characteristics of both groups, we found a more pronounced limitation of functional activity, a higher activity of the disease on several scales at once, and a pronounced intensity of the pain syndrome.

Conclusions:

1. COVID -19 can provoke a worsening of the course of AS due to the overproduction of IL -17, which is a key pro- inflammatory cytokine in the pathogenesis of this disease.
2. The conducted studies showed the need to optimize the algorithm for diagnosing AS with the additional inclusion of such markers as IL-17 and IgG . COVID -19.

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РЕЗЮМЕ

INFLUENCE OF POST-COVID-19 INFECTION ON THE LEVEL OF INTERLEUKIN-17 IN PATIENTS WITH ANKYLOSING SPONDYLITIS

Abdurakhmanova Nargiza Mirza-Baxtiyarxonovna^{1*}, Ahmedov Khalmurad Sadullaevich¹, Razzakova Feruza Sayfiyevna²

Tashkent Medical Academy¹

National University of Uzbekistan named after Mirza Ulugbek, Tashkent²

*e-mail: abdurakhmanova.nargiza@yandex.ru

Мақолада ковиддан кейинги даврда анкилозловчи спондилоартрит билан касалланган беморларда яллиғланиш жараёнида иштирок этувчи цитокин - интерлейкин-17 даражасини ўрганишга бағишланган ўз тадқиқотларимиз натижалари келтирилган. Интерлейкин-17 миқдори икки гуруҳда: COVID-19 ўтказган ва ўтказмаган анкилозловчи спондилоартритга чалинган беморларда ҳамда соғлом шахсларда ўрганилди. Интерлейкин-17 даражаси касалликнинг клиник белгилари ва фаоллиги билан боғлиқлиги ҳам ўрганилди. Тадқиқотлар натижаларига кўра, коронавирус инфекцияси интерлейкин-17 даражасининг сезиларли даражада ошиши ва уни анкилозловчи спондилоартритни фаоллигини ошишига таъсир қилиши аниқланди.

Калит сўзлар: COVID-19, интерлейкин-17, анкилозловчи спондилоартрит, BASDAI, ASDAS.