Horizon | Journal of Humanity and Artificial Intelligence

THE INFLUENCE OF AN ELECTROACTIVATED AQUEOUS SOLUTION ON THE DYNAMICS OF BIOCHEMICAL PARAMETERS AND THE RATE OF WOUND HEALING IN THE TREATMENT OF PURULENT DISEASES OF SOFT TISSUES ON AN OUTPATIENT BASIS

Rakhmatov Sh. Sh.
Bukhara State Medical Institute

Abstract

We studied the results of a study of 130 patients with purulent diseases of soft tissues on an outpatient basis. All examined patients, depending on the method of treatment, were divided into two groups: group I included 62 patients with purulent diseases of soft tissues, who, as a local treatment, used wound sanitation with 25% dimethyl sulfoxide solution with the application of Levomekol ointment under gauze bandages. The main group II patients received surgical treatment of a purulent focus, debridement and application of the wound with an electroactivated solution of anolyte and catholyte (EAS-A and EAS-K) The results of the study showed the use of an electroactivated aqueous solution has a positive effect on the dynamics of biochemical parameters and the rate of healing of the wound process for 2-3 days and is a more economical, simple and convenient method of treating purulent wounds on an outpatient basis.The study showed physicochemical methods of treatment of patients with the use of anolyte EAS and EAS catholyte is an effective way of treating purulent soft tissue diseases on an outpatient basis.

Keywords: EAS anolyte, EAS catholyte, dimethyl sulfoxide, purulent wound.

Actuality

Surgical infection is one of the most important problems of modern medicine. Its significance is, due to the wide spread purulent-inflammatory diseases, the frequency of which does not decrease, but tends to increase. Patients with this pathology account for more than a third of all surgical patients. (1; c 427., 7; c 591.,2; c 14-18.,3; c 60-61)

Despite the achievement of medical science in the treatment of purulent diseases of soft tissues in an inpatient setting, the results of treatment of this category of patients in an outpatient setting do not sufficiently satisfy clinicians and patients. (11; c 72-73). This, in our opinion, is most due to two reasons with sufficient provision of modern technology in hospitals, which lags far behind in outpatient clinics. The second important reason is that the majority of scientific development is directed to the study of new methods of treatment in the inpatient setting, and there is little research devoted to the improvement of new methods of treatment in the outpatient setting. The latter requires the development of the most simple, economical and convenient methods of treatment for use in outpatient settings. The use of physical and chemical methods is a more convenient way in the treatment of purulent diseases of soft tissues on an outpatient basis. (11; c 72-73.,12; c 43-45) We have sufficient experience in the use of a chemical preparation of a 25% solution of dimethyl sulfoxide in the treatment of purulent diseases of

soft tissues. Positive results were obtained in the treatment of purulent diseases of soft tissues with the use of a 25% solution of dimethyl sulfoxide in the complex of treatment.

A number of authors in their works give preference to the use of electroactivated aqueous solutions (EAS) obtained by the STEL device in the treatment of purulent diseases of soft tissues of various etiologies. (6; c 15., 7; c 54-56)

We have used electroactivated aqueous solutions of anolyte and catholyte for the treatment of purulent diseases of soft tissues. For the preparation of an electroactivated aqueous solution EAS, the Apparatus SPC "Espero-1" was developed in 1998 by domestic scientists, employees of the Tashkent Institute of Central Asian Gas Research S.A. Alekhin. The Espero-type bioelectroactivator is approved by the Pharmaceutical Committee of the Republic of Uzbekistan for the production of drugs used in medical and clinical practice and was widely used by employees of the V.V. Vakhidov Research Institute and clinics of the Tashkent State Medical Institute No. 2.

The aim of the study was to determine the effectiveness of using an electroactivated solution on the dynamics of biochemical parameters and the rate of wound healing in the treatment of purulent soft tissue diseases on an outpatient basis.

Material and methods

The paper presents the results of a study of 130 patients with purulent diseases of soft tissues who received outpatient treatment at the Family Polyclinic No. 6 of the Bukhara City Medical Association for the period 2018-2021. All examined patients were divided into two groups depending on the method of treatment: group I included 62 patients with purulent diseases of soft tissues, who were treated locally with Levomekol ointment under a gauze bandage with a solution of 25% dimethyl sulfoxide solution daily. Group II 68 patients as a local treatment used debridement of the wound with an electrically activated aqueous solution with the application of ointment Levomekol under a gauze bandage. During the study, the clinical effectiveness of the treatment methods was evaluated using the dynamics of biochemical parameters and the rate of wound healing.

The predictive coefficient (PC) of the course of the wound process was determined by the formula of M.F. Mazurik (1984):

$$PC = \frac{TPP \ \ (total\ plasma\ protein)}{TPWD\ (total\ protein\ of\ wound\ detachable)}$$

In all patients, pH was measured in dynamics - the measurement of wound exudation.

Taking into account the properties and mechanism of action of various types of biologically active solutions to the wound process; - "electroactivated anolyte solution" EAS-A we used in the treatment of the first phase of purulent surgical diseases of soft tissues.

"Electroactivated catholyte solution" EAS-C is used in the treatment of the second phase of purulent-surgical diseases of soft tissues.

EAS-A and EAS-C received using the Espero 1 apparatus (8; 9; 10; 1998.)

Results and discussion

The control group was represented by 62 patients. Of the 62 patients in group I comparison, 42 (67.7%) patients had purulent wounds after various purulent surgical diseases of soft tissues, such as phlegmon, abscess, festering hematoma, felon, mastitis, and 20 (32.3%) - purulent postoperative wounds.

On the day of admission, all patients with purulent diseases of soft tissues underwent an emergency operation to open the purulent focus and sanitize the purulent cavity with antiseptic solutions. As a local treatment, debridement of wounds with a 25% solution of dimethyl sulfoxide in combination with Levomekol ointment under aseptic gauze dressings was additionally used.

The study of the dynamics of biochemical parameters of blood and wounds in patients with purulent diseases of soft tissues of group I is shown in table 1

Table 1. Dynamics of biochemical parameters of blood and wounds in patients of group I (n=62)

Indicators	Observation time					
	Day of admission	3 day	5 day	7 day	10 day	14 day
Wound environment pH	4,1±0,32	4,6±0,28	4,9±0,21*	5,2±0,23***	6,8±0,33	7,0±0,36
% reduction of the wound surface	0	0	1,7±0,11***	2,6±0,12**	2,9±0,14	3,7±0,16
Wound exudate protein (g/l)	56,7±1,22	54,7±2,28	51,3±2,14*	48,6±2,2	42,1+1,18	-
Total blood protein (g/l)	59,8±2,11	62,6±2,36	66,4±2,20	69,4±2,7	72,6±2,80	72,8±2,3
PC according to M.F. Mazuryka	1,05±0,04	1,14±0,05	1,29±0,06*	1,42±0,07*	1,72+0,05	-

Note: * - differences relative to the data of the previous day are significant (* - P <0,05, ** - P <0,01, *** - P <0,001)

In the first days of wound treatment, the pH of the wound environment was 4,1±0,32; wound exudate protein 56,7±1,22 (g/l); total blood protein 59,8±2,11 (g/l); PC 1,05±0,04.

Against the background of complex treatment with the use of a 25% solution of dimethyl sulfoxide, by day 3, the pH of the wound medium was 4.6 ± 0.28, that is, there was a shift to the neutral side. The protein content in the wound exudate decreased to an average of 54.7±2.28 g/l. Total blood protein 62.6±2.36 (g/l); The recalculation of PC revealed its growth to an average of 1.14±0.05 units.

By the 5th day of treatment, the pH of the wound medium was closer to the neutral medium (4.9±0.21). The daily percentage of reduction in the area of the wound surface averaged 1.7±0.11%. Wound exudate protein decreased to an average of 51.3±2.14 g/l. Total blood protein 66.4±2.20 (g/l); At the same time, PC according to M.F. Mazurik was equal to 1.29±0.06 units.

By 7-10 days of treatment, the pH of the wound environment shifted closer to neutral values of 5.2±0.23 and 6.8±0.33. The decrease in the area of the wound surface reached an average of 2.6±0.12% and 2.9±0.14%. Wound exudate protein decreased to 48.6±2.2 g/l and 42.1±1.18 g/l. Total blood protein 69.4±2.7 (g/l) and 72.6±2.80 g/l; PC was equal to 1.42±0.07 units. and 1.72+0.05 units.

By 13-14 days of treatment, the pH of the wound environment had a stable neutral value. The decrease in the area of the wound surface reached an average of 3.7±0.16%.

Dynamic control of the level of microbial contamination of purulent wounds of the analyzed group revealed the following: at the time of admission, the microbial contamination of the wound was 108 mt/g. After surgical treatment of the wound and local application of a 25% solution of dimethyl sulfoxide, it decreased by 4 orders of magnitude, during the treatment it was further reduced, and by 2-3 days of treatment, the microbial contamination of the wound in these patients was at or below the critical level, amounting to while 103 mt/g - 102 mt/g tissue. All patients underwent antibiotic therapy, taking into account the sensitivity of the wound microflora.

The use of a 25% solution of dimethyl sulfoxide on wounds in the complex treatment of patients with purulent diseases of the soft tissues of the body contributed to the complete cleansing of wounds from infection by 7.8 ± 0.4 days of treatment. By 7.0 ± 0.3 days, active resorption of the infiltrate around the wound was observed. The beginning of the appearance of granulations was noted by 9.5±0.6 days of treatment, and epithelialization by 12.0±1.5 days. These data are confirmed by cytological studies. So,

on the third day, in cytological preparations, a large number of destructive and degeneratively altered leukocytes were determined, mainly with an incomplete and perverse type of phagocytosis.

On the ninth-tenth days, the cytological picture was mostly inflammatory and inflammatory-regenerative in nature, and only by the eleventh day - 11.0 ± 1.5 days, a predominantly regenerative type of cytograms was noted.

In 68 patients of group II with various purulent wounds, the effectiveness of topical application of EAS was studied.

As noted above, in the treatment of the examined group II patients with purulent diseases of soft tissues, taking into account the antibacterial and reparative properties of EAS, EAS-A was used in the first phase of the wound, and EAS-C was used during the transition of the wound process to the second phase for debridement and application of the wound. The results of the analysis of biochemical parameters of blood and wounds of group II patients are shown in Table 2.

All analyzed biochemical parameters of blood and wounds of patients with purulent diseases of soft tissues of group II on the day of admission were significantly low.

Table 2. Dynamics of biochemical parameters of blood and wounds in patients with purulent diseases of soft tissues of group II (n=68)

Indicators	Observation time					
	1 day	3 day	5 day	7 day	10 day	14 day
Wound environment pH	4,0±0,22	4,6±0,22	5,4±0,35 *	6,2±0,27*	7,1±0,35*	7,4±0,28
Percentage reduction in wound surface area	0	0	1,5±0,07 ***	3,0±0,12***	3,7±0,16***	3,8±0,16
Wound exudate protein (g/l)	56,4±2,12	52,5±2,39	50,9±1,70**	47,3±1,33	41,2+1,11	-
Total blood protein (g/l)	62,8±2,27	63,7±2,81	67,1±2,4	71,9±2,80	73,1+2,6	73,4±2,4
PC according to M.F. Mazurik	1,11±0,03	1,21±0,04**	1,31±0,06**	1,52±0,03	1,77+0,05	-

Note: * - differences relative to the data of the previous day are significant (* - P <0,05, ** - P <0,01, *** - P <0,001)

Thus, the pH of the wound medium by the first day was 4.0±0.22, the exudate protein was 56.4±2.12 g/l, the total blood protein was 62.8±2.27 (g/l), PC by M .F. Mazurik - 1.11±0.03. On the third day of treatment, the pH of the wound medium averaged 4.6±0.22, Wound exudate protein was 52.5±2.39 g/l, Total blood protein was 63.7±2.81 (g/l), PC according to M.F. Mazurik 1.21±0.04. On the fifth day of treatment, the pH of the wound medium reached 5.4±0.35, the percentage of reduction in the area of the wound surface approached the figure - 1.5±0.07% per day. Wound exudate protein was 50.9±1.70 g/l Total blood protein 67.1±2.4 (g/l) PC according to M.F. Mazurik in this period was equal to 1.31±0.06. On the seventh day, the pH of the wound medium approached neutral - 6.2±0.27, the percentage of decrease in the area of the wound surface approached the figure - 3.0±0.12%, Wound exudate protein was 47.3±1.33 g/ l, Total blood protein 71.9±2.80 (g/l), while PC according to Mazurik was 1.52±0.03. On the tenth day, the pH of the wound environment approached neutral - 7.1±0.35, the percentage of decrease in the area of the wound surface approached the figure - 3.7±0.16%, Wound exudate protein was 41.2 + 1.11 g / l, Total blood protein 73.1 + 2.6 (g / l) while PC according to Mazurik was - 1.77 + 0.05. It should be noted that all the analyzed biochemical parameters and the rate of wound healing by the 14th day of treatment were within the normal range.

Conducting antibiotic therapy in patients of group II was the same as in the first group.

A comparative analysis of the terms of wound healing in patients of groups I and II revealed the following (Fig. 1).

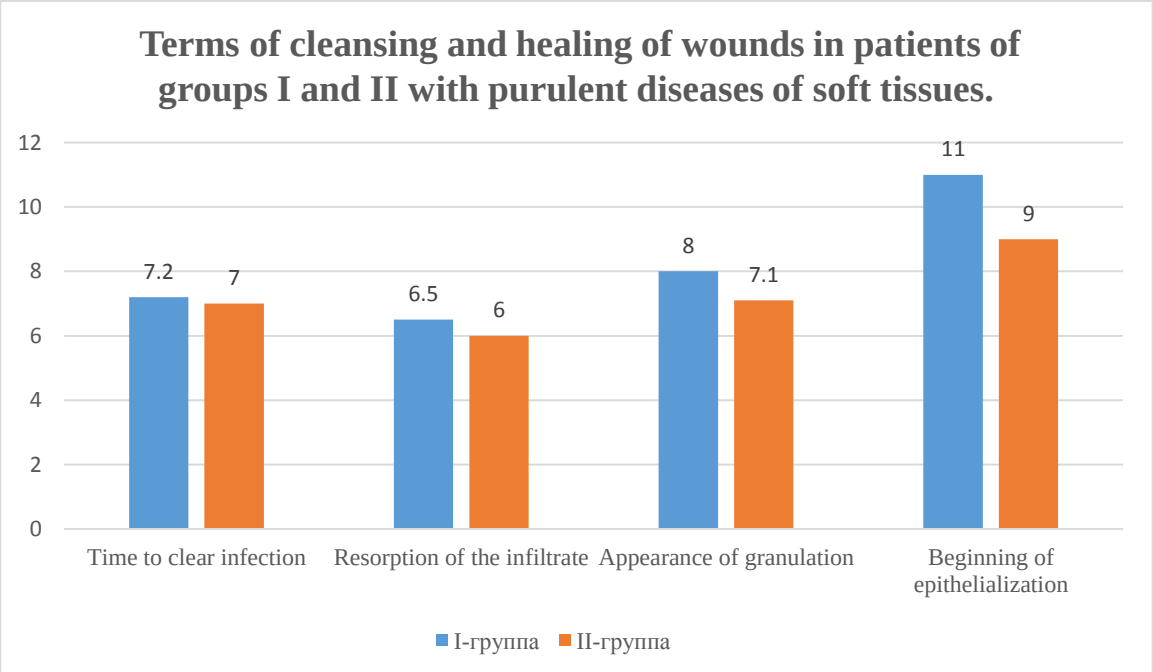

Fig. 1 Terms of cleansing and healing of wounds in patients of groups I and II with purulent diseases of soft tissues.

As can be seen in Figure 1, when using local surgical treatment of wounds with EAR in the complex treatment of patients with purulent diseases of soft tissues, complete cleansing of wounds from infection was observed by 7.0 ± 0.4 days of treatment. By the 6.0±0.5 day, complete resorption of the infiltrate was noted. The beginning of the appearance of granulation was noted by 7.1±0.4 days of treatment, and epithelialization appeared by 9.8±0.7 days. A comparative analysis of these indicators in patients of groups I and II revealed a significant advance in the timing of cleansing and healing of wounds in patients of group II by 2-3 days compared to the comparison group [1-20].

Thus, a comparative analysis of the dynamics of biochemical parameters and the rate of cleansing and healing of wounds in patients with purulent diseases of soft tissues of groups I and II revealed the following: the use of a 25% solution of dimethyl sulfoxide in the treatment complex in the local treatment of purulent wounds is an effective method. The average duration of treatment for patients in group I was 8.0±0.5 days. At the same time, the transition from the first phase of the wound process to the second one averages 7.1±0.4 days.

A study in patients with purulent diseases of soft tissues of an electroactivated solution of EAS-A and EAS-C on an outpatient basis revealed the following features of the course of the wound process: the use of EAS for local treatment of purulent wounds leads to complete cleansing of the wound, normalization of clinical and laboratory biochemical parameters[21-40]. At the same time, for assessing the course of the wound process, indicators such as the pH of the wound medium, the percentage of reduction in the area of the wound surface, Wound exudate protein (g/l), PC according to M.F. Mazurik, and the speed of cleansing and wound healing.

Thus, our study showed the physicochemical methods of treating patients with the use of EAS-A and EAS-C is an effective way to treat purulent soft tissue diseases on an outpatient basis.

Conclusions

1. The use of a solution of an electroactivated solution of EAS-A and EAS-C is an effective, simple, convenient and economical way of the physico-chemical method of treating purulent wounds on an outpatient basis.

2. The use of EAS-A solution effectively affects the process of cleansing purulent wounds, while the biochemical parameters of the pH of the wound environment of the PC according to Mazuriki is an important criterion for assessing the wound process.
3. The use of EAR solution in the treatment of purulent diseases of soft tissues is a simple, convenient and effective method of treatment that can be successfully used in the treatment of purulent wounds on an outpatient basis.

Bibliography

1. Mustafayeva, S. (2023). XORIJIY TIL (INGLIZ TILI) NI O'QITISHDA ZAMONVIY PEDAGOGIK TEXNOLOGIYALAR; TURLI METODIK USULLAR VA METODLAR. *Инновационные исследования в современном мире: теория и практика*, *2*(18), 37-40.
2. Ergashev, H., & Mustafaeva, S. (2023). ЎРТА ОСИЁ ШИШАСОЗЛИГИ. *Инновационные исследования в современном мире: теория и практика*, *2*(17), 126-129.
3. Mustafaev, U., & Mustafaeva, S. (2022). HIGHER EDUCATION: ADVANTAGES, PROBLEMS AND SOLUTIONS OF THE CREDIT-MODULE SYSTEM. *Oriental renaissance: Innovative, educational, natural and social sciences*, *2*(9), 258-264.
4. Mustafaeva, S. U. (2022). LINGUISTIC APPROACHES OF STYLISTIC TOOLS IN IMPROVING THE COMMUNICATIVE SKILL IN THE CLASSROOM. *Oriental renaissance: Innovative, educational, natural and social sciences*, *2*(5), 1134-1139.
5. Mustafayeva, S. U. (2021). HOZIRGI DAVR TALABI ASOSIDA INGLIZ TILINI O 'QITISH JARAYONIDA TURLI TAMOYILLAR VA METODLARNING O 'RNI. *Oriental renaissance: Innovative, educational, natural and social sciences*, *1*(11), 277-282.
6. Ягьяева, Э. Б. (2023). НЕКОТОРЫЕ ПЕДАГОГИЧЕСКИЕ АСПЕКТЫ ОРГАНИЗАЦИИ САМОСТОЯТЕЛЬНОЙ РАБОТЫ СТУДЕНТОВ ДЛЯ ЭФФЕКТИВНОГО УСВОЕНИЯ ЯЗЫКА. *Herald pedagogiki. Nauka i Praktyka*, *3*(3).
7. Ягьяева, Э. Б. (2021). ТРУДНОСТИ ОТДАЛЕННОГО ОБУЧЕНИЯ СТУДЕНТОВ НЕ ФИЛОЛОГИЧЕСКИХ СПЕЦИАЛЬНОСТЕЙ (ТУРИЗМ). *Актуальные вопросы современной науки и практики*, 109.
8. Yagyaeva, E. B., & Zokirov, A. (2022). PECULIARITIES OF THE ORGANIZATION OF MULTI-ETHNIC, CONVENED MAHALLAS DURING THE YEARS OF INDEPENDENCE. *Science Time*, (2 (98)), 19-22.
9. Yagyayeva, E. (2023). NOFILOLOGIK TA'LIM YO'NALISHLARIDA XORIJIY TILNI O'ZLASHTIRISH XUSUSIYATLAR. *Yosh Tadqiqotchi Jurnali*, *2*(3), 3-7.
10. Ягъяева, Э. Б. (2017). Язык как отражение культуры народа. *Вопросы науки и образования*, (3 (4)), 85-86.
11. Musurmon, I. (2020). THE ESSENCE OF THE CONCEPT OF" CULTURE"," PROFESSIONAL CULTURE" IN SHAPING PROFESSIONAL CULTURE FOR STUDENTS OF PROFESSIONAL COLLEGES. *European Journal of Research and Reflection in Educational Sciences Vol*, *8*(1).
12. Imomov, M. (2023). PRIORITY PRINCIPLES OF PROFESSIONAL CULTURE DEVELOPMENT OF STUDENTS ON THE BASIS OF A COMPETENT APPROACH. *Science and innovation*, *2*(B4), 172-175.
13. MUSURMON, I., ZULFIYA, A., SURAYYO, A., MUXAYYO, A., & AZIZA, K. (2022). The Importance Of Interactive Methods And Logical Games In Preparing Students For Professional Pedagogical Activities. *Journal of Positive School Psychology*, *6*(11), 1293-1296.

14. Pirnazarovich, I. M. (2021). METHODOLOGY OF DEVELOPING PROFESSIONAL CULTURE OF COLLEGE STUDENTS ON THE BASIS OF COMPETEN
15. Musurmon, I. (2021). Criteria and indicators defining the level of professional development of a professional graduate (On the example of vocational colleges in industry). *ACADEMICIA: AN INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL*, *11*(1), 1326-1330.
16. Musurmon, I. (2020). USE OF MODERN INFORMATION TECHNOLOGIES IN THE PROCESS OF FORMING A PROFESSIONAL CULTURE OF STUDENTS OF TECHNICAL SPECIALTIES. *BBK 87*, 87.
17. Хайдаров, М. М. (2019). Историческое развитие основ семейного права и его принципов в Республике Узбекистан. *Современный мусульманский мир. Международный научный журнал Российского исламского института*, (2), 5.
18. Исмоилов, М. (2022, February). ЎЗБЕКИСТОНДА ТАСАВВУФНИНГ ЎРГАНИЛИШИГА ДОИР. In *International Conference on Multidimensional Research and Innovative Technological Analyses* (pp. 169-172).
19. Ismoilov, M. M., Lutfillayev, K. M., & Egamov, A. A. (2021). Activities Of Central Asian Commentators In The Science Of Tafsir (On The Example Of Surah" Laylat Al-Qadr"). *Turkish Online Journal of Qualitative Inquiry*, *12*(6).
20. Djuraeva, S. N., & Rakhimdjanov, D. A. (2022). TRADE RELATIONS OF THE SURKHAN OASIS ON THE GREAT SILK ROAD IN THE MIDDLE AGES AND THE CRAFTS THAT FLOURISHED THERE. *American Journal Of Social Sciences And Humanity Research*, *2*(12), 56-61.
21. Рахимджанов, Д. А. (2022). Роль Абу Хафса Насафи В
22. Развитии Учения Мутуридия. *CENTRAL ASIAN JOURNAL OF SOCIAL SCIENCES AND HISTORY*, *3*(11), 194-199.
23. Рахимджанов, Д. А. (2022). АБУ ХАФС НАСАФИ И ЕГО КНИГА «КИТАБ АЛЬ-КАНД». *BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI*, 290-294.
24. Rahimjonov, D. (2019). The importance of social rehabilitation of people who have fallen under the influence of extremist ideas in the process of globalization. *The Light of Islam*, *2019*(1), 12.
25. Mirrahimova, M. H., Khalmatova, B. T., & Tashmatova, G. A. (2019). Bronchial asthma in children: a modern view of the problem. *Toshkent tibbiyot akademiyasi axborotnomasi*, (1), 31-34.
26. Миррахимова, М. Х., Халматова, Б. Т., & Тошматова, Г. А. (2019). Бронхиальная астма у детей: современный взгляд на проблему.
27. Tashmatova, G. A., & Khalmatova, B. T. (2021). Bronchial asthma in children during the covid-19 pandemic: a feature of the course.
28. Toshmatova, G. A., Shakarova, M. S. Q., & Emirova, A. R. (2020). Meaning Of Respiratory Mycoplasma Infection In Children With Bronchial Asthma. *The American Journal of Medical Sciences and Pharmaceutical Research*, *2*(12), 47-54.
29. Toshmatova, G. A., Shakarova, M. S. Q., & Emirova, A. R. (2020). Meaning Of Respiratory Mycoplasma Infection In Children With Bronchial Asthma. *The American Journal of Medical Sciences and Pharmaceutical Research*, *2*(12), 47-54.
30. Toshmatova, G. A., Shakarova, M. S. Q., & Emirova, A. R. (2020). Meaning Of Respiratory Mycoplasma Infection In Children With Bronchial Asthma. *The American Journal of Medical Sciences and Pharmaceutical Research*, *2*(12), 47-54.
31. Khalmatova, B., Mirrakhimova, M., Tashmatova, G., & Olmosov, R. (2017). Efficiency of the usage of antagonists of leukotrienic receptors at children with bronchial asthma. In *International Forum on*

Contemporary Global Challenges of Interdisciplinary Academic Research and Innovation (pp. 291-296).

32. Ташматова, Г. А., Халматова, Б. Т., & Миррахимова, М. Х. (2020). Распространенность аллергических заболеваний у детей, проживающих в промышленных городах Узбекистана (по данным анкетирования).
33. Abdulloyeva, M., Pulatova, K., & Mirzaev, R. (2023). ORTIQCHA VAZN VA ARTERIAL GIPERTONIYA BILAN OG'RIGAN YOSHLARDA YUZAGA KELADIGAN JINSIY ZAIFLIK. *Евразийский журнал медицинских и естественных наук*, *3*(4 Part 2), 91-94.
34. Khasanjanova, F. O., Samveilovna, P. K., & Bakhtiyorovna, Y. I. (2023). EVALUATION OF THE CLINICAL EFFECT OF SIMVASTATIN IN PATIENTS WITH UNSTABLE ANGINA AT A YOUNG AGE.
35. Pulatova, K. S., Inoyatov, S. S., & Numonov, D. U. (2022). REDUCED SEXUAL DYSFUNCTION IN YOUNG ADULTS WITH OVERWEIGHT AND ARTERIAL HYPERTENSION. *Central Asian Research Journal for Interdisciplinary Studies (CARJIS)*, *2*(1), 302-306.
36. Баратова, М. Р., Косимова, Ш. М., & Хидирова, Н. К. (2021). ПРЕИМУЩЕСТВА БИОСТИМУЛЯТОРА УЧКУН ПРИ ВЫРАЩИВАНИИ ОГУРЦА В УСЛОВИЯХ АНДИЖАНСКОЙ ОБЛАСТИ. *Life Sciences and Agriculture*, (1 (5)), 68-72.
37. Kudratovna, K. N., & Mirzakhamitovna, K. S. (2022). The Use of the Biostimulant Uchkun in the Cultivation of Pumpkin Variety Spanish 73. *Current Journal of Applied Science and Technology*, *41*(42), 15-19.
38. Косимова, Ш. (2022). ҚОВОҚ НАВЛАРИНИ ЕТИШТИРИШДА БИОСТИМУЛЯТОРЛАРДАН ФОЙДАЛАНИШ ИМКОНИЯТЛАРИ. *Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot*, *1*(27), 149-152.
39. Kudratovna, K. N., Mirzakhamitovna, K. S., & Rakhimovna, B. M. (2022). ADVANTAGES OF BIOSTIMULANTS IN GROWING PROMISING PUMPKIN VARIETIES. *British Journal of Global Ecology and Sustainable Development*, *10*, 83-88.
40. Баратова, М. Р., Касымова, Ш., Закирова, Р. П., & Хидырова, Н. К. (2020). ВЛИЯНИЕ КОМПОЗИЦИИ УЧКУН ПЛЮС НА УРОЖАЙНОСТЬ ТЫКВЫ СОРТОВ ПАЛОВ КАДУ 268 И ИСПАНСКАЯ-73. *Конференцію зареєстровано в УкрІНТЕІ (посвідчення № 645 від 21.10. 2020р).*, 9.