

# Factors Predisposing to Perinatal Hypoxia in Infants with Respiratory Distress Syndrome

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**Abstract:** This review focuses on identifying and understanding the various risk factors that contribute to perinatal hypoxia among newborns diagnosed with Respiratory Distress Syndrome (RDS). Perinatal hypoxia, a condition characterized by insufficient oxygen supply to the fetus or newborn, poses significant risks of morbidity and mortality, particularly in infants afflicted with RDS. The complexity of this condition necessitates a multifaceted approach to identify maternal, fetal, and delivery-related factors that increase the likelihood of hypoxia. This encompasses prenatal aspects such as maternal health and lifestyle, fetal vulnerabilities including prematurity and genetic predispositions, and perinatal challenges like the method of delivery and immediate postnatal care. Understanding these risk factors is crucial for developing targeted interventions aimed at reducing the incidence and severity of perinatal hypoxia in this vulnerable population.

**Keywords:** Perinatal Hypoxia, Respiratory Distress Syndrome, Newborns, Risk Factors, Maternal Health, Prematurity, Prenatal Care, Perinatal Morbidity.

Respiratory distress syndrome (RDS) is the leading cause of respiratory dysfunction in the period of early neonatal adaptation. The higher its occurrence, the lower the gestational age and body weight at birth. RDS is one of the most frequent and severe diseases of the early neonatal period in premature infants, and it accounts for about 25% of all deaths, and in children born at 26-28 weeks of gestation, this figure reaches up to 80%.

Viral infections during pregnancy can disrupt immunological tolerance and have a harmful effect on the fetus. Despite these possible links between pregnancy and infection-related morbidity, it is unclear how pregnancy affects the mother's response to certain viral pathogens. In this context, the novel coronavirus (SARS-CoV-2) may cause coronavirus diseases 2019 (COVID-19) in pregnant women.

Vertical transmission can occur, but rarely, due to a powerful physical barrier, finely regulated placental immune defenses, and modulation strategies. In particular, the immunomodulatory mechanisms used by the placenta can mitigate a strong immune response, possibly mitigate the cytokine storm closely associated with critically ill COVID-19 patients, possibly minimize cell and tissue damage, and potentially reduce SARS-CoV-2 transmission. Through this, the placenta serves as a front of protection against pathogens, regulating the transmission of type III interferon signals, triggered by microRNA autophagy. Based on these data, we conclude that vertical transmission can occur, but rarely, due to a powerful physical barrier, finely regulated placental immune defenses, and modulation strategies.

## ***Materials and methods***

Immunological studies of the blood of sick children were conducted in the laboratory of Immunomorphology of the Institute of Human Immunology and Genomics of the Academy of Sciences of the Republic of Uzbekistan. The indicators of cytokine (IL-6, IL-8, FNO-a, INF- $\gamma$ ) status in the blood were studied. Blood tests in the early (up to 7 days of life) and late (from the 8th to the 28th day of life) neonatal adaptation period using the ELISA method. The test system was used by the manufacturer CJSC Vector Best (St. Petersburg). Cytokine levels were determined according to the attached instructions.

The principle of operation of the kit according to the attached instructions. The kit uses a "sandwich"-a variant of solid-phase enzyme immunoassay. To implement this option, two monoclonal antibodies

with different epitope specificity to the studied cytokines were used. One of them is immobilized in the solid phase (the inner surface of the wells), the second is conjugated with peroxidase. At the first stage of the analysis, the content contained in the calibration and test samples binds to antibodies immobilized on the inner surface of the wells. In the second stage of the analysis, the immobilized interleukin interacts with the conjugate of the second antibodies, peroxidase. The amount of conjugate bound is directly proportional to the amount of interleukin in the test sample.

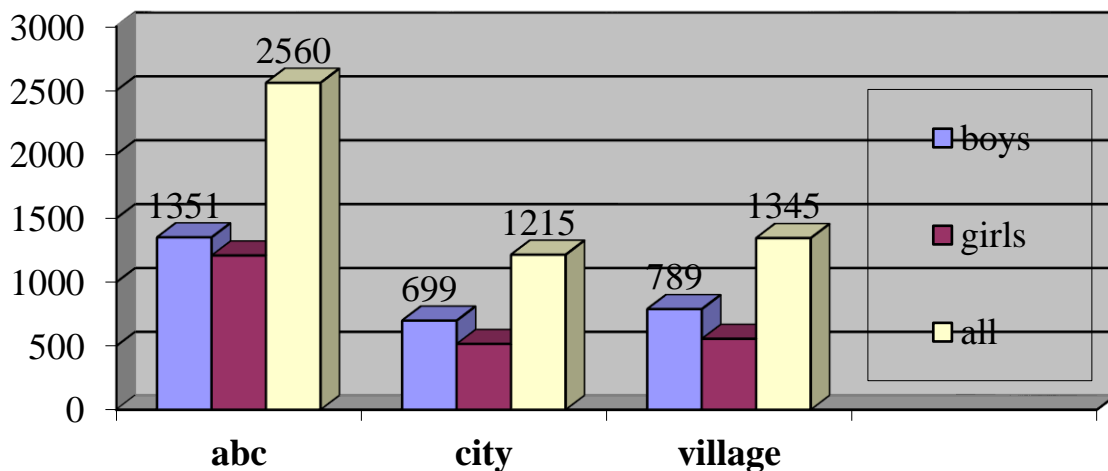
During incubation with the substrate mixture, the solution is stained in the wells. The degree of staining is directly proportional to the number of bound labeled antibodies. After measuring the optical density of the solution in the wells, the concentration of the corresponding interleukin in the samples to be determined is calculated based on the calibration curve.

**Results.** The object of the study was 424 patients: 212 of them newborns and their mothers (212 women in labor) hospitalized in the department of neonatology of the Bukhara Regional Children's Multidisciplinary Medical Center in the period 2020-2022.

A retrospective analysis of 2,560 newborn histories was performed. The analysis of children by gender parity and place of residence showed a predominance of boys ( $n=1351$ ,  $52.7\pm 0.4\%$ ) than girls ( $n=1209$ ,  $47.2\pm 0.4\%$ ).

The analysis of the place of residence showed the predominance of children living in rural areas 1345 ( $52.5\pm 0.2\%$ ) (Fig.2.).

**Figure 1. Distribution by place of residence and sex of newborns**



According to parity, it turned out that there were slightly more children with RDS ( $n=1428$ ) from the first pregnancy ( $55.8\pm 0.6\%$ ) than newborns born from the 2nd and pregnancy-768 ( $30.0\pm 1.1\%$ ) and from the 3rd and more pregnancies-364 ( $14.2\pm 1.0\%$ ).

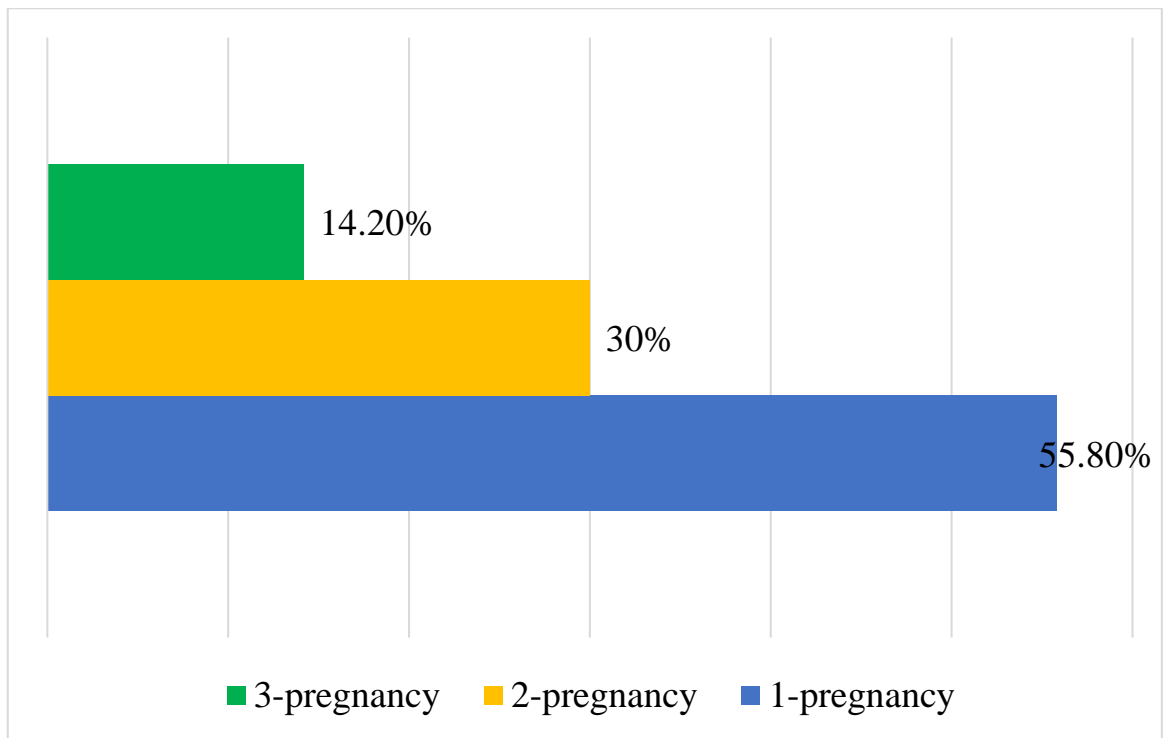


Figure 2.

Distribution of patients by parity

The postnatal age of the children ranged from 2 days to 28 days of life. All newborns were full-term, with a gestation period at birth from 38 to 42 weeks.

Cases of consanguineous marriage were found in 120 newborns, which is  $4.68 \pm 1.1\%$ .

The study of the health status of mothers of newborns (women in labor) revealed a high incidence of anemia of I- II degree (n=1114, 43.5%), gestational hypertension (n=439, 17.2%), preeclampsia (n=347, 13.5%), diffuse goiter (n=361, 14.1%), pyelonephritis (n=75, 2.9%)

(Fig.2).

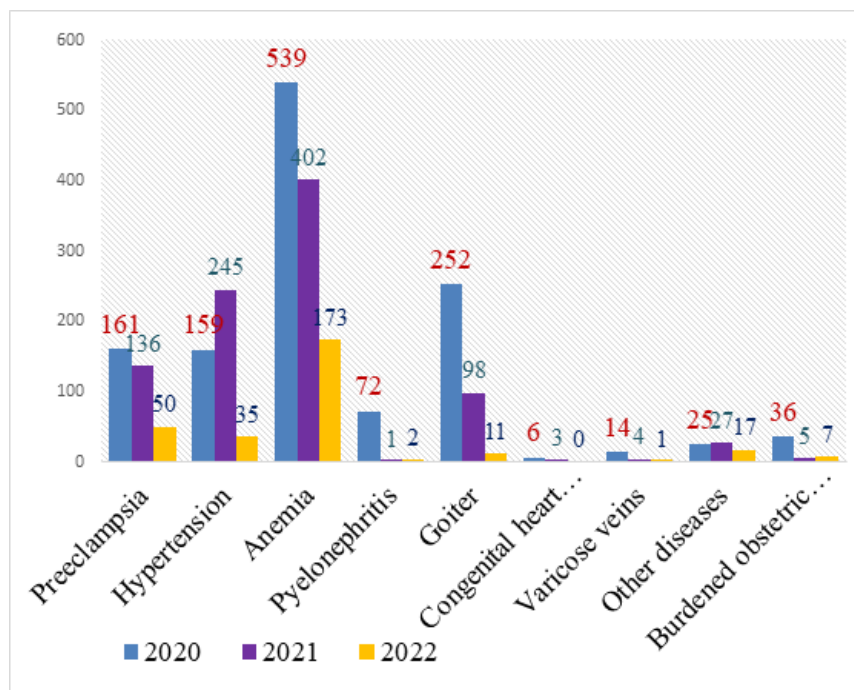


Figure 3. The structure of morbidity in pregnant women

Table 2.

nosology	2020	2021	2022	Total
	abc	abc	abc	Abc(%)
Preeclampsia	161	136	50	347 (29,3)
Hypertension	159	245	35	439 (37,2)
Anemia	539	402	173	1114 (43,5)
Pyelonephritis	72	1	2	75 (2,9)
Goiter	252	98	11	361 (30,6)
Congenital heart defects	6	3	-	9 (0,76)
Varicose veins	14	4	1	19 (1,61)
Other diseases	25	27	17	69 (5,85)
Burdened obstetric history	36	5	7	48 (4,1)

### Diseases of the mother during pregnancy

All established conditions and concomitant diseases occur against the background of a burdened obstetric history-48 (1.87%).

The structure of diseases and conditions of the mother was compiled for a detailed study and identification of the leading causal factors of hypoxia and hypoxemia in newborns.

As a result, risk factors for the development of perinatal hypoxia in newborns were identified (Table 2).

### Risk factors for perinatal hypoxia in newborns

Risk factors	Quantity	%
Anemia of moderate and/or severe degree	298	82,8
Cardiovascular pathology of pregnant women (gestational hypertension)	106	29,4
Toxicosis of pregnant women	308	85,5
Multiple pregnancies	12	3,3
Chorioamnionitis/ STI	98	27,2
Polyhydramnios	38	10,6
Abnormal fetal position (pelvic/transverse)	24	6,7
Overgrowth of the fetus	16	4,4
Umbilical cord pathology/fetoplacental insufficiency	14	3,9
Anomalies of labor activity	14	3,9

Of the risk factors, pregnancy toxicosis prevails -308 (85.50%), anemia of moderate and/or severe degree -298 (82.8%) and cardiovascular pathology (gestational hypertension) of 106 pregnant women (29.4%). Chorionamnionitis/STI was also found in 98 (27.2%) women, polyhydramnios 38 (10.6%) and fetal malformation (pelvic/transverse) in 47 (3.9%) women.

### Conclusion

Thus, the results obtained allowed us to conclude that perinatal fetal hypoxia in newborns develops with anemia and moderate and/or severe, cardiovascular pathology, gestational hypertension of pregnant women. Chorionamnionitis/STIs, polyhydramnios and abnormal fetal position (pelvic/transverse) in women were also established.

### Literature

1. Мухамедова Ш. Т. и др. Внутрибольничная инфекция у новорожденных детей //Биология и интегративная медицина. – 2021. – №. 3 (50). – С. 75-86.

2. Мухамедова Ш. Т. Особенности динамики цитокинов у новорожденных с синдромом системного воспалительного ответа. – 2020.
3. Мухамедова Ш. Т., Юлдашева Г. Г. Состояние материнского организма-предиктор развития неонатальной дезадаптации новорожденных //Global science. Development and novelty. – 2016. – С. 37-39.
4. Мухамедова Ш., Гайбиева Ш. Диагностическое значение показателей цитокинов при синдроме системного воспалительного ответа у новорожденных //Журнал вестник врача. – 2021. – Т. 1. – №. 2. – С. 67-70.
5. Мухамедова Ш., Мухитдинов Ш. КОМОРБИДНЫЕ СОСТОЯНИИ У ДЕТЕЙ С ГЕЛЬМИНТОЗАМИ //Models and methods in modern science. – 2023. – Т. 2. – №. 9. – С. 9-10.
6. Мухамедова Ш., Мухитдинов Ш. КОМОРБИДНЫЕ СОСТОЯНИИ У ДЕТЕЙ С ГЕЛЬМИНТОЗАМИ //Models and methods in modern science. – 2023. – Т. 2. – №. 9. – С. 9-10.
7. Мухамедова Ш., Бахронова Д. РАННЯЯ ДИАГНОСТИКА И ПРОГНОЗИРОВАНИЕ ТЕЧЕНИЯ ССВО У НОВОРОЖДЕННЫХ С НЕИНФЕКЦИОННЫМИ ПЕРИНАТАЛЬНЫМИ ЗАБОЛЕВАНИЯМИ //Инновационные исследования в современном мире: теория и практика. – 2023. – Т. 2. – №. 20. – С. 117-120.
8. Мухамедова Ш. Т. Особенности динамики цитокинов у новорожденных с синдромом системного воспалительного ответа. – 2020.
9. Mukhamedova S. T. The prognostic significance of cytokines in the diagnosis of pathology of newborns./Shakhnoza T. Mukhamedova, Dilnoza R. Hamraeva, Fazolat A. Karomatova //Journal of Natural Remedies. – 2021. – №. 1 (1). – С. 119.
10. Мухамедова Ш., Гайбиева Ш. Диагностическое значение показателей цитокинов при синдроме системного воспалительного ответа у новорожденных //Журнал вестник врача. – 2021. – Т. 1. – №. 2. – С. 67-70.
11. Мухамедова Ш., Мухитдинов Ш. ПОКАЗАТЕЛИ ГУМОРАЛЬНОГО ИММУНИТЕТА У ДЕТЕЙ С ГЕЛЬМИНТОЗАМИ //Естественные науки в современном мире: теоретические и практические исследования. – 2023. – Т. 2. – №. 8. – С. 8-10.
12. Mukhamedova S. T., Navruzova S. I. INFLUENCE OF THE STATE OF METABOLISM OF THE MATERNAL ORGANISM ON THE FORMATION OF NEPHROPATHIES IN NEWBORNS //British Medical Journal. – 2023. – Т. 3. – №. 3.
13. Tolibovna M. S., Rustamovna A. N. Innovative Approach to the Diagnosis of Renal Circulation in Newborn //Central Asian Journal of Medical and Natural Science. – 2023. – Т. 4. – №. 1. – С. 374-380.
14. Ilkhomovna K. D. Morphological Features of Tumor in Different Treatment Options for Patients with Locally Advanced Breast Cancer //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 2. – С. 4-5.
15. Khodzhaeva D. I. Changes in the Vertebral Column and Thoracic Spinecells after Postponement of Mastoectomy //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 4. – С. 109-113.
16. Khodjayeva D. I. MORPHOLOGY OF IDIOPATHIC SCOLIOSIS BASED ON SEGMENT BY SEGMENT ASSESSMENT OF SPINAL COLUMN DEFORMITY //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 208-215.
17. Ilkhomovna K. D. Modern Look of Facial Skin Cancer //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 85-89.

18. Ходжаева Д. И. Современные возможности ультразвуковой диагностики рака кожи лица //Вопросы науки и образования. – 2021. – №. 25 (150). – С. 21-24.
19. Aslonov S. G. et al. Modern Approaches to Oropharyngeal Cancer Therapy //International Journal of Discoveries and Innovations in Applied Sciences. – 2021. – Т. 1. – №. 3. – С. 38-39.
20. Khodjayeva D. I. MORPHOLOGY OF IDIOPATHIC SCOLIOSIS BASED ON SEGMENT BY SEGMENT ASSESSMENT OF SPINAL COLUMN DEFORMITY //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 208-215.
21. Khodjaeva D. I. Magnetic-resonance imaging in the diagnosis of breast cancer and its metastasis to the spinal column //Scientific progress. – 2021. – Т. 2. – №. 6. – С. 540-547.
22. Ilkhomovna K. D. MANIFESTATIONS OF POST-MASTECTOMY SYNDROME, PATHOLOGY OF THE BRACHIAL NEUROVASCULAR BUNDLE IN CLINICAL MANIFESTATIONS //Innovative Society: Problems, Analysis and Development Prospects. – 2022. – С. 225-229.
23. Khodzhaeva D. I. Modern Possibilities of Ultrasounddiagnostics of Skin Cancer //IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 101-104.
24. Ilkhomovna K. D. Modern Look of Facial Skin Cancer //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 85-89.
25. Ilkhomovna K. D. Morphological Features of Tumor in Different Treatment Options for Patients with Locally Advanced Breast Cancer //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 2. – С. 4-5.
26. Khodzhaeva D. I. Changes in the Vertebral Column and Thoracic Spinecells after Postponement of Mastoectomy //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 4. – С. 109-113.
27. Khodjayeva D. I. MORPHOLOGY OF IDIOPATHIC SCOLIOSIS BASED ON SEGMENT BY SEGMENT ASSESSMENT OF SPINAL COLUMN DEFORMITY //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 208-215.
28. Ilkhomovna K. D. Modern Look of Facial Skin Cancer //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 85-89.
29. Ходжаева Д. И. Современные возможности ультразвуковой диагностики рака кожи лица //Вопросы науки и образования. – 2021. – №. 25 (150). – С. 21-24.
30. Aslonov S. G. et al. Modern Approaches to Oropharyngeal Cancer Therapy //International Journal of Discoveries and Innovations in Applied Sciences. – 2021. – Т. 1. – №. 3. – С. 38-39.
31. Khodjayeva D. I. MORPHOLOGY OF IDIOPATHIC SCOLIOSIS BASED ON SEGMENT BY SEGMENT ASSESSMENT OF SPINAL COLUMN DEFORMITY //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 208-215.
32. Khodjaeva D. I. Magnetic-resonance imaging in the diagnosis of breast cancer and its metastasis to the spinal column //Scientific progress. – 2021. – Т. 2. – №. 6. – С. 540-547.
33. Ilkhomovna K. D. MANIFESTATIONS OF POST-MASTECTOMY SYNDROME, PATHOLOGY OF THE BRACHIAL NEUROVASCULAR BUNDLE IN CLINICAL MANIFESTATIONS //Innovative Society: Problems, Analysis and Development Prospects. – 2022. – С. 225-229.
34. Khodzhaeva D. I. Modern Possibilities of Ultrasounddiagnostics of Skin Cancer //IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 101-104.
35. Ilkhomovna K. D. Modern Look of Facial Skin Cancer //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 85-89.

36. Nazarov J., Sharipova M. A. The Immune System in Children with Different Incidence Rates And //Central Asian Journal of Medical and Natural Science. – 2021. – С. 5-7.
37. Erkinovich N. J. S. Assessment of the ecological state and water quality class of water bodies in the Bukhara Region according to the periphyton indicators //Indian Journal of Environmental Protection. – 2022. – Т. 42. – №. 3. – С. 367-373.
38. Назаров Ж. С. Э. ЛАКОНИЗМ, ДЕДУКЦИЯ И КЕЙСЫ В ПЕДАГОГИЧЕСКОЙ ПРАКТИКЕ //март-апрель. – 2022. – С. 13.
39. Erkinovich N. J. S. HPV–Relevance, Oncogenesis and Diagnosis (A Review) //EUROPEAN JOURNAL OF INNOVATION IN NONFORMAL EDUCATION. – 2023. – Т. 3. – №. 1. – С. 129-134.
40. Erkinovich N. J. S. COMPARATIVE IMMUNOBIOLOGICAL CHARACTERISTICS OF PRIMARY AND SECONDARY TUBERCULOSIS WITH MULTIPLE AND EXTENSIVELY DRUG RESISTANCE //INTERNATIONAL JOURNAL OF HEALTH SYSTEMS AND MEDICAL SCIENCES. – 2023. – Т. 2. – №. 5. – С. 108-110.
41. Erkinovich, N. J. S. (2023). COMPARATIVE IMMUNOBIOLOGICAL CHARACTERISTICS OF PRIMARY AND SECONDARY TUBERCULOSIS WITH MULTIPLE AND EXTENSIVELY DRUG RESISTANCE. INTERNATIONAL JOURNAL OF HEALTH SYSTEMS AND MEDICAL SCIENCES, 2(5), 108-110.
42. Nazarov, J. S. E. (2022). Indicators of Biochemical Contamination of Water Sources in Uzbekistan. Central Asian Journal of Medical and Natural Science, 3(3), 551-556.
43. Назаров, Ж. С. Э., & Ефремова, Н. Н. (2022). Приемы повышения активизации учащихся с помощью нестандартных вопросов. Коллекция гуманитарных исследований, (2 (31)), 87-94.
44. Fatullayeva B. O. New Covid-19 Coronavirus Infection in the Practice of a Neonatologist and Pediatrician //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2023. – Т. 2. – №. 10. – С. 227-235.
45. Fatullayeva B. O. FEATURES OF THE COURSE OF PREGNANCY AND CHILDBIRTH WITH COVID-19 INFECTION //BOSHQARUV VA ETIKA QOIDALARI ONLAYN ILMIY JURNALI. – 2023. – Т. 3. – №. 10. – С. 39-47.