

To study the features of extrapulmonary manifestations of helicobacter pylori infection in school-age children with chronic gastroduodenal pathology

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ABSTRACT: The peculiarity of the manifestations of helicobacter pylori infection in school-age children with chronic gastroduodenal pathology has been studied. 76 children aged from 7 to 17 years were analyzed, making up the first group of subjects with Helicobacter pylori-associated gastroduodenal pathology. A control group (the second group) of 30 children with chronic gastroduodenal pathology unrelated to Helicobacter pylori of a similar age was compiled. It was found that with the joint course of diseases, the duration of the history of the manifestation of symptoms of dyspepsia increases with the presence of Helicobacter pylori infection. Symptoms are recorded – a decrease in appetite and a tendency to constipation, many times more often – 11.6 times in the first group and 5.3 times in the second group, respectively. There was more intense abdominal pain in the first group of children studied, the second control group was characterized by less intense pain. The inflammatory process was diagnosed in 70 (92.1%) patients from the first group, and in 6 children of the second group with esogastroduodenoscopic (EGDS), pathological changes were not recorded. An increase in the degree of Helicobacter pylori infection accompanied by longer abdominal symptoms was revealed.

KEYWORDS: gastroduodenal pathology, helicobacter pylori, school-age children.

INTRODUCTION

In recent years, gastroduodenal pathology, including chronic damage to the upper digestive tract in children, has been a serious medical and social problem due to its high prevalence, clinical course features and high risk of early disability. Recently, the traditional understanding of the mechanisms of formation of chronic pathology of the gastrointestinal tract in both adults and children has changed significantly.

The aim of our study was to study the clinical characteristics of Helicobacter pylori associated gastroduodenal pathology in children.

MATERIALS AND METHODS

A special monitoring map has been developed

for the condition of sick children with extra-ventricular manifestations of Helicobacter pylori infection in school-age children.

General clinical examination of patients included anamnesis collection, objective examination, instrumental and laboratory methods of research. Consultation by specialized specialists (allergist, hematologist, endocrinologist, etc.).

When collecting a family history, attention is paid to the state of health of parents and immediate relatives: the presence of an allergic background, chronic and hereditary diseases, bad habits. Indicators of physical development were assessed according to the standards of growth and development of children recommended by WHO (2006).

RESULTS AND DISCUSSION

We analyzed the clinical picture in 76 children aged 7 to 17 years with *Helicobacter pylori* associated gastroduodenal pathology. The control group included 30 children with chronic gastroduodenal pathology not associated with *Helicobacter pylori* of the same age.

Table 1.

Distribution of children by gender and age

Nosology	Boys n=27	Girls n=49	7-11 y.o.		12-17 y.o.	
			a6c	%	a6c	%
Chronic gastroduodenitis n= 76	27 (35,5%)	49 (64,5%)	15	19,7	61	80,3

Among the surveyed, the number of children of primary school age was (19.7%) aged 7-11 years, senior school age (80.3%). The number of girls prevailed by 1.8 times.

Analysis of clinical manifestations of *Helicobacter pylori* associated gastroduodenal pathology revealed the features of chronic gastroduodenitis. It was found that with the combined course of diseases, the duration of the history of the manifestation of symptoms of dyspepsia increases with the presence of *Helicobacter pylori* infection.

It is noteworthy that patients with helicobacter-associated chronic gastritis and gastroduodenitis of combined and isolated variants of the course, as well as peptic ulcer disease, presented almost the same complaints - abdominalgia localized in the upper abdomen and epigastrium, belching, heartburn, a periodic feeling of nausea and bitterness in the mouth, extremely rarely - vomiting.

Retrospectively, an ulcer history can be established in 2/3 (72.5%) patients with duodenal ulcer. The features of helicobacteriosis occurring in combination, compared with the isolated variant, should include symptoms that are repeatedly more frequently recorded - a decrease in appetite and a tendency to constipation - 11.6 times in the first group and 5.3 times in the second group, respectively.

In the first group of patients, in 75% of cases, the presence of symptoms of gastric and intestinal dyspepsia in children was noted. Frequent involvement in the pathological process of the gallbladder in gastroduodenal pathology, especially duodenal localization, is

associated with the anatomical and embryonic unity of the duodenum and gallbladder.

This was manifested by various clinical signs: abdominal pain, nausea, heartburn, belching, bitterness in the mouth, bloating, decreased appetite, diarrhea or constipation, which are characteristic of this pathology.

The characteristics of pain included: localization; nature; duration; prevalence; time of occurrence; dyspeptic disorders accompanying pain; provoking factors; methods of elimination. The complaints could be related to diseases of the upper and lower digestive tract and gall bladder dysfunction of the hypomotor type (in 17% of cases).

When analyzing the nature of abdominal pain, it was found that patients of the main group more often complained of prolonged (25.0%; $P < 0.05$), aching (36.14%), dull (52.6%; $P < 0.05$) pain. The remaining patients also revealed the presence of cramping and stabbing, cutting pains.

The average age (years) of the observed children was 11.3 ± 0.6 years. In 32 (56.1%) of the examined children with chronic gastroduodenitis associated with *Helicobacter pylori*, early clinical manifestations were more often late epigastric pain, white coating of the tongue at the root, its swelling with tooth prints on the lateral surfaces, unpleasant odor, bad breath, soreness during palpation in the epigastric and pyloroduodenal area.

In the clinical picture, dyspeptic symptoms prevailed in children of all comparison groups, they were noted in 82.9%, the same number of children complained of the asthenovegetative spectrum (headaches, dizziness, weakness, fatigue).

All these symptoms, characteristic of Helicobacteriosis in most patients, appeared in 38 patients for the first time 1-2 months ago, in the remaining 7 patients - more than a year ago.

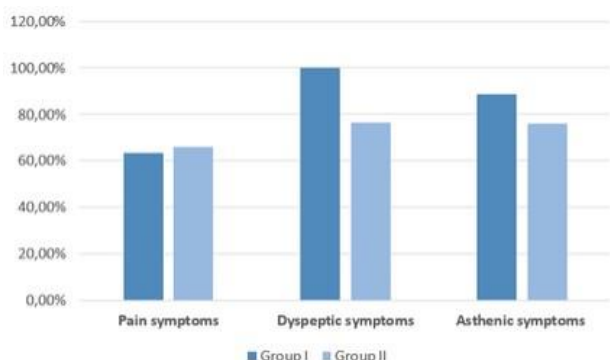
69.8% of children from the first group complained of abdominal pain. Thus, the majority of patients in the first group had a combination of pain, dyspeptic and asthenovegetative syndromes. At the same time, there were certain differences in the prevalence and severity of these syndromes in the comparison groups.

In addition, it should be noted that abdo-

minal pain was more intense in group I, a quarter of the children in this group indicated that they were worried about severe pain. Less intense pain is typical for children of the second group.

Figure 1.

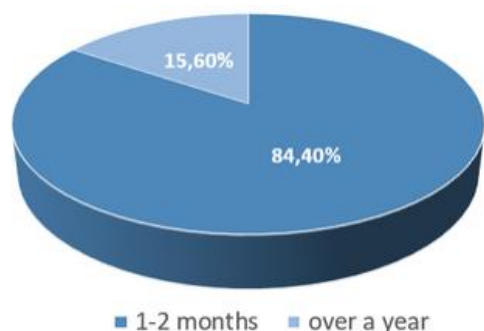
Prevalence of pain, dyspeptic and asthenic symptoms in comparison groups.



In most patients of group I, the pain was constant (60.9% compared to 52.0% in group II), and mixed pain was noted only in patients of the first group. We also conducted a comparative analysis of dyspeptic symptoms in clinical groups.

Figure 2.

Characteristics of the first group according to the duration of the anamnesis.



When analyzing the nature of abdominal pain, it was found that patients of the main group more often complained of prolonged (25.0%; $P < 0.05$), aching (36.14%), dull (52.6%; $P < 0.05$) pain. The remaining patients also revealed the presence of cramping and stabbing, cutting pains. When studying the prevalence of abdominal pain, it was found that in children with HCG, they most often radiated to the right shoulder blade (30.1%) and the right shoulder (22.8%), while in children of the comparison group - with the same frequency

in the area of the right (16.6%) and left shoulder blades (16.7%; $p < 0.01$).

Every third child (36.1%) of the main group noted that abdominal pain was of a shingling nature, which was much more common than in the comparison group (26.6%). Attacks of abdominal pain in children of both groups were equally accompanied by symptoms of autonomic dysfunction in the form of increased sweating and anxiety. In children of the first group, abdominal pain was accompanied by dyspeptic disorders from the upper digestive tract in the form of nausea (35.5%), belching (77.6%), heartburn (25%), feelings of bitterness in the mouth (21.1%), which was somewhat more common than in children of the comparison group (30.0%; 43.3; 16.7 and 26.7%), respectively). We also conducted a comparative analysis of dyspeptic symptoms in clinical groups. It was revealed that dyspepsia in children with a burdened allergic background is characterized by discomfort in the epigastrium and belching of air, and nausea and vomiting occur less frequently in this group than in the first group, the differences are significant at $p < 0.05$. In the group of children with *Helicobacter pylori* (35.5%), nausea, belching (77.6%), heartburn (25%), feelings of bitterness in the mouth in (21.1%) cases were detected in children (35.5%), which was slightly more common than in children of the comparison group (30.0%; 43.3; 16.7 and 26.7%) accordingly. The children of the main group associated the appearance of pain with disorders in the volume (55.6%) and the qualitative composition of food in the form of abuse of fatty dishes (51.1%), which is significantly ($p < 0.001$) more often than in the comparison group (10.0% and 13.0%), respectively. Analysis of anamnestic data showed that a history of pregnancy pathology occurred in 39.4% (30 children), the most common complications were preeclampsia and pregnancy toxicosis. Every fourth child had a history of an unfavorable course of labor: asphyxia, premature birth, or cesarean delivery. Complications in childbirth were especially common in children of the first group. Cesarean delivery was observed in 15 children from this group (19.7%), while in the second group they occurred in 4 (13.6%).

Table 2.

Clinical characteristics of abdominal pain syndrome in children with chronic gastroduodenitis depending on the association of *Glycobacter pylori*.

Symptoms	Children Hp n=76		Children without Hp n=30	
	abs.	%	abs.	%
by the nature of the pain syndrome				
- Cramping	14	18,4	2	6,7*
- Cutting	5	6,6	1	3,3
- Stabbing	11	14,4	2	6,7**
- Silly	40	52,6	8	26,7*
- Aching	14	18,4	5	16,7
- Long-term pain	19	25,0	2	6,7*
- In the right hypochondrium	14	18,4	2	6,7
by the time of pain occurrence				
- Early pains	20	26,3%	3	10%
- Late pains	25	32,9%	3	10%
- Before eating	23	30,3%	6	20%
- After eating	32	42,1%	8	26,7%
-- Headaches	22	28,9%	4	13,3%
- After fatty foods	58	76,3%	5	16,7%
by localization of pain				
In the umbilical region	44	57,9	8	26,7*
In the epigastric region	56	73,7	6	20*
In the right hypochondrium	32	42,1%	1	3,3*
Pain in the right hypochondrium with irradiation in the back and right shoulder blade	8	10,5	-	-
Pain in the upper half of the abdomen, which can be paroxysmal or constant aching	52	68,4	15	16,7*

Note: * the confidence value between the compared groups, where * -P<0.05;**- P<0.01;

Table 3.

Clinical characteristics of dyspeptic syndrome in children with children with chronic gastroduodenitis depending on the association of *Helicobacter pylori*.

Symptoms	Children Hp n=76		Children without Hp n=30	
	n	%	n	%
- Bitterness in the mouth	16	21,1	8	26,7

- Vomiting:	17	22,4	2	6,7*
-The nature of vomit: with food	9	11,8	1	3,3
With bile	7	9,2	1	3,3
- Vomiting does not bring relief	5	6,6	1	3,3
-Violation of appetite	51	67,1	11	36,7*
- Nausea	27	35,5	9	30
-Feeling of heaviness in the right hypochondrium	32	42,1%	3	10*
- Flatulence	30	39,5	11	36,6
- Heartburn	19	25	5	16,7*
- Belching	59	77,6	13	43,3*
-Violation of the nature of the stool: constipation	35	46,1	13	43,3
-unstable	12	15,7	5	16,6
Blistering symptoms				
-Murphy-	9	11,8	1	3,3
-Kera -	7	9,2	2	6,7
-Lepene-	2	2,6	-	-
- Ortner-		-	-	-

Note: * the confidence value between the compared groups, where * -P<0.05

The formation of the microbial landscape is also adversely affected by premature birth, which occurred 2.1 times more often in the group of children of the first group than in the comparison group (9.4%). In this case, apparently, the causes of development could be transient enzyme deficiency, characteristic of prematurely born children, and antibiotic therapy, which is often noted in the history of premature babies. As expected, there were features of hereditary burden in the comparison groups.

Heredity for allergic diseases and gastrointestinal diseases was burdened, including in group I, in 35.3% and 31.8%, in group II – in 6.6% and 5.2%, (P<0.05), however, the total burden (for one or more diseases) was significantly higher in children of the first group compared with the second group, which is 3 times more often than in the second group. The same trend was noted by us in relation to food and drug intolerance, which occurred in the anamnesis of three quarters of children from the main group (74.3%), in a third of children of the second group (31.7%).

Table 4.

Features of nutrition of children of patients depending on the association of non-*Glycobac-*

ter pylori in the first year of life.

Features feeding	Group I (n=76)		Group II (n=76)		P
	abs.	%	abs.	%	
Exclusive breastfeeding up to 6 months	8	10,5	18	60,0	<0,05
Feeding with adapted mixtures from birth	25	32,8	2	6,6	<0,05
Feeding with unadapted mixtures from 3 months.	18	36,8	3	10,0	>0,05
Violations of the timing of introduction and types of complementary foods	49	64,4	10	33,3	>0,05

Note: P is the reliability of the difference between the compared groups

Note: * the confidence value between the compared groups, where * - $P < 0.05$

Table 4., presents the results of the analysis of nutritional characteristics in the first year of life of children with chronic gastroduodenitis, depending on the association of *Glycobacter pylori*. Nutrition is very important for the health, growth and development of a child at any age. An important aspect in the development of a child is the nature of feeding. It is well known that natural feeding not only has a positive effect on the physical, neuropsychic development of the child, but also, as studies show, reduces the risk of diseases in adulthood. We assessed the delayed effect of the nature of breastfeeding on the development of non-*Glycobacter pylori*. in children. To do this, the duration of breastfeeding, the timing of administration, types of complementary foods, feeding with unadapted mixtures and cow's milk were analyzed. It turned out that the absence of breastfeeding or its short duration was more common among children with non-*Glycobacter pylori*. ($P < 0.05$). It was revealed that in the group of children with Non-*Glycobacter pylori*, violations of the regime and timing of the introduction of complementary foods were observed more often than in the control group. Exclusive breastfeeding up to 6 months in the anamnesis was detected in 17.7% of the first group and 60.0% of children of the control group. Feeding defects in the form of early and inconsistent introduction of complementary foods, the use of foods that do not meet the physiological needs of the child's body were found in children with non-*Glycobacter pylori*, which is almost 2 times more common than in

the control group ($P < 0.05$). The same high percentage (33.3%) were children from the main group who were artificially fed with unadapted milk mixtures and undiluted cow's milk, while adapted mixtures were used to feed only 2 children. In 40% of children, feeding with unadapted mixtures from 3 months was observed in the main group of children ($P < 0.05$). A typical mistake was the early (in 3–4 months) introduction of cereal complementary foods, exceeding the amount of food that does not meet the needs of the baby, abuse of carbohydrate products (juices, cookies, bread, potatoes) in the 2nd half of life. Hereditary burden of anemia was also found more often in the first observation group.

According to our data, in the general blood test in children with HCG with *Helicobacter pylori*, there is a significant increase in the number of eosinophils, as well as a decrease in hemoglobin levels. Individual analysis showed that in the group of children of the first group, eosinophilia occurred in every third child. In this regard, we conducted a study on parasitoses (giardiasis and helminthic invasions coprologically and to determine the level of ELISA in blood serum and Ig E). It was revealed that parasitoses aggravated the course with helicobacteriosis c in more than a third of cases – 31 children (40.7%), which is 2.2 times higher than in the second group, where 15.9% of such children turned out to be. According to our data, giardiasis and enterobiosis prevailed in the structure of parasitoses, which accounted for up to 90% of all detected cases of invasions. Pronounced endoscopic changes were noted in the absolute majority of patients of the first group. The inflammatory process was diagnosed in 70 (92.1%). No pathological changes were recorded in 6 children of the second group with EGDS. The leading form of lesion in the first group of patients with CO were superficial lesions, when the only endoscopic criterion of inflammation was hyperemia, focal or diffuse (erythema), while the diagnosis of "superficial gastritis" appeared in the conclusions. In 31.8%, along with hyperemia, there was edema from the stomach, which was edema from the stomach, which was regarded as a sign of severe gastritis, in 7 erosions and/ or hemorrhages

were detected. Hyperemia of the lower third of the esophagus, which we regarded as a sign of reflux esophagitis, was present in every fifth examined (20.7%). The most common variant of motor disorders detected during endoscopy was duodenogastric reflux (DHR) - 38.7% of children, gastroesophageal reflux (GER) was detected in 15 patients (10.4%). Motor disorders were found in 32.4% in group I and in 13.1% in group II. As a result of the endoscopic examination of the upper digestive tract, it was found that for a group of children with *Helicobacter* gastritis, characteristic changes in the mucous membrane of the gastroduodenal zone are changes in the type of gastroduodenitis. At the same time, patients with non-*Helicobacter* gastritis are characterized by changes, both by the type of isolated gastritis, observed in 30% of children, and gastroduodenitis, characteristic of 70% of patients. This is consistent with clinical data on the prevalence of "late" and "night" pain in patients of the first group. Concomitant esophageal lesions are detected with a high frequency - in more than half of the patients in each group. At the same time, erosive esophagitis is almost twice as common in the group of patients with non-*Helicobacter* gastritis. This also correlates to some extent with clinical data on the prevalence of dyspeptic complaints in patients of this group.

Table 5.

Coprological indicators of patients depending on the association of *Helicobacter pylori* in %

Sign	HGD with Hp n=76		HGD without Hp n=30	
Feces for latent bleeding	11	14,4	1	1,3*
Creatorrhea	19	25,0	2	2,6*
Amylorrhea	53	69,7	5	6,5*
Steatorrhea	34	44,7	5	6,5*

Note: * the confidence value between the compared groups, where * - $P < 0.05$

All children of the main and control groups underwent a coprology analysis. A distinctive moment in the group of patients of the first group was the prevalence of the number of children with amylo-rrhea in 53 (69.7%) versus the second group of patients in 5 (16.7%), respectively. Steatorrhea of the first type with the appearance of neutral fat in the feces,

which indicated pancreatic insufficiency, was detected in the first group in 34 (44.7%) patients, and in the control group 5 (16.7%), respectively. Bile acids and soaps in the feces, i.e. steatorrhea of the second type, which indicated insufficient intake of bile into the small intestine, i.e. bile stagnation was detected in 34 (44.7%) and 31 (40.8%), against the indicators of the control group 5 (16.7%) and 4 (13.3%), respectively.

CONCLUSION

Thus, with *Helicobacter pylori* associated gastroduodenal pathology, most children have more pronounced clinical symptoms. The increase in the degree of *Helicobacter pylori* infection is accompanied by longer abdominal symptoms. Heredity for allergic diseases and anemia was burdened more often in the first group of patients, which may have occurred in the formation of extra-ventricular manifestations of *Helicobacter pylori*-associated gastroduodenal pathology in children.

REFERENCES

1. In Akhmedov.A., Gauss O.V. "Extra-ventricular manifestations associated with *Helicobacter pylori* infection" // Clinical medicine. Russia. M.; 2017, 95(1) pp. 132-145.
2. A. Naletov. V., Masyuta D. I., Guz N. P. Serum markers of endogenous intoxication of erosive ulcers in diseases of the duodenum associated with the persistence of cytotoxic strains of *Helicobacter pylori* in children. Materials of the 24th Congress of Pediatric Gastroenterologists of Russia. Moscow; 2017: 106-8.
3. Yu. Lobanov. F., Latyshev D. Yu., K Pechkina. G. Asthenic manifestations in children with chronic gastritis infected with Saga-Saga positive and negative strains of *Helicobacter pylori* // Doctor. Ru. 2017. No. 12 (141). pp. 12-17.
4. Chmiela M., Kupchinskas Ya. Review: pathogenesis of *Helicobacter pylori* infection. *Helicobacter*. 2019 September;24 Supplement 1: e12638.
5. Ford A.K., Yuan Yu., Forman D., Hunt R., Moayed P. Eradication of *Helicobacter*

- pylori for the prevention of gastric neoplasia. *Cochrane Database System Rev.* 2020 July 6;7:CD005583.
6. Li Wu, L.V. T, He S, Wang X, Cram D.S., Zhou L, etc. Evaluation of multiplex ARMS-PCR to detect *Helicobacter pylori* mutations that confer resistance to clarithromycin and levofloxacin. *Intestinal Pathog.* 2020;12:35.
 7. Pichon M, Pichard B, Barrios T, Pluso S, Croquet C, Fotsing G, etc. Diagnostic accuracy of a non-invasive test for the detection of *Helicobacter pylori* and clarithromycin resistance in feces using PCR analysis of Amplidiag H. pylori+clarir in real time. *Jay Klin Microbiol.* 2020, March 25;58(4).
 8. Jehann Q, Benezhat L, Megraud F, Bessed E, Lehur P. Evaluation of Allplex™ H pylori and ClariR PCR analysis for the detection of *Helicobacter pylori* during gastric biopsy. *Helicobacter.* August 2020;25(4): e12702.
 9. Nissen O.P., Bordin D., Tepes B., Perez-Aisa A., Vaira D., Kaldas M., etc. European Registry for the Treatment of *Helicobacter pylori* (Hp-EuReg): models and trends in the appointment of empirical first-line eradication and results for 5 years and 21,533 patients. *Intestine.* January 2021;70(1):40-54.
 10. McNicoll A.G., Bordin D.S., Lucendo A., Fadeenko G., Fernandez M.K., Voinovan I. et al. The combination of bismuth and standard triple therapy eliminates *Helicobacter pylori* infection in more than 90% of patients. *Clinical Gastroenterol Hepatol.* 2020 January; 18(1): 89-98.
 11. Tukhtaeva, N. K., Karimov, M. S., Azimova, M. M., & Sibirkina, M. V. (2022). Genotypical Features of *Helicobacter Pylori* in the Formation of Nsaid Gastropathies in Patients with Rheumatoid Arthritis. *Eurasian Medical Research Periodical*, 8, 94-97.
 12. Tukhtaeva, N. K., Karimov, M. S., Sibirkina, M. V., Nurmetov, K. T., & Ghimadutdinova, A. G. (2021). Features of *helicobacter pylori* genes in NSAID gastropathy in patients with rheumatoid arthritis. *湖南大学学报 (自然科学版)*, 48(10).
 13. Khasanova, G. H., Tukhtaeva, N. K., Saidov, V. M., & Zhulkevych, I. V. (2019). Modern approaches to dietotherapy in hypertensive disease. *Вісник наукових досліджень*, (1), 11-14.

14. Tukhtaeva, N. K. (2023). The degree of damage to the gastroduodenal zone in patients with rheumatoid arthritis against the background of basic and anti-inflammatory therapy. *Texas Journal of Medical Science*, 25, 58-62.
15. Xudayberganova, N. X. (2022). klinicheskaya karakteristika helicobacter pylori assotsirovannoy gastroduodenalnoy patologii u detey.
16. Xudayberganova, N. X., Yuldosheva, D. Sh., Abzalova, D. A., & Rashidova, M. A. (2019). izuchenie pishchovogo statusa detey shkolnogo vozrasta s izbytochnoy massoy tela. tom-ii, 361.
17. Xudayberganova, N. X. (2023). klinicheskaya effektivnost primeneniya preparata ferlatum dlya lecheniya jelezodefitsitnoy anemii.
18. Xudayberganova, N. X., & Raxmatullaeva, G. K. (2023). to assess the frequency of iron deficiency anemia and helicobacter pylori infection among school-age children with chronic gastroduodenal pathology.
19. Xudayberganova, N. X., & Axmedova, I. M. kliniko-bioximicheskie osobennosti vnejeludochnykh proyavleniy helicobacter pylori assotsirovannoy gastroduodenalnoy patologii u detey. yangi o'zbekiston: innovatsiya, fan va ta'lim 18-qism, 26.
20. Axmedova, I. M., & Xudayberganova, N. X. (2022). vnejeludochnye proyavleniya xronicheskogo gastroduodenita u detey.
21. Xudayberganova, N. X., & Axmedova, I. M. (2023). techenie xronicheskoy gastroduodenalnoy patologii u detey i infeksiya helicobacter pylor. academic research in educational sciences, (1), 196-205.
22. Salaeva, M. S., & Xudayberganova, N. X. (2015). Vzaimosvyaz sotsialnykh faktorov s parametrami kachestva jizni u bolnykh xronicheskoy obstruktivnoy boleznyu legkix. *Vestnik KGMA im. IK Axunbaeva*, (3), 74-79.
23. Xudayberganova, N. X., Azimova, M. M., & Talipov, R. M. (2023). Formation of Iron Deficiency Anemia in Children with Chronic Gastroduodenitis of Helicobacteriosis Etiology.
24. Mavlyanov, I. R., Mustafin, R. I., & Tuxtaeva, N. X. (2012). Karakteristika prosvetnoy i pristenochnoy mikroflory

25. jeludka bolnix s revmatoidnymi i reaktivnimi artritami. Vestnik novyx meditsinskix texnologiy, 19(2), 319-322.
26. Kenjaevich, Q. A., Xasanovna, T. N., & Shakirovich, K. M. R. (2021). Assessment of the gastrointestinal tract in patients with rheumatoid arthritis. European Journal of Pharmaceutical and Medical Research, 2(5), 34-37.