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A B S T R A C T

of the dissertation for the degree of Doctor of Philosophy

**CHARACTERISTICS OF INTESTINAL MICROFLORA
IN HELICOBACTER PYLORI – ASSOCIATED
GASTRODUODENAL PATHOLOGIES AND
SOME ASPECTS OF ITS DIAGNOSTICS**

Speciality: 2414.01 – Microbiology

Field of science: Medicine

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Bakı – 2024

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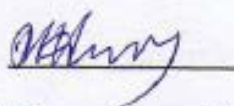
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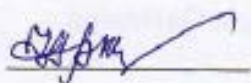
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GENERAL DESCRIPTION OF THE WORK

Relevance of the topic and degree of elaboration. About 50% of the world's population is infected with *Helicobacter pylori* infection, and the prevalence of this infection in developing countries is 70-80%. This microorganism is not only the main causative agent of gastritis and gastric ulcer, but also a risk factor of gastric adenocarcinoma. Thus, *H.pylori* has an etiological role in approximately 50-60% of gastritis, 90% of duodenal ulcer disease, 50-80% of gastric ulcer disease and 60-70% of gastric cancer cases^{1,2}. Recently, the role of *H. pylori* in other pathologies such as diarrhea of unknown etiology (irritable bowel syndrome) is being studied^{3,4}.

In addition, recent studies have focused on studying the effects of *H.pylori* and its metabolism on gastric and intestinal microflora^{5,6,7}.

¹ De Martel C., Ferlay J., Franceschi S. et al. Global burden of cancers attributable to infections in 2008: a review and synthetic analysis // *Lancet Oncol.*, 2012, v.13, №6, p. 607-615

² Krisztina Hagymasi and Zsolt Tulassay. *Helicobacter pylori* infection: New pathogenetic and clinical aspects // *World J Gastroenterol.*, 2014, v.20, №21, p. 6386-6399

³ Ding, Y.W. Anorectal motility, rectal sensation and influence of Hp in patients with diarrhea-predominant irritable bowel syndrome / Y.W.Ding, D.Chen, H.Liu [et al]. // *Academic Journal of Guangzhou Medical College.*, - 2011, v.39, №1, - p. 9-11

⁴ Yakoob J. Virulence markers of *Helicobacter pylori* in patients with diarrhoea-dominant irritable bowel syndrome / J.Yakoob, Z.Abbas, S.Naz. [et al]. // *British Journal of Biomedical Science.*, - 2012, v.69, №1, - p. 6-10

⁵ Engstrand L., Lindberg M. *Helicobacter pylori* and the gastric microbiota // *Best Pract Res Clin Gastroenterol.*, 2013, v.27, №1, p. 39-45

⁶ Kienesberger S., Cox L.M., Livanos A. et al. Gastric *Helicobacter pylori* Infection Affects Local and Distant Microbial Populations and Host Responses // *Cell Rep.*, 2016, v.14, p. 1395-1407

⁷ Llorca L., Perez Perez G., Urruzuno P. et al. Characterization of the Gastric Microbiota in a Pediatric Population According to *Helicobacter pylori* Status // *Pediatr. Infect. Dis. J.*, 2017, v.36, p.173-178

At present, the idea that this bacterium causes pathologies in the host organism by changing the normal microflora is increasing⁸.

As a result of research, it was found that there is a significant relationship between *H.pylori* and the microflora of the stomach and duodenum^{9,10}. In various studies, during *H.pylori* colonization, *Enterococcus spp.* and *Staphylococcus aureus* increased in the stomach and duodenum, while lactobacilli decreased in the normal microflora of the stomach^{11,12}. *Bifidobacterium spp.*, *Bacteroides spp.* and a significant change in the amount and localization of other bacteria was observed^{13,14}. However, the research conducted so far could not unambiguously explain the nature of changes in intestinal microflora in diseases caused by *H.pylori*. Also, the interaction between *H.pylori* and intestinal microflora and its role in the pathogenesis of the disease has not been clarified.

⁸ Denisse Bravo, Anilei Hoare, Cristopher Soto et al. Helicobacter pylori in human health and disease: Mechanisms for local gastric and systemic effects // World J Gastroenterol., 2018, v.24, №28, p. 3071-3089

⁹ Gregory Sharp, MD. Helicobacter Pylori Stool Antigen Test to Replace the Helicobacter Pylori Antibody Serology Test // Pathology & laboratory medicine - april 19, 2016

¹⁰ Yang Y.C., Kuo T.Y., Hong Z.W. et al. High yield purification of Helicobacter pylori neutrophil-activating protein overexpressed in Escherichia coli // BMC Biotechnol., 2015, v.8, p. 15-23

¹¹ Crane R.J., Jones K.D., Berkley J.A. Environmental enteric dysfunction: an overview // Food Nutr Bull, 2015, v.36, №1, p. 76-87

¹² Schulz C., Scutte K., Malfrather P. Helicobacter pylori and Other Gastric Microbiota in Gastrointestinal Pathologies // Dig. Dis., 2016, v.34, №3, p. 210-216

¹³ Heimesaat M.M., Fischer A., Plickert R. et al. Helicobacter pylori induced gastric immunopathology is associated with distinct microbiota changes in the large intestines of long-term infected Mongolian gerbils // PloS One., 2014, v.9, №6, p.1-11

¹⁴ Yin Y.N., Wang C.L., Liu X.W. et al. Gastric and duodenum microflora analysis after long-term Helicobacter pylori infection in Mongolian Gerbils // Helicobacter., 2011, v.16, №5, p. 389-397

It is known that the normal microflora of the gastrointestinal tract can be changed under the influence of various factors, and dysbiotic conditions can occur for many reasons. Thus, the role of intestinal parasites and helminths is undeniable here. However, the possible relationship between *H.pylori* and dysbiotic conditions is almost unexplored^{15,16}.

There are many invasive and non-invasive examination methods for the diagnosis of *H.pylori* infection. Invasive methods include the following methods applied on the basis of endoscopy and biopsy: direct microscopic examination, cultural method, rapid urease test, cyto-histological examinations and molecular-genetic method (polymerase chain reaction - PCR). Non-invasive methods include serological method, urea (urea) breath test (UBT), determination of carbon isotope (¹³C) in urine or blood, antigen test with saliva and stool samples, as well as molecular-genetic method (PCR)^{17,18,19}.

Despite the fact that all these methods are used in different frequencies, the determination of *H.pylori* in patients with gastroduodenal pathology by non-invasive methods still remains its actuality. The ideal method is high sensitivity and specificity, easy to apply, relatively quick response, minimally invasive and financially inexpensive. An examination method that can fully meet all these requirements has not yet been discovered.

¹⁵ Lin Li, Xiaoying Zhou, Shuping Xiao et al. The Effect of Helicobacter pylori Eradication on the Gastrointestinal Microbiota in Patients with Duodenal Ulcer // J Gastrointestin Liver Dis., 2016, v.25, №2, p. 139-146

¹⁶ Sabah A.A., Gneidy M.R., Saleh N.M. Prevalence of Helicobacter pylori infection among adult patients with different gastrointestinal parasites in Tanta City district // J. Egypt Soc. Parasitol., 2015., v.45, №1, p. 101-106

¹⁷ Qasımova M.Ç. Helicobacter pylori ilə törədilən xəstəliklərin diaqnostika problemləri / Əziz Əliyevin anadan olmasının 120 illik yubileyi münasibətilə ATU-da keçirilən elmi-praktiki konfransın materialları. Bakı: 2017, səh. 440-441

¹⁸ Dr. Cemile Sönmez. Helicobacter pylori infeksiyonu tanısında yeni yaklaşımlar // Helicobacter pylori & Türkiye. Türk Gastroenteroloji Vakfı, 2013, səh. 318-327

¹⁹ Bessede E., Arantes V., Megraud F. et. al. Diagnosis of Helicobacter pylori infection // Helicobacter, 2017

However, among non-invasive methods, faecal antigen testing is simple and easy to apply, and is also useful for detecting active infection. This test can also be used to detect the incidence of *H.pylori* infection in asymptomatic individuals for the purposes of epidemiological studies and for control after treatment (usually after 4 weeks). The sensitivity and specificity of the method is 95%²⁰.

However, the most important disadvantages of non-invasive methods is the impossibility of isolating bacteria and determining their sensitivity to antibiotics due to the inability to directly intervene in the digestive tract. Therefore, it is usually recommended to use two methods together in initial recognition. In patients with ulcer-like dyspepsia or other gastrointestinal symptoms or suspected peptic ulcer, non-invasive tests for detection of *H.pylori* are appropriate.

One of the mentioned non-invasive examination methods is the serological method. It has been known that both local and general immune response is formed in the body against *H.pylori*. However, determination of antibodies (IgM, IgG) against *H.pylori* in blood serum cannot provide accurate information about the nature of gastroduodenal pathologies caused by *H.pylori* in all cases. In other words, it cannot distinguish gastroduodenitis, gastric and duodenal ulcers, as well as other pathologies.

Thus, the researches conducted in this topic in *H.pylori*-associated gastroduodenal pathologies (gastritis, gastric and duodenal ulcer and cancer) allow a deeper study of the nature of the changes in the normal microflora of the intestine, as well as the interaction between *H.pylori* and the intestinal microflora and its pathogenesis. shows the need to clarify its role. This is explained by the perspective of considering changes in intestinal microflora in the treatment of diseases related to *H.pylori*.

Also, identification of non-invasive methods that can determine the nature of *H.pylori*-associated gastroduodenal pathologies (gastritis or gastric-duodenal ulcer) and localization promises promising opportunities in the diagnosis of *H.pylori*-associated diseases.

²⁰ Zeki Calik, Murat Karamese, Osman Acar A. et al. Investigation of Helicobacter pylori antigen in stool samples of patients with upper gastrointestinal complaints // Brazilian journal of microbiology, 2016, v 4, №7, p. 167-171

The aim of the research is to study the characteristics of the intestinal microflora during *H.pylori*-associated gastroduodenal pathologies and to compare non-invasive laboratory examination methods in the diagnosis of *H.pylori*.

Tasks of the research:

1. Study of intestinal microflora in stool samples of patients whose blood serum has anti-*H.pylori* antibodies during gastroduodenal pathologies;
2. Investigation of helminth and parasitic infestations in stool samples of patients whose blood serum has anti-*H.pylori* antibodies during gastroduodenal pathologies;
3. Comparative study of anti-*H.pylori* antibodies (IgM and IgG) in blood serum of patients with gastroduodenal pathologies by enzyme-linked immunosorbent assay (ELISA) and express antibody test;
4. Examination of *H.pylori* antigens in stool samples of patients whose blood serum has anti-*H.pylori* antibodies;
5. Comparative evaluation of the results of anti-*H.pylori* antibody in blood serum and *H.pylori*-antigen tests in stool samples.

The object and subject of the research:

The object of the study is patients with gastroduodenal pathologies. The patients whose results of *H.pylori* tests were positive formed the main observation group of the study. Practically healthy individuals without gastroduodenal pathologies were included in the control group. The subject of the study is the condition of the intestinal microflora in patients with *H.pylori*-associated gastroduodenal pathologies and non-invasive examination methods used in the diagnosis of these diseases.

Methods of the research: The methods of the research were microscopic, cultural (bacteriological), immunological (serological) and statistical methods.

The main provisions defended:

1. In *H.pylori*-associated gastritis, gastric and duodenal ulcers, there are changes in the obligate normal microflora of the intestine.

2. The incidence of parasitic (*Blastocystis hominis*) infestation is different in *H.pylori*-associated gastritis and gastro-duodenal ulcers.
3. Anti-*H.pylori* G immunoglobulins (IgG) are detected in the blood serum of a large number of patients with gastritis. The express antibody test for determining antibodies against *H.pylori* in gastritis has relatively poor sensitivity and specificity.
4. Anti-*H.pylori* immunoglobulins (IgG) are detected in the blood serum of most patients with gastric and duodenal ulcers. Express antibody test for determination of antibodies against *H.pylori* in gastric and duodenal ulcers has high sensitivity and specificity.
5. *H.pylori* antigens in stool samples are detected in approximately half of patients with gastritis, and in a large proportion of patients with gastric and duodenal ulcers. Although the stool antigen test has low sensitivity in gastritis, this test has high sensitivity and specificity in gastric and duodenal ulcers.
6. *H.pylori* antigens are detected in stool samples of most of the patients who have anti-*H.pylori* antibody detected in blood serum during gastric and duodenal ulcer.
7. The results of serological examinations in *H.pylori*-associated gastric and duodenal ulcers confirm the results of the CLO (*Campylobacter-like organism*) test in most cases.
8. Most patients with diarrhea of unknown etiology (irritable bowel syndrome) have anti-*H.pylori* antibodies in blood serum and *H.pylori* antigens in stool samples.

Scientific novelty of the research:

- The characteristics of the intestinal microflora in *H.pylori*-associated gastrointestinal pathologies were studied;
- The diagnostic capabilities of anti-*H.pylori* antibody in blood serum and *H.pylori*-antigen tests in stool samples were compared in patients with gastritis, gastric and duodenal ulcers;
- During gastroduodenal pathologies, the possibilities of differentiation of gastritis or gastric and duodenal ulcer were investigated through the stool antigen test, which allows detecting *H.pylori* antigens in stool samples.

Scientific and practical significance of the research:

- The perspective of taking into account the changes in the intestinal microflora in the treatment of *H.pylori*-associated gastroduodenal pathology;
- Diagnostic possibilities of determination of *H.pylori* antigens in stool samples.

Approbation and application of dissertation results:

The dissertation materials were reported and discussed:

- «*Helicobacter pylori*-yə qarşı anticisimlər aşkar edilmiş şəxslərdə ekspress antigen testinin nəticələri» / Allerqologiya, İmmunologiya və İmmunoreabilitasiya üzrə V Azərbaycan Milli Konqresi. Bakı: 21 oktyabr 2016.
- «*Helicobacter pylori* ilə törədilən xəstəliklərin diaqnostika problemləri» / Əziz Əliyevin anadan olmasının 120 illik yubileyi münasibətilə ATU-da keçirilən elmi-praktik konfrans. Bakı: 2017.
- «*Helicobacter pylori* və bağırsağ mikroflorasının xüsusiyyətləri» / Azərbaycanın Dövlət Müstəqilliyinin bərpaasının 25-ci ildönümünə həsr olunmuş Təbabətin Aktual Problemləri 2017 elmi-praktik konfrans. Bakı: 2017.
- «*Helicobacter pylori* antigenləri aşkar edilmiş nəcis nümunələrinin bakterioloji müayinəsinin nəticələri» / Azərbaycan Xalq Cümhuriyyətinin 100 illik yubileyinə həsr edilmiş Təbabətin Aktual Problemləri 2018 elmi-praktik konfrans. Bakı: 2018.
- «*Helicobacter pylori*-nin lokalizasiyası» / Əməkdar elm xadimi, professor Rafiq Əşrəf oğlu Əsgərovun anadan olmasının 85 illik yubileyinə həsr olunmuş beynəlxalq elmi konfrans. Bakı: 2018.
- «*Helicobacter pylori* və gastrointestinal sistemdən kənar xəstəliklər» / Əməkdar elm xadimi, t.e.d., professor Tağı Ələkbər oğlu Tağızadənin 95 illik yubileyinə həsr olunmuş elmi-praktik konfrans. Bakı: 2018.
- «*Helicobacter pylori* ilə əlaqəli mədə və onikibarmaq bağırsağ xoralarında *Escherichia coli* və şərti-patogen bakteriyaların rastgəlmə tezliyi» / XIV Ümumdünya Böyrək Gününə həsr

- olunmuş «Müasir Nefrologiyanın Aktual Problemləri» adlı elmi-praktik konfrans. Bakı: 2019.
- «Mədə və onikibarmaq bağırsağ xoralarında invaziv və qeyri-invaziv testlərin nəticələrinin müqayisəli qiymətləndirilməsi» / ATU-nun Neyrocərrahlıq kafedrasının yaranmasının 50 illik yubileyinə həsr edilmiş «Neyrocərrahlığın müasir problemləri» mövzusunda beynəlxalq elmi-praktik konfrans. Bakı: 11-12 May, 2019.
 - «*Helicobacter pylori* ilə əlaqəli müxtəlif gastrointestinal patologiyalarda ekspress serum-anticisim və nəcis antigen testlərinin diaqnostik imkanlarının müqayisəli qiymətləndirilməsi» / «İmmunpatoloji xəstəliklər» mövzusunda I Beynəlxalq Konfrans. Bakı: 17-18 May, 2019
 - «*Helicobacter pylori* ilə əlaqəli qastroduodenal patologiyalarda ekspress serum testinin nəticələri» / «Tibbin Görən Gözü» Şüa diaqnostikasının aktual problemlərinə həsr edilmiş beynəlxalq elmi-praktik konfrans. Bakı: 2019.
 - «*Helicobacter pylori* ilə əlaqəli mədə və onikibarmaq bağırsağ xoralarında anaerob kultivasiyanın nəticələri» / Bakı Dövlət Universitetinin nəzdində Tibb fakültəsinin yaranmasının 100 illik yubileyinə həsr edilmiş Təbabətin Aktual Problemləri 2019 beynəlxalq elmi-praktik konfrans. Bakı: 2019.
 - «Диагностические возможности антиген теста при *Helicobacter pylori* - ассоциированных гастродуоденальных патологиях» / «Научная интеграция в интерпретации современного образовательного процесса третьего тысячелетия» LXXVIII (M-78) Международная научно-практическая конференция. Казань: 30 ноября 2019 года.
 - «Features of the intestinal microflora in gastritis associated with *Helicobacter pylori*» / Integration of Education, Science and Business in Modern Environment: Summer Debates: abstracts of the 2nd International Scientific and Practical Internet Conference. Dnipro: August 17-18, 2020.
 - «Qastroduodenal patologiyası olan xəstələrin müxtəlif yaş qruplarında *Helicobacter pylori*-nin rastgəlmə tezliyi» /

Əməkdar elm xadimi, tibb elmləri doktoru, professor Mina Müzəffər qızı Davatdarovanın anadan olmasının 85 illik yubileyinə həsr olunmuş beynəlxalq elmi konfrans. Bakı: 25-26 Sentyabr, 2020

- «Naməlum etiologiyalı diarreyalı xəstələrdə *Helicobacter pylori*-nin rastgəlmə tezliyi» / Azərbaycan Tibb Universitetinin 90 illik yubileyinə həsr olunmuş “Təbabətin Aktual Problemləri -2020” mövzusunda beynəlxalq elmi-praktik konqres. Bakı: 19-20 Dekabr, 2020
- «*Helicobacter pylori* ilə əlaqəli mədə və onikibarmaq bağırsağ xoralarında parazitər invaziyaların rastgəlmə tezliyi» / Azərbaycan Tibb Universitetinin 90 illik yubileyinə həsr olunmuş “Sağlam əmək və həyat təhlükəsizliyi - 2021” mövzusunda elmi-praktik konfrans. Bakı, 2021
- «Роль *H.pylori* при диарее неизвестной этиологии» / Международной научно-практической конференции «Наука в интерпретации современного образовательного процесса». Россия, г. Казан: Апрель, 2022
- «Changes in the normal intestinal microflora during *Helicobacter pylori*-associated gastroduodenal diseases» / XIII International Scientific and Practical Conference Science and practice: implementation to modern society. Manchester, Great Britain: October 16-18, 2022
- «*Helicobacter pylori* ilə əlaqəli qastritlərdə parazitər invaziyaların rastgəlmə tezliyi» / Professor Zərifə Ağarza qızı Zeynalovanın anadan olmasının 90 illik yubileyinə həsr olunmuş elmi konfrans. Bakı, 2023.
- «Müxtəlif gastroduodenal patologiyalarda *Helocobacter pylori*-nin nəcis antigen testi vasitəsilə təyininin nəticələri» / Ümummilli lider Heydər Əliyevin 100 illik yubileyinə həsr olunmuş “Tibbi profilaktikanın aktual problemləri” mövzusunda Beynəlxalq Elmi Konfrans. Bakı: 27 Oktyabr, 2023
- «Diagnostic significance of stool antigen test in the determination of *Helicobacter pylori*» / Proceedings of the 6th International Scientific and Practical Conference Scientific

paradigm in the context of technologies and society development. Geneva, Switzerland: 26-28 November, 2023

The preliminary discussion of the dissertation was performed at the interdepartmental meeting of “Medical Microbiology and Immunology”, “Biological chemistry”, “Infectious diseases”, “Epidemiology”, and “Child and Adolescent Health, and Occupational Health” departments of the Azerbaijan Medical University (May 20, 2021; Protocol No. 04). The dissertation was presented and discussed at the Scientific Seminar of the BED 4.19 Dissertation Council operating under the Azerbaijan Medical University (December 15, 2023; Protocol No. 01).

The main concepts of the dissertation are used in the educational process at the department of Medical Microbiology and Immunology of the Azerbaijan Medical University.

The name of the institution where the dissertation work was performed: Scientific-Research Educational-Clinical Microbiological Laboratory of the department of Medical Microbiology and Immunology of Azerbaijan Medical University.

Published scientific works:

Based on the materials of the dissertation, 29 works were published. Of these, there are 8 articles, three of which are published in journals abroad, and 21 theses, five of which are published abroad. 3 of the published scientific articles are not co-authors.

The scope and structure of the dissertation:

The dissertation is written in Azerbaijani language in A4 format, “Times New Roman” 14 font and 1.5 line spacing. The dissertation consists of the table of contents (2821 symbols), introduction (16225 symbols), chapter of literature review (57978 symbols), materials and methods of research (19760 symbols), special studies (27953 symbols), discussion of obtained results (45857 symbols) 138 pages (173625 symbols) consisting of 4 chapters, conclusions (1896), practical recommendations (834 symbols), list of used scientific references and list of abbreviations (301 symbols). The dissertation is illustrated with 4 tables and 22 figures. The list of scientific references consists of 206 bibliographic sources (17 of them in Azerbaijani, 2 in Turkish, 5 in Russian, 182 in English).

MATERIALS AND METHODS OF RESEARCH

Pathological materials (blood and stool samples) obtained from patients aged 17-70 and practically healthy individuals with various gastroduodenal complaints were used in the research. Examination materials were taken from patients before treatment with antibacterial (anti-*Helicobacter pylori*) drugs or at least one month after treatment. Patients with gastroduodenal complaints in all cases underwent appropriate initial medical examination.

Pathological materials obtained in the study (blood and stool samples) were examined by clinical-laboratory methods in the Scientific-Research Educational-Clinical Microbiology laboratory operating under the Department of Medical Microbiology and Immunology of the Azerbaijan Medical University. The diagnosis of gastric and duodenal ulcer was confirmed by endoscopic method at the Educational-Therapy Clinic of AMU.

A total of 200 patients were examined in the research work in 2015-2019. 98 of them were patients with gastritis, 30 with gastroduodenal ulcer, 16 with gastroduodenal cancer and 16 with diarrhea (160 patients in total). 20 patients with negative *H.pylori* tests made up the practically healthy (control) group of the study. In addition, a randomly selected group (random group) of 20 people without gastrointestinal complaints was also included in the study in order to compare the frequency of parasitic infestations found in patients with *H.pylori*-associated gastroduodenal pathology.

In the study, stool samples obtained from patients were examined using bacteriological (coproculture) and microscopic methods, as well as express monoclonal antigen tests (stool antigen tests). Cultivation of stool (coproculture) - study of representatives of intestinal microflora, microscopic method - to detect helminth and parasitic infestations and express monoclonal stool antigen test - to determine *H.pylori* antigens in stool samples were used.

Microbiological examination of stool samples by cultural method and identification of obtained microorganisms were carried out according to generally accepted principles. For the bacteriological examination of stool samples, a suspension was

prepared by dissolving 5 mg of stool sample taken with a bacterial loop in a test tube containing 5 ml of sterile physiological solution²¹.

In order to determine the absolute number of *Escherichia coli* in 1 gram of stool samples, the suspension prepared according to the specified procedure was inoculated onto the surface of the solid nutrient medium with a standard-sized bacteriological loop with a capacity of 0.01 ml. After one day of incubation, the *E.coli* colonies formed on the surface of the nutrient medium were counted, and the number of *E.coli* in 1 gram of the stool sample was expressed as CFU/g, taking into account the initial amount of the sample and the degree of dilution.

Bifidobacterium spp. and *Lactobacillus spp.* Bifidum semi-liquid medium and Lactobacagar were used in order to obtain a pure culture of representatives of obligate intestinal microflora.

In stool samples, *Bifidobacterium spp.* and *Lactobacillus spp.* In order to determine the relative number of obligate microflora representatives of the intestine, dilutions were prepared in sterile physiological solution in proportions of 10^{-1} , 10^{-2} 10^{-10} from the suspension prepared in the specified manner, and inoculation to Bifidum semi-liquid medium and Lactobacagar, which is an selective nutrient medium, from each dilution has been done.

In order to examine stool samples microscopically, the material on the slide was dissolved in both physiological solution and Lugol's solution, and a "crushed drop" preparation was prepared²¹. Helminth and parasite infestations were investigated by examining the obtained preparations with a 40x microscope lens.

Blood samples obtained from patients were examined by standard enzyme-linked immunosorbent assay (ELISA) and express antibody test. So, the titer of antibodies (IgM and IgG) formed against *H.pylori* in blood serum was determined by standard ELISA, and the presence of these antibodies was determined by express antibody test.

²¹Zeynalova, S.Q. Tibbi mikrobiologiya və immunologiyadan təcrübə məşğələlərinə rəhbərlik. / S.Q.Zeynalova, İ.B.Əhmədov, A.Q.Bayramov - Bakı: Təbib nəşriyyatı, - 2007. - 357 s.

CLO (Campylobacter-like organism)-test, a rapid urease test, was also used in the study. The CLO-test is based on the detection of the urease enzyme of *H.pylori* in biopsy samples taken from the stomach and duodenum during endoscopy.

The sensitivity and specificity of the methods used in the study were determined separately. When evaluating the sensitivity and specificity of research methods, the results of enzyme-linked immunosorbent assay (ELISA) (positive results of anti-*H.pylori* antibodies) were used as a reference method ("gold standard").

The statistical analysis of the obtained results was based on parametric methods, the integrity of the difference between the groups was determined using the Student's *p* criterion. All the numerical indicators in the groups were arranged in the order of variation and the average indicator (*M*) and standard error (*m*) of these indicators were determined and expressed as $M \pm m$ for each variation order. When $p < 0.05$, the difference between the groups was considered statistically honest, that is, the hypothesis "0" was rejected.

THE RESULTS OF THE RESEARCH AND THEIR DISCUSSION

Characteristics of intestinal microflora in *Helicobacter pylori*-associated gastroduodenal pathologies. In the study, 68 (69%) of 98 patients diagnosed with gastritis based on clinical symptoms and current complaints *H.pylori* antibodies (IgM and IgG) had detected in blood serum with ELISA, and the result were negative in 30 (31%).

The aim of the research was to study the changes in the intestinal microflora in *H.pylori*-associated gastroduodenal pathologies, the stool samples were obtained from 68 patients with gastritis with anti-*H.pylori* antibodies in the blood serum were examined by the bacteriological (cultural) method. The materials were cultured under both - aerobic and anaerobic conditions.

As a result of the examinations, it was found that the amount of *E.coli* expressed as a decimal logarithm (8.0 ± 0.07 CFU/g) in 1 gram of stool samples obtained from gastritis patients with anti-*H.pylori*

antibodies in blood serum - are less than practically healthy individuals included in the control group (8.3 ± 0.03 CFU/g) ($p=0.003$).

Based on the results of anaerobic cultivation of other representatives of obligate intestinal microflora (*Bifidobacterium spp.* and *Lactobacillus spp.*) in gastritis with anti-*H.pylori* antibodies in blood serum - the amount of *Bifidobacterium spp.* expressed as a decimal logarithm is 7.0 ± 0.2 CFU/g, and the amount of *Lactobacillus spp.* were 5.0 ± 0.2 CFU/g. In healthy individuals from the control group, the amount of *Bifidobacterium spp.* and *Lactobacillus spp.* were 9.0 ± 0.2 CFU/g ($p=0.025$) and 7.0 ± 0.2 CFU/g ($p=0.016$), respectively, that is, a significant decrease in the amount of these bacteria was determined in gastritis.

Thus, in patients with gastritis with anti-*H.pylori* antibodies detected in blood serum, the number of obligate microflora representatives (*E.coli*, *Bifidobacterium spp.*, and *Lactobacillus spp.*) were determined to be significantly reduced compared to practically healthy individuals.

Antibodies against *H.pylori* were detected in the blood serum of 27 (90%) of 30 patients diagnosed with gastric and duodenal ulcers in the study, and the result were negative in 3 (10%) patients. Thus, out of 15 patients diagnosed with gastric ulcers, 13 (87%) had anti-*H.pylori* antibodies in their blood serum, and 2 (13%) had a negative result. Also, out of 15 patients diagnosed with duodenal ulcers, 14 (93%) had anti-*H.pylori* antibodies in blood serum, and 1 (7%) had a negative result. Stool samples of patients with gastric and duodenal ulcers, whose blood serum had anti-*H.pylori* antibodies were examined by the bacteriological method.

The amount of *E.coli* expressed as a decimal logarithm (7.9 ± 0.05 CFU/g) in the stool samples of patients with *H.pylori*-associated gastric ulcer and *E.coli* in the stool samples of patients with *H.pylori*-associated duodenal ulcer (7.9 ± 0.03 CFU/g) was almost unchanged ($p>0.05$). However, a significant decrease in the amount of *E.coli* was observed in patients with both gastric and duodenal ulcers compared to healthy individuals. Thus, the amount of *E.coli* in practically healthy individuals was 8.3 ± 0.03 CFU/g

($p < 0.001$). Also, the amount of *E.coli* did not differ in ulcer and gastritis patients (7.9 ± 0.03 , 7.9 ± 0.05 and 8.0 ± 0.07 CFU/g, respectively; $p > 0.05$).

As a result of anaerobic cultivation with stool samples of patients with gastric ulcers, other representatives of obligate intestinal microflora - *Bifidobacterium spp.* and *Lactobacillus spp.* its amount expressed as a decimal logarithm was 7.0 ± 0.4 and 5.0 ± 0.2 CFU/g, respectively, and 9.0 ± 0.2 ($p = 0.036$) and 7.0 ± 0.2 CFU/g ($p = 0.014$), respectively, in practically healthy individuals from the control group, that is, a sufficient decrease in the amount of these bacteria was determined in patients with gastric ulcer.

The results of anaerobic cultivation of stool samples from patients with duodenal ulcers were as follows: *Bifidobacterium spp.* - 6.0 ± 0.3 CFU/g, *Lactobacillus spp.* - 5.0 ± 0.2 CFU/g. For comparison, in practically healthy individuals from the control group, the amount of *Bifidobacterium spp.* and *Lactobacillus spp.* were 9.0 ± 0.2 ($p = 0.021$) and 7.0 ± 0.2 CFU/g ($p = 0.014$), respectively, that is, a sufficient decrease in the amount of these bacteria was determined in patients with duodenal ulcer.

Stool samples of patients with gastric and duodenal cancer were cultured only under aerobic conditions. It was found that the amount of *E.coli* expressed as a decimal logarithm in 1 gram of stool samples obtained from these patients (7.9 ± 0.1 CFU/g) are significantly less than practically healthy individuals included in the control group (8.3 ± 0.03 CFU/g) ($p = 0.002$) (Figure 1).

Thus, as a result of the study of changes in the amount of some representatives of obligate normal intestinal microflora in H.pylori-associated gastroduodenal pathologies, it can be noted that in patients with gastritis, gastric and duodenal ulcers, the representatives of obligate intestinal microflora (*E.coli*, *Bifidobacterium*, and *Lactobacillus*) are significantly less compared to practically healthy people.

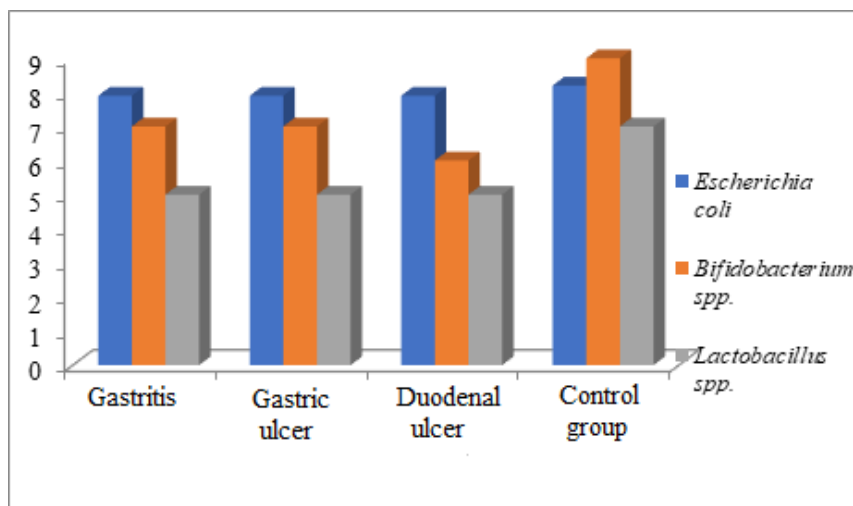


Figure 1. Changes in the amount of some representatives of obligate normal intestinal microflora in *H.pylori*-associated gastroduodenal pathologies. The number of microorganisms in 1 g of stool sample on the ordinate axis (in decimal logarithms)

Frequency of occurrence of parasitic infestations in *Helicobacter pylori*-associated gastroduodenal pathologies. Of 68 patients with *H.pylori*-associated gastritis, helminth and parasitic infestations were detected in 29 (43%) and no infestation were detected in 39 (57%). *Ascaris lumbricoides* were detected in 20 (29.4%), *Blastocystis hominis* in 3 (4.4%), and *A.lumbricoides* and *B.hominis* co-invasion in 6 (8.8%).

2 of 13 patients with *H.pylori*-associated gastric ulcer (15.4%) had *A.lumbricoides*, 2 (15.4%) *B.hominis* invasion, 1 of 14 patients (7%) with duodenal ulcer *A.lumbricoides*, and 3 (21.4%) *B.hominis* infestations were detected.

Thus, the results of studying the frequency of parasitic infestations in gastroduodenal pathologies (gastritis and gastro-duodenal ulcer) with *H.pylori*-associated show that *A.lumbricoides* infestation is more common in gastritis patients than in patients with gastric and duodenal ulcers (respectively 29.4% and 11.1%, $\chi^2=3.81$; $p=0.051$). Separately, *B.hominis* invasion was significantly less

common in patients with gastritis compared to patients with gastric and duodenal ulcers (4.4% and 18.5%, respectively, $\chi^2=4.98$; $p=0.026$).

Study of antibodies (IgM and IgG) against *Helicobacter pylori* in the blood serum of patients with gastrointestinal pathology. As a result of the study, anti-*H.pylori* antibodies were detected in blood serum with ELISA in 68 (69%) of 98 gastritis patients, and no anti-*H.pylori* antibodies were detected in 30 patients (31%). Antibodies against *H.pylori* detected in blood serum consisted of IgG in 51 (75%) patients, IgM in 1 (1.5%) patient, and IgG and IgM immunoglobulins in 16 (23.5%) patients. In total, IgG antibodies against *H.pylori* were detected in 67 (98.5%) patients.

In total, the express antibody test performed with the blood serum of 98 gastritis patients were positive in 71 samples (72%) and negative in 27 (28%). However, this test was positive in 58 (86.6%) and negative in 9 (13.4%) of 67 patients with gastritis (with *H.pylori*-associated) who had anti-*H.pylori* antibodies (IgG) were detected in blood serum with ELISA. Thus, the express antibody test in *H.pylori*-associated gastritis patients confirmed the ELISA in 86.6% of cases. The sensitivity and specificity of the ELISA during gastritis were 100%, and the sensitivity and specificity of the express antibody test were 86.6% and 69.2%, respectively.

Thus, in approximately two-thirds of patients with gastritis, antibodies against *H.pylori* are detected in the blood serum. Antibodies against *H.pylori* in blood serum mainly consist of immunoglobulins belonging to the IgG class. The express antibody test used to determine antibodies against *H.pylori* confirms the ELISA in most cases.

30 patients diagnosed with gastric and duodenal ulcers were examined with ELISA with blood serum. The obtained results were as follows: antibodies against *H.pylori* were detected in the blood serum of 27 (90%) patients, and the result was negative in 3 (10%). Of the positive results, 17 (63%) had only IgG, and 10 (37%) had both IgM and IgG.

Express antibody test with blood serum of 30 patients with gastric and duodenal ulcers was found to be positive in 23 (77%) and

negative in 7 (23%) of these patients. However, the express antibody test was positive in 23 (85%) and negative in 4 (15%) of 27 ulcer patients in whom anti-*H.pylori* antibodies were detected with ELISA in blood serum. Thus, the express antibody test in ulcer patients confirmed the ELISA in 85% of cases. The sensitivity and specificity of the ELISA for gastric and duodenal ulcers were 100%, respectively, and the sensitivity and specificity of the express antibody test were 85% and 100%, respectively.

Thus, in the majority of patients with gastric and duodenal ulcers, antibodies against *H.pylori* are detected in the blood serum. Antibodies detected against *H.pylori* in the blood serum of patients with gastric and duodenal ulcers mainly consist of immunoglobulins belonging to the IgG class. The express antibody test used to determine antibodies against *H.pylori* in patients with gastric and duodenal ulcers confirms the ELISA in most cases.

Antibodies against *H.pylori* are detected in the blood serum of both groups of patients during gastritis and duodenal ulcer, but these antibodies are determined in more cases during gastroduodenal ulcer than in gastritis (in 90% and 69% of patients, respectively, $\chi^2 = 7.487$; $p = 0.006$).

However, it should be noted that the determination of antibodies in blood serum cannot provide accurate information about the character of gastroduodenal pathologies caused by *H.pylori* in all cases. In other words, it cannot distinguish gastroduodenitis, gastric and duodenal ulcers, as well as other pathologies.

Study of *Helicobacter pylori* antigens in stool samples of patients with anti-*H.pylori* antibodies in blood serum. *H.pylori* antigen test with stool samples was positive in 37 (38%) of 98 gastritis patients and negative in 61 (62%).

However, this test was positive in 33 (49%) and negative in 34 (51%) of 67 patients with gastritis in whom anti-*H.pylori* antibodies were detected in blood serum (Figure 2). The sensitivity and specificity of stool antigen test in gastritis were 49% and 100%, respectively.

The diagnostic possibilities of all the tests applied during gastritis - the frequency of detection of *H.pylori* antibodies in blood

serum of patients through ELISA and express antibody test, *H.pylori* antigens in stool samples through stool antigen test are shown in Figure 3.

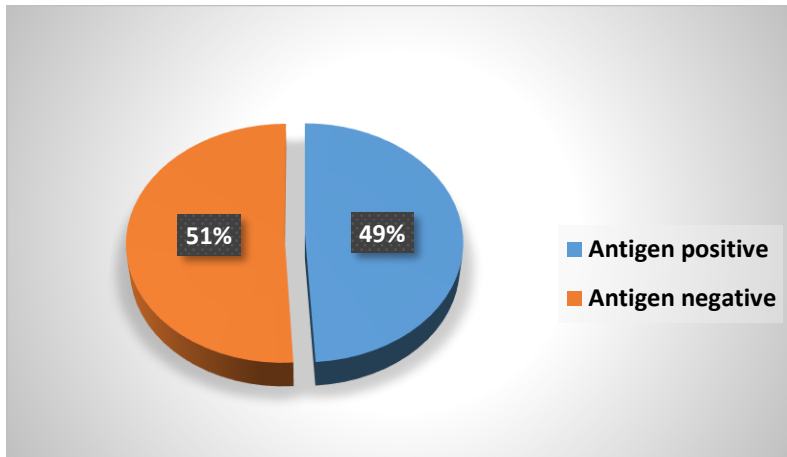


Figure 2. Frequency of *H.pylori* antigens in stool samples of patients with gastritis with anti-*H.pylori* antibodies detected in blood serum

H.pylori antigen test with stool samples was positive in 23 (77%) and negative in 27 (23%) of 30 patients with gastric and duodenal ulcers.

However, the stool antigen test was positive in 21 (78%) and negative in 6 (22%) of 27 patients with gastric and duodenal ulcers in whom anti-*H.pylori* IgG was detected in blood serum (Figure 4). The sensitivity and specificity of this test for gastric and duodenal ulcers were 78% and 100%, respectively.

The diagnostic possibilities of all the tests applied in the case of gastric and duodenal ulcer - the frequency of detection of *H.pylori* antibodies in the blood serum of patients through ELISA and express antibody test, and *H.pylori* antigens in stool samples through the stool antigen test are shown in Figure 5.

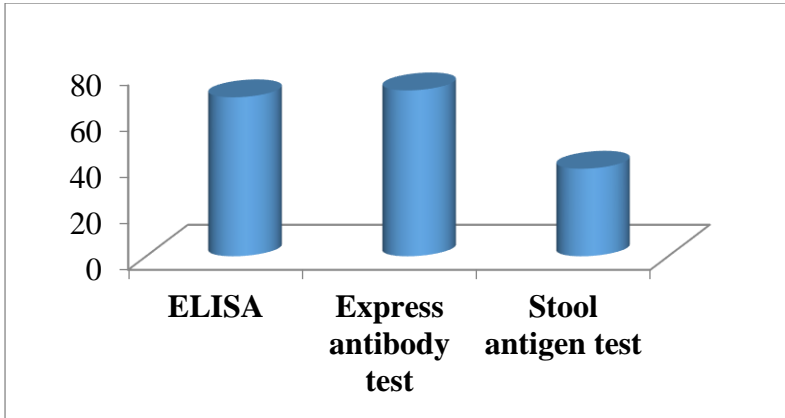


Figure 3. Frequency of detection of *H.pylori* antibodies in blood serum of patients with gastritis with ELISA and express antibody test, and *H.pylori* antigens in stool samples with stool antigen test (number of positive results on the ordinate axis in percentage)

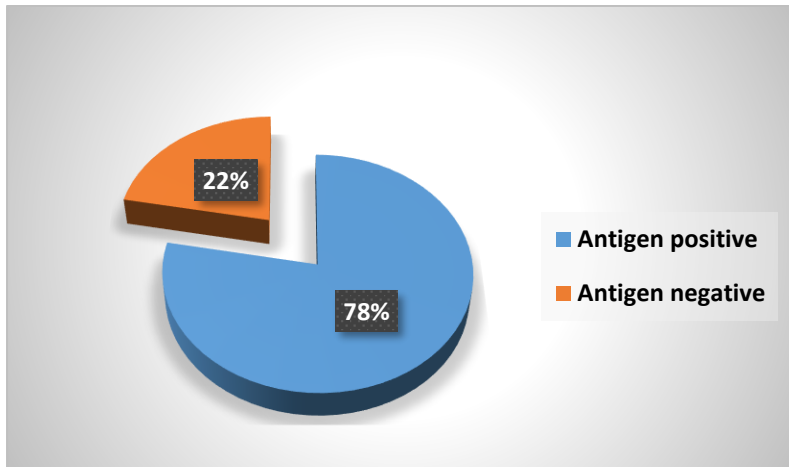


Figure 4. Frequency of *H.pylori* antigens in stool samples of patients with gastric and duodenal ulcers with anti-*H.pylori* antibodies detected in blood serum

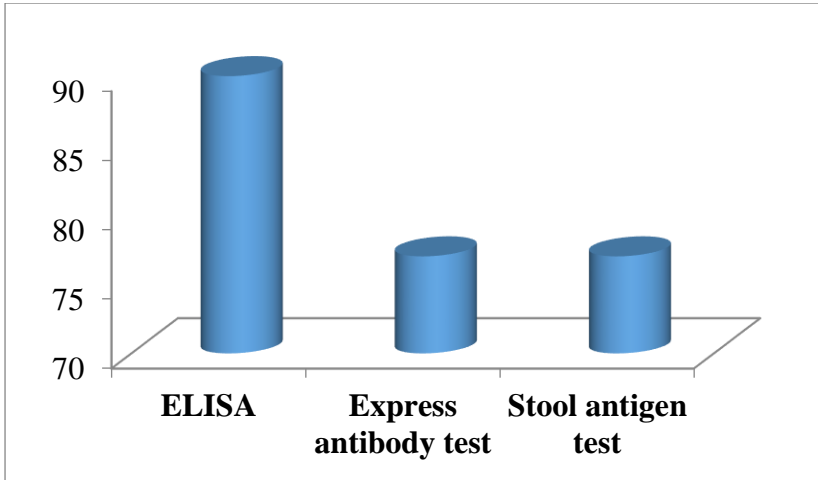


Figure 5. Frequency of detection of *H.pylori* antibodies in the blood serum of patients with gastric and duodenal ulcers with ELISA and express antibody test, and *H.pylori* antigens in stool samples with stool antigen test (the number of positive results on the ordinate axis in percentage)

Also, 16 patients with gastric and duodenal cancer were examined in the study. *H.pylori* antigens were detected in stool samples of these patients in 10 out of 16 patients (62.5%), and the result was negative in 6 (37.5%).

Thus, as a result of research, it was determined that in patients with *H.pylori*-associated gastric and duodenal ulcers, the stool antigen test was positive in significantly more cases than in patients with *H.pylori*-associated gastritis (78% and 49%, respectively, $\chi^2=6.405$; $p=0.011$). The results of the study show the prospects of using the stool antigen test in the differentiation of gastritis and ulcer diseases. This test is convenient due to the fact that it is inexpensive in terms of finances and the simplicity of the technique of use, as well as the fact that the examination results are obtained quickly.

Comparative evaluation of the results of *H.pylori*-antibody in blood serum and *H.pylori*-antigen tests in stool samples. In the study, the frequency of occurrence of *H.pylori* antigens in stool

samples and anti-*H.pylori* antibodies in blood serum during gastroduodenal pathologies was comparatively evaluated (table 1).

Table 1

Comparative evaluation of serum-antibody and stool-antigen tests in gastroduodenal pathologies

The character of the disease	Number of patients (n)	Antibodies against <i>H.pylori</i> (ELISA)		Express antibody test (n, %)		Stool antigen test (n, %)	
		Poz. (n,%)	Neq. (n, %)	Poz. (n, %)	Neq. (n, %)	Poz. (n, %)	Neq. (n, %)
Gastritis	98	68 (69%)	30 (31%)	71 (72%)	27 (28%)	37 (38%)	61 (62%)
Gastric ulcer	15	13 (87%)	2 (13%)	11 (73%)	4 (27%)	10 (67%)	5 (33%)
Duodenal ulcer	15	14 (93%)	1 (7%)	12 (80%)	3 (20%)	13 (87%)	2 (13%)
Gastroduodenal cancer	16	-	-	-	-	10 (62,5%)	6 (37,5%)
Control group	20	-	20 (100%)	-	20 (100%)	-	20 (100%)

In patients with gastritis, 33 (49%) of 67 patients in whom IgG against *H.pylori* was detected with ELISA had a positive stool antigen test. Comparison of the obtained results showed that ELISA and stool antigen tests in gastritis patients confirmed each other in 49% of cases. The express antibody test was positive in 58 (86.6%) and negative in 9 (13.4%) of 67 patients with gastritis in whom anti-*H.pylori* IgG was detected in blood serum. Of the 58 patients with a positive express antibody test, 33 (57%) had a positive stool antigen test, and 25 (43%) had a negative result. Comparison of the obtained results showed that express antibody and stool antigen tests in gastritis patients confirmed each other in 57% of cases.

Stool antigen test was positive in 21 of 27 patients (78%) in whom IgG against *H.pylori* was detected with ELISA during gastric and duodenal ulcers. Thus, in patients with *H.pylori*-associated

gastric and duodenal ulcers, ELISA and stool antigen testing confirmed each other in 78% of cases. In patients with gastric and duodenal ulcers, 20 of 23 patients (87%) in whom anti-*H.pylori* antibody was detected with express antibody test, stool antigen test was positive, that is, express antibody and stool antigen tests confirmed each other in 87% of cases.

In patients with gastric and duodenal ulcers, biopsy samples taken from the ulcer area were also examined using the CLO-test based on the synthesis of urease enzyme by *H.pylori* bacteria. This test was applied in 17 ulcer patients and all results were positive. 16 (94%) of CLO-test positive patients were positive with ELISA, 15 (88%) with express antibody test and 13 (76%) with stool antigen test. In 13 (76%) of the performed examinations, the results of CLO-test and serological tests coincided. As a result of the study, it was determined that the CLO-test confirms the ELISA method in 94%, the express antibody test in 88% and the stool antigen test in 76% of cases.

Thus, although the results of enzyme-linked immunosorbent assay and express antibody tests that detect antibodies against *H.pylori* in blood serum do not differ significantly in gastritis and gastric-duodenal ulcer diseases, the results of the stool antigen test that detects *H.pylori* antigens in stool samples depend on the character of the pathological process. Thus, the stool antigen test was positive in 78% of patients with gastric and duodenal ulcers, and in 49% of patients with gastritis ($\chi^2=6.405$; $p=0.011$). Thus, the obtained results show the prospect of using the stool antigen test as a non-invasive test that allows distinguishing the character of gastroduodenal pathology with *H.pylori*-associated.

Frequency of occurrence of *H.pylori* in patients with diarrhea of unknown etiology. 16 patients with diarrhea of unknown etiology were included in the study. In 13 of these patients (81.3%), antibodies against *H.pylori* were detected in blood serum with ELISA. All (100%) of these patients had a positive stool antigen test. Thus, the conducted research shows that *H.pylori* can have an etiological role in diarrhea of unknown etiology.

CONCLUSION

1. In patients with *H.pylori*-associated gastritis, gastric and duodenal ulcers, the amount of representatives of obligate intestinal microflora (*Escherichia coli*, *Bifidobacterium* and *Lactobacillus*) is significantly lower than in practically healthy individuals.
2. The frequency of helminth (*Ascaris lumbricoides*) and parasitic (*Blastocystis hominis*) infestations in *H.pylori*-associated gastro-duodenal pathologies do not differ compared to healthy individuals. In *H.pylori*-associated gastritis patients, helminth infestation did not differ compared to patients with gastric and duodenal ulcers, but parasitic infestation was significantly less frequent.
3. Antibodies against *H.pylori* are detected in blood serum in approximately two-thirds of patients with gastritis. Antibodies against *H.pylori* in blood serum mainly consist of immunoglobulins belonging to the G class. The express antibody test to determine antibodies against *H.pylori* confirms the ELISA method in most cases.
4. Antibodies against *H.pylori* are detected in the blood serum of most patients with gastric and duodenal ulcers. Antibodies against *H.pylori* in the blood serum of these patients mainly consist of immunoglobulins belonging to the G class. Express antibody test to determine antibodies against *H.pylori* in patients with gastric and duodenal ulcers confirms the ELISA method in most cases.
5. *H.pylori* antigens are detected in stool samples of approximately half (49%) of patients with gastritis with anti-*H.pylori* antibodies in blood serum. *H.pylori* antigens are determined in stool samples of a large number of ulcer patients (78%) with anti-*H.pylori* antibodies in blood serum.
6. In gastric and duodenal ulcers with a positive CLO (Campylobacter-like organism)-test with biopsy samples serological examinations (ELISA, express antibody and stool antigen tests) show a positive result in most cases.
7. Anti-*H.pylori* antibodies in blood serum and *H.pylori* antigens in stool samples are detected in most patients with diarrhea of unknown etiology.

PRACTICAL RECOMMENDATIONS

1. In patients with gastritis, gastric and duodenal ulcers, the number of obligate microflora representatives of the intestine are significantly reduced, so it is appropriate to use eubiotics and probiotics that ensure the recover of intestinal microflora in the complex treatment of these diseases.
2. In the case of gastritis, gastric and duodenal ulcer, the express antibody test can be used as an auxiliary method to the ELISA method to detect antibodies against *H.pylori* in blood serum. This test allows you to get a quick result, as well as, it is inexpensive, it does not require a special set of reagents and equipment.
3. The stool antigen test, which allows detecting *H.pylori* antigens in stool samples, can be used in the differentiation of gastritis, gastric and duodenal ulcer diseases. This test is also convenient because it is cheap and simple in technique, as well as the results can be obtained quickly.

LIST OF PUBLISHED SCIENTIFIC WORKS ON THE SUBJECT OF THE DISSERTATION:

1. Qasımova M.Ç., Qurbanov A.İ. «Qan zərdabında *Helicobacter pylori*-yə qarşı anticisimlər aşkar edilmiş şəxslərdə ekspress antigen testinin nəticələri» // Sağlamlıq jurnalı, №2, Bakı, 2016, səh.106-110
2. Qasımova M.Ç., Qurbanov A.İ. «*Helicobacter pylori*-yə qarşı anticisimlər aşkar edilmiş şəxslərdə ekspress antigen testinin nəticələri» / Allerqologiya, İmmunologiya və İmmunoreabilitasiya üzrə V Azərbaycan Milli Konqresinin materialları. Bakı, 21 oktyabr 2016, səh. 63-64
3. Qasımova M.Ç., Qurbanov A.İ. «*Helicobacter pylori* ilə əlaqəli müxtəlif gastrointestinal patologiyalarda helmint və parazit invazyalarının rastgəlmə tezliyi» // Azərbaycan Təbabətinin Müasir Nailiyyətləri jurnalı, №3, Bakı, 2017, səh. 138-140
4. Qasımova M.Ç. «*Helicobacter pylori* ilə törədilən xəstəliklərin diaqnostika problemləri» / Əziz Əliyevin anadan olmasının 120 illik yubileyi münasibətilə ATU-da keçirilən elmi-praktik konfransın materialları. Bakı, 2017, səh. 440-441
5. Qasımova M.Ç., Qurbanov A.İ. «*Helicobacter pylori* və bağırsağ mikroflorasının xüsusiyyətləri» / Azərbaycanın dövlət müstəqilliyinin bərpasının 25-ci ildönümünə həsr olunmuş Təbabətin Aktual Problemləri 2017 elmi-praktik konfransın materialları. Bakı, 2017, səh. 142
6. Qasımova M.Ç. «*Helicobacter pylori* ilə əlaqəli gastroduodenal patologiyalarda bağırsağ mikroflorasının xüsusiyyətləri və onun diaqnostikasının bəzi aspektləri» // Sağlamlıq jurnalı, №1, Bakı, 2018, səh.196-199
7. Qasımova M.Ç. «*Helicobacter pylori* antigenləri aşkar edilmiş nəcis nümunələrinin bakterioloji müayinəsinin nəticələri» / Azərbaycan Xalq Cümhuriyyətinin 100 illik yubileyinə həsr edilmiş Təbabətin Aktual Problemləri 2018 elmi-praktik konfransın materialları. Bakı, 2018, səh. 201
8. Qasımova M.Ç., Qurbanov A.İ. «*Helicobacter pylori*-nin lokalizasiyası» / Əməkdar elm xadimi, professor Rafiq Əşrəf

- oğlu Əsgərovun anadan olmasının 85 illik yubileyinə həsr olunmuş beynəlxalq elmi konfrans materiallarının toplusu. Bakı, 2018, səh. 110
9. Гасымова М.Ч., Гурбанов А.И. «Сравнительная характеристика результатов серологических исследований при *Helicobacter pylori*-ассоциированных гастритах» // Журнал «Медицинские новости», №3, Беларусь, 2018, стр. 82-84
 10. Qasımova M.Ç., Qurbanov A.İ. «*Helicobacter pylori* və gastrointestinal sistemdən kənar xəstəliklər» / Əməkdar elm xadimi, t.e.d., professor Tağı Ələkbər oğlu Tağızadənin 95 illik yubileyinə həsr olunmuş elmi-praktik konfransın materialları. Bakı, 2018, səh. 141-142
 11. Qasımova M.Ç. «*Helicobacter pylori* ilə əlaqəli mədə və onikibarmaq bağırsağ xoralarında *Escherichia coli* və şərtipatogen bakteriyaların rastgəlmə tezliyi» / XIV Ümumdünya Böyrək Gününə həsr olunmuş “Müasir Nefrologiyanın Aktual Problemləri” adlı elmi-praktik konfransın materialları. Bakı, 2019, səh. 52
 12. Qasımova M.Ç. «*Helicobacter pylori* ilə əlaqəli müxtəlif gastro-intestinal patologiyalarda ekspress serum-anticisim və nəcis antigen testlərinin diaqnostik imkanlarının müqayisəli qiymətləndirilməsi» / “İmmunpatoloji xəstəliklər” mövzusunda I Beynəlxalq Konfrans. Azərbaycan Allergologiya və Klinik İmmunologiya jurnalı, cild 7, №2, Bakı, 17-18 May, 2019, səh. 29
 13. Qasımova M.Ç., Qurbanov A.İ. «*Helicobacter pylori* ilə əlaqəli gastroduodenal patologiyalarda ekspress serum testinin nəticələri» / Tibbin Görən Gözü Şüa diaqnostikasının aktual problemlərinə həsr edilmiş beynəlxalq elmi-praktik konfransın materialları. Bakı, 2019, səh. 159
 14. Qasımova M.Ç., Qurbanov A.İ. «Mədə və onikibarmaq bağırsağ xoralarında invaziv və qeyri-invaziv testlərin nəticələrinin müqayisəli qiymətləndirilməsi» / ATU-nun Neyrocərrahlıq kafedrasının yaranmasının 50 illik yubileyinə həsr edilmiş «Neyrocərrahlığın müasir problemləri» mövzusunda Beynəlxalq Elmi-praktik Konfransın materialları. Tibb jurnalı, Bakı, 11-12 May, 2019, səh. 171

15. Qasımova M.Ç., Qurbanov A.İ., Nərimanov V.Ə. «Helicobacter pylori ilə əlaqəli mədə və onikibarmaq bağırsağ xoralarında anaerob kultivasiyanın nəticələri» / Bakı Dövlət Universitetinin nəzdində Tibb fakültəsinin yaranmasının 100 illik yubileyinə həsr edilmiş Təbabətin Aktual Problemləri 2019 beynəlxalq elmi-praktik konfransın materialları. Bakı, 2019, səh. 255
16. Гасымова М.Ч. «Диагностические возможности антиген теста при Helicobacter pylori-ассоциированных гастродуоденальных патологиях» / «Научная интеграция в интерпретации современного образовательного процесса третьего тысячелетия» LXXVIII (М-78) Международная научно-практическая конференция. Казань: 30 ноября 2019 года.
17. Qasımova M.Ç. «Helicobacter pylori ilə əlaqəli gastroduodenal patologiyalarda seroloji müayinələrin nəticələrinin müqayisəli qiymətləndirilməsi» // Azərbaycan Təbabətinin Müasir Nailiyyətləri jurnalı, №4, Bakı, 2019, səh. 193-197
18. Гасымова М.Ч., Гурбанов А.И. «Сравнительная характеристика серологических методов исследования при Helicobacter pylori-ассоциированной язвенной болезни желудка и двенадцатиперстной кишки» // Журнал «Медицинские новости», №5, Беларусь, 2020, стр. 82-84
19. Qasımova M.Ç. «Helicobacter pylori ilə əlaqəli gastrointestinal patologiyalarda bağırsağ mikroflorasında baş verən dəyişikliklər» // Metabolizm jurnalı, №1, Bakı, 2020, səh. 16-20
20. Gasımova M.C. «Features of the intestinal microflora in gastritis associated with Helicobacter pylori» / Integration of Education, Science and Business in Modern Environment: Summer Debates: abstracts of the 2nd International Scientific and Practical Internet Conference. Dnipro: August 17-18, 2020, p.115
21. Qasımova, M.Ç., Qurbanov, A.İ. Naməlum etiologiyalı diarreyalı xəstələrdə Helicobacter pylori-nin rastgəlmə tezliyi // Azərbaycan Tibb Universitetinin 90 illik yubileyinə həsr olunmuş “Təbabətin Aktual Problemləri-2020” mövzusunda beynəlxalq elmi-praktik konqres. - Bakı: - 2020, - s. 211-212
22. Gastroduodenal patologiyası olan xəstələrin müxtəlif yaş qruplarında Helicobacter pylori-nin rastgəlmə tezliyi / Əməkdar

- elm xadimi, tibb elmləri doktoru, professor Mina Müzəffər qızı Davatdarovanın anadan olmasının 85 illik yubileyinə həsr olunmuş beynəlxalq elmi konfrans. Bakı: 25-26 Sentyabr, 2020
23. Qasımova, M.Ç. Helicobacter pylori ilə əlaqəli mədə və onikibarmaq bağırsaq xoralarında parazitlar invazyalarının rastgəlmə tezliyi // Azərbaycan Tibb Universitetinin 90 illik yubileyinə həsr olunmuş “Sağlam əmək və həyat təhlükəsizliyi - 2021” mövzusunda elmi-praktik konfrans. - Bakı: - 2021, - s. 54-55
24. Qasımova, M.Ç., Qurbanov, A.İ., Nərimanov, V.Ə., Bayramova, R.S. Helicobacter pylori ilə əlaqəli gastritlərdə parazitlar invazyalarının rastgəlmə tezliyi // Professor Zərifə Ağarza qızı Zeynalovanın anadan olmasının 90 illik yubileyinə həsr olunmuş elmi konfrans. – Bakı: - 2023, -s. 86-87
25. Qasımova, M.Ç., Qurbanov, A.İ. Müxtəlif gastroduodenal patologiyalarda Helocobacter pylori-nin nəcis antigen testi vasitəsilə təyininin nəticələri // Ümummillî lider Heydər Əliyevin 100 illik yubileyinə həsr olunmuş “Tibbi profilaktikanın aktual problemləri” mövzusunda Beynəlxalq Elmi Konfrans. - Bakı: - 2023, - s. 24-25
26. Гасымова, М.Ч., Талыбова, Ч.Х., Новрузова, М.С., Байрамова, Р.С. Роль H.pylori при диарее неизвестной этиологии // Международной научно-практической конференции «Наука в интерпретации современного образовательного процесса». - Россия, г. Казан: - 2022, -с. 24-25
27. Gasimova, M.Ch., Gurbanov, A.I. Changes in the normal intestinal microflora during Helicobacter pylori-associated gastroduodenal diseases // XIII International Scientific and Practical Conference Science and practice: implementation to modern society. - Manchester, Great Britain: - 2022, - p. 176-177
28. Gasimova, M.Ch., Gurbanov, A.I., Novruzova, M.S., Talibova, J.Kh. Narimanov, V.A., Diagnostic significance of stool antigen test in the determination of Helicobacter pylori» / Proceedings of the 6th International Scientific and Practical Conference Scientific paradigm in the context of technologies and society development. - Geneve, Switzerland: - 2023, - s. 263-265

29. Gurbanov, A.I., Gasimova, M.Ch. stool antigen test in the H.pylori-associated gastroduodenal pathologies: diagnostic opportunities to determine of the character and localization of the pathological processes // - Italy: Journal Annali d'Italia, - 2022, №35, - p. 34-37

ABBREVIATIONS

CLO-test - Campylobacter-like organism test

ELISA - enzyme-linked immunosorbent assay

IFR - immunofluorescence reaction

CFR - complement fixation reaction

MALT - mucosa associated lymphoid tissue

PPIs - proton pump inhibitors

UBT - urea breath test

PCR - polymerase chain reaction

The defence will be held on "28" February 2024 at 14⁰⁰
at the meeting of the Dissertation council BED 4.19 of Supreme
Attestation Commission under the President of the Republic of
Azerbaijan operating at Azerbaijan Medical University

Address: AZ1022, Baku, A.Gasimzade Street 14 (conference hall).

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Abstract was sent to the required addresses on
"25" January 2024

Signed for print: 17.01.2024
Paper format: 60x84 ¹/₁₆
Volume: 36943
Number of hard copies: 20