

STATUS OF THE AUTONOMIC NERVOUS SYSTEM AND ULCER DISEASE OF THE STOMACH AND DUODENUM

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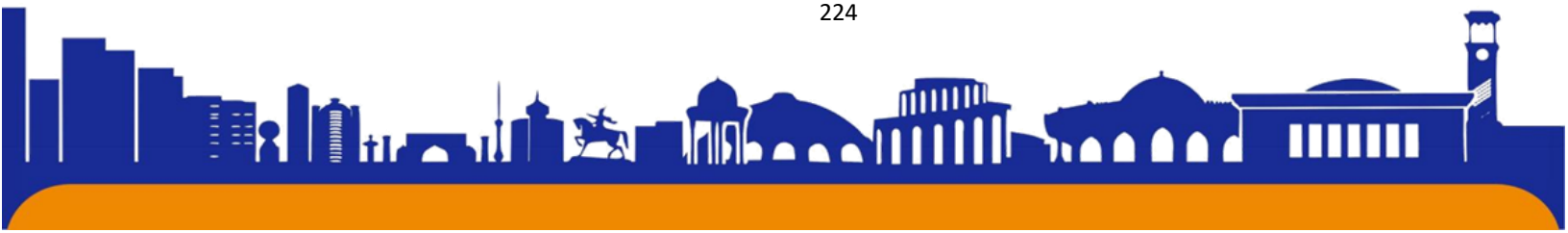
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Resume. *From modern perspectives, peptic ulcer disease is considered a multifactorial poly-etiological disease. The founder of the neurogenic concept of lesion development, G. Bergman, believed that the main role in the pathogenesis is played by functional disorders of the autonomic nervous system with the predominance of the vagus nerve tone. Disruption of the harmonious effect on the stomach of parasympathetic and sympathetic parts of the autonomic nervous system leads to the formation of ulcers. The disruption of the sympathetic innervation of the gastroduodenal complex plays a significant role in the development of morpho-functional changes. The flow of sympathetic pulses causes excessive excretion of catecholamines, leading to disruption of tissue trophic processes. Stress stimulates the function of the hypothalamus. This causes hypersecretion of hydrochloric acid and pepsin, hypermotorism and hypertonia of the stomach, spasm of the blood vessels and ischemia.*

Keywords: gastric and duodenal ulcer disease, autonomic nervous system, sympathetic nervous system, parasympathetic nervous system.

Currently, to assess the vegetative status of the organism, in addition to the recommendations of A.M. Vein [9] (with the help of which, based on clinical symptoms and functional tests, vegetative tone, vegetative reactivity and vegetative support are





assessed), the method of cardiac arrhythmography is used, based on the analysis of the structure of the sinus heart rate, which opens up the possibility of further study of this problem. Nomura M. et al. [13] the relationship between heart rate variability and *Helicobacter pylori* infection (HP) was assessed. The function of the autonomic nervous system (ANS) was studied using daily ECG monitoring according to Holter. The authors concluded that ANS dysfunction, as well as HP infection, is a necessary condition for the formation of chronic peptic ulcer [2].

Any type of vegetative imbalance can trigger a recurrence of ulcerative disease (UD) [6]. In this case, "vagotonia" contributes to increased aggression, and "sympathicotonia" contributes to disruption of microcirculation, decreasing the secretion of mucus and bicarbonates. The ANS is the link between psyche and somatics.

Given the contradictory nature of the literature on autonomic dysregulation in ulcerative colitis (4), there is a need for further study of this problem using objective research methods, namely cardiac arrhythmography.

Ulcers with a high recurrence rate are currently an important scientific and practical problem related to their treatment. Determining the atogenesis of ulcers has been and remains the subject of intensive research. Therefore, the study of physiological processes in patients with nervous system-regulated ulcers using modern objective research methods is relevant [12].

Purpose of work. To conduct a comparative assessment of the features of the autonomic nervous system in patients with peptic ulcer disease and duodenal ulcer disease using an objective diagnostic method - cardiorythmography [7].

Materials and methods. The ANS tone status was studied in 40 patients with GUD, 36 patients with DUD, and 30 healthy individuals (control group) using the cardiorythmographic method and determining the Kerdo index (KI) using the formula: $KI = (1 - DAP/HR) \times 100$, where DAD is diastolic blood pressure, HR is heart rate.

Cardio-rhythmographic studies were conducted using the "Valent" diagnostic system. Cardiorythmogram construction was performed according to the recording of the second standard ECG departure. 200 cardiac intervals were recorded. Automatic analysis and determination of fashion indicators (Mo) were conducted. It characterizes





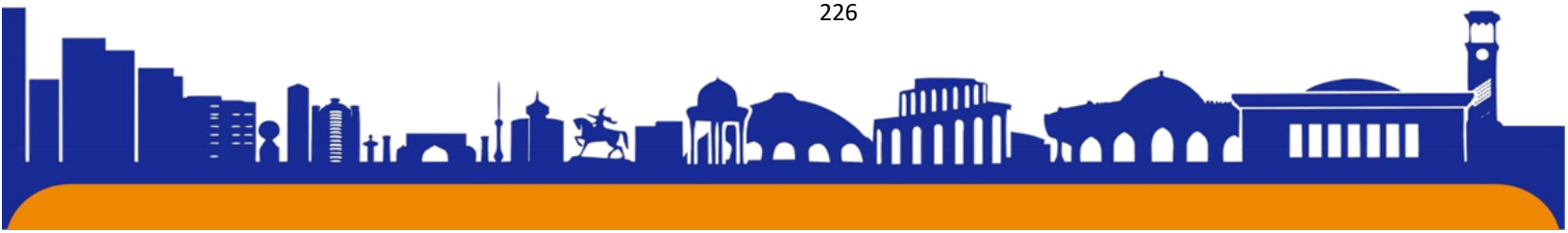
the dominance of the sympathetic or parasympathetic part of the autonomic nervous system. The stress index, which depends on the degree of involvement of all regulatory systems, and the vegetative equilibrium index, which mainly reflects the activity of the ANS sympathetic section, were determined. The participation of the parasympathetic nervous system in the regulation of heart rate was determined by slowing down the rhythm, increasing the rhythm, the appearance of respiratory arrhythms on the pneumograms, on the rhythmograms - increasing the power of fast waves, identifying the "hump" on the frequency spectrum graph in the area of high frequencies. The involvement of the sympathetic nervous system was determined by the increase in heart rate, the absence of fast waves on the rhythmograms, the predominance of slow second-order waves, the increase in the power of slow second-order waves against the background of increased heart rate on the frequency spectrum graph, and the increase in heart rate against the background of rigid sinus rhythm.

Cardio-rhythmographic active wedge-orthostatic test was used to clarify the reaction of the CNS to external stimuli [3]. The analysis of the sample is based on the nature of the rhythmogram in the sense of its sympathetic or vagus orientation in the first and second stages of the study. Clinically, vegetative reactivity was assessed based on eye, heart, and solar reflexes.

To study the psychological characteristics and subjective perception of the patient's autonomic dysfunction, the clinical questionnaire of K.K. Yakin and D.M. Mendelevich was used [10].

The age of the subjects ranged from 19 to 70 years. Among the group of patients with gastrointestinal injuries, there were 30 men and 10 women. For the first time, 25 patients had been diagnosed with the disease, 15 patients had a long history of the disease. Among the group of patients with TBI, there were 24 men and 12 women. The first identified ulcer was observed in 20 patients, 16 patients had a long history of the disease. The control group consisted of 20 men and 10 women.

NR infection was determined by a urea respiratory test (HELIC test), as well as by determining the total antibody titer to the CagA antigen NR using the IFA method ("HelicoBest-Antibody").



The motor activity of the stomach was studied using an electrogastrographic method (EGS-4M apparatus).

Radioisotopic scintigraphy, which involves external detection of sequential changes in the counting rate over the gastric region after the patient receives labeled food with $^{113}\text{M In}$ radioactivity and calculates the time of half-and full gastric emptying.

The study of the gastric acid production function was conducted using an intra-gastric pH meter with a microprocessor acidogastrometer "AGM-03."

Laser Doppler flowmetry (LDF) was used to study the state of microcirculation in the gastric projection zones. Blood flow was studied in the epigastric region and in the palmar surface of the hand. The microcirculation state was characterized by the following parameters: microcirculation index (M), which reflects the basal blood flow level; its standard deviation (δ), which characterizes the temporal variability, fluctuation of the erythrocyte flow (flaks); microcirculation frequency characteristics.

Results. In the examination of patients, the total antibody titer (M, G, A) to the CagA antigen HP was detected in 70% of cases (28 people) in the group of patients with GUD and in 80.5% of cases (29 people) in the group of patients with DUD. In the control group, the total antibody titer was found in 20% (6 people). The urea respiratory test data were consistent with the enzyme immunoassay data. HP infection was more frequently observed in patients with DUD.

In the study of ANS tone according to KI data and as a result of cardiorhythmographic examination, it was found that in the control group, 66.6% (20 people) had eightonia, 13.3% (4 people) had moderate sympathicotonia, and 20% (6 people) had vagotonia. Vegetative imbalance deviations were more common in the group of patients with GUD. Thus, 65% (26 patients) showed a predominance of the ANS sympathetic section, 25% (10 patients) showed a predominance of the ANS parasympathetic section, and 10% (4 patients) showed eutonia. In the group of patients with DUD, 50% (18 patients) had ANS sympathetic division, 33.3% (12 patients) had ANS parasympathetic division, and 16.6% (6 patients) had eutonia. KI data and cardiorhythmogram parameters coincided, which allows us to confidently determine

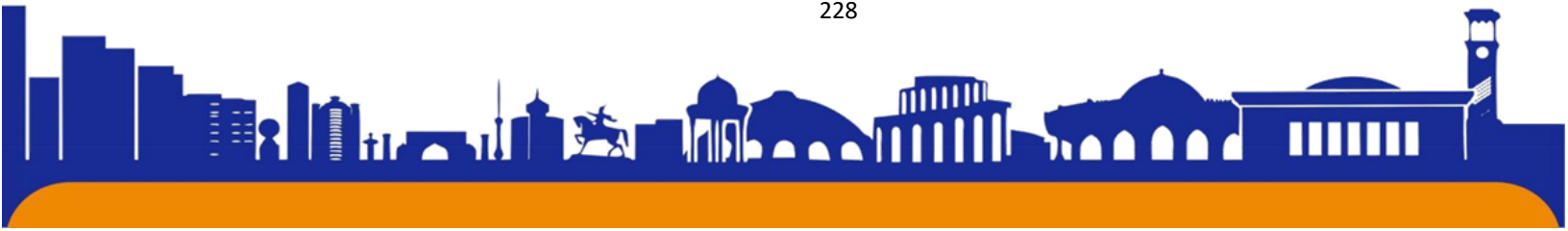


the predominance of tone in one or another part of the ANS. However, KI does not allow for the evaluation of vegetative reactivity and the identification of functional classes in cardiorythmographic tests.

There is a correlation between ANS status, clinical picture, and disease course. Studies have shown that vegetative dystonia and HP infection are significantly more common in both GUD and DUD than in the control group ($p < 0.05$). Vegetative dystonia was more often observed in GUD, while sympathicotonia was more often observed in GUD (65%), and the predominance of parasympathetic ANS was observed in DUD (33.3%). Vegetative imbalance was more often detected during the exacerbation of the disease (85% in GUD, 83.3% in DUD).

Sympathicotonia is mainly observed in patients with a short history of the disease (in patients with GUD 80%, DUD 83,3%), indicating the preserved adaptive abilities of the body. With a favorable course of the disease, the sympathetic imbalance quickly became eutonic, and the ulcers quickly became scarring, indicating the body's adequate adaptive capabilities. When adaptive abilities decrease, persistent sympathicotonia develops, which is compensated by systemic vagotonia. Parasympathicotonia is more characteristic of patients with a more prolonged ulcerative history with a more complicated course of the disease (in patients with GUD 53.3%, DUD 75%). In clinical trials, young patients with GUD and DUD in a significant number of cases (men 92.5%, women 85.3%) associated the onset and exacerbation of the disease with stressful situations. Analysis of the autonomic nervous system revealed a sympathetic imbalance of the ANS. There was no significant difference in the tone of the ANS by gender. When the tone of the ANS sympathetic section predominated, pain syndrome, impaired stomach motor function, and nausea were more common. Vagotonia was more commonly accompanied by a burning sensation and a hyperacid state.

In patients with GUD, normal type of vegetative reactivity was observed in 10 (25%) subjects, while parasympathetic type of reactivity was observed in 6 (15%) subjects, while in 24 (60%) subjects, sympathetic type of reactivity was observed in 6 (15%) subjects, while parasympathetic type of reactivity was observed in 6 (15%) subjects, while parasympathetic type of reactivity was observed in 6 (15%) subjects.





Patients with DUD exhibited normal reactivity in 10 (27.7%) subjects, parasympathetic reactivity in 6 (16.6%), and sympathetic reactivity in 20 (55.5%) patients.

The following results were obtained when conducting an active clinical orthostatic test in patients with GUD: normal reaction was observed in 10 (25%) patients, asympathetic reactivity in 6 (15%), and hypersympathetic reactivity in 24 (60%) patients. Normal reactions were observed in 10 (27.7%) patients with DUD, asympathetic reactivity in 6 (16.6%), and hypersympathetic reactivity in 20 (55.5%) patients. Both groups exhibited an inadequately expressed sympathetic reaction in orthostasis. The degree of overstrain of the ANS sympathetic region in determining vegetative reactivity was most pronounced in GUD, indicating the mobilization of protective mechanisms and increased adrenergic effects on metabolic processes.

In the control group, vegetative reactivity was normal in all cases, normal sympathetic (19 people, 63.3%) and normal parasympathetic (11 people, 36.6%) types of vegetative relationships were identified. Strong sympathetic, strong parasympathetic, and paradoxical types were not observed in healthy individuals.

Vegetative support in 10 (25%) patients with GUD was assessed as sufficient (short-term increase in systolic blood pressure by 20 mm Hg and less, transient increase in heart rate to 30 per minute), in 22 (55%) - as excessive (systolic blood pressure increase by more than 20 mm Hg, increase in heart rate when the patient rises by 30 per minute), in 8 (20%) - deficit of vegetative support (decrease in systolic blood pressure by more than 15-20 mm Hg or isolated decrease in diastolic blood pressure). Vegetative support in 12 (33.3%) patients with DUD was considered sufficient, in 16 (44.4%) - excessive, in 8 (22.2%) - deficit of vegetative support. Thus, in 66.6% of patients with DUD and in 75% of patients with GUD, there was a violation of vegetative support. Vegetative support in the control group was sufficient ($p < 0.001$). Vegetative support violations indicate an imbalance in the functioning of the ANS in patients with UD during exercise.

Micrcirculation features depending on the vegetative tone were observed. Patients with sympathiadrenal type of vegetative tone have lower basal blood flow



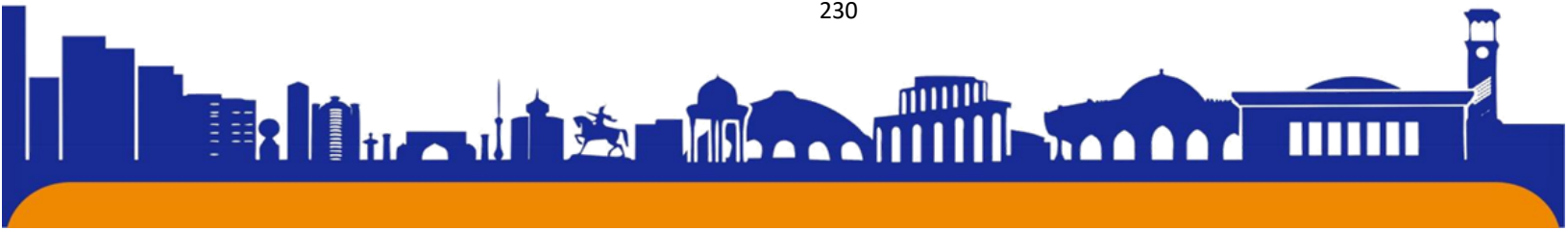


values than vagotonia and eutonia, which agrees with the literature data that sympathicotonia contributes to a greater degree of microcirculation disruption than vagotonia [2]. Microcirculation scores in patients with GUD were significantly lower than in the control group and lower than in patients with DUD.

In the study of the motor function of the stomach in patients with UD, the normokinetic type of motor skills was observed in 6 patients, the hypokinetic type in 16, and the hyperkinetic type in 14. In patients with GUD, the normokinetic type of motor activity was observed in 6 patients, the hypokinetic type in 22, and the hyperkinetic type in 12. In gastric hypertrophy, the parasympathetic part of the ANS predominates (83.3% in patients with DUD, 90% in patients with GUD), which is explained by the increased release of acetylcholine, which leads to increased gastric motor activity. In the presence of hypothyroidism, the ANS sympathetic section predominated (72.2% in patients with DUD, 77% in patients with GUD). In patients with sympathicotonia, stomach hypothyroidism contributes to acid retention and creates conditions for acid-peptic damage to the mucous membrane. Balance between branches of ANS (eutonia) is characteristic of normomotor of stomach.

Sphincteral disorders were more common in patients with hyper-sympathicotonia. Scintigraphic examination of evacuation function in 64.7% of patients with DUD and in 62.5% of patients with GUD slowed evacuation. The results of the study showed that the motor function of the gastroduodenal complex was impaired in practically all examined patients with UD (both vagotonic and sympathetonic). Thus, sympathicotonia, like vagotonia, disrupting motor skills, promotes ulceration, and coordinated, coordinated activity of parasympathetic and sympathetic links of nervous regulation (in the case of eutonia) creates conditions for normal peristalsis. Motor disturbances in the gastroduodenal zone create conditions for acid-peptic damage to the mucous membrane.

An increase in gastric juice acidity with the greatest changes was found in vagotonic patients (91.6% in patients with DUD, 80% in patients with GUD). Sympathetic tonia also shows a high level of acidity in a significant number of patients with DUD - 50%, in patients with GUD - 19.2%, which is explained by the tonic



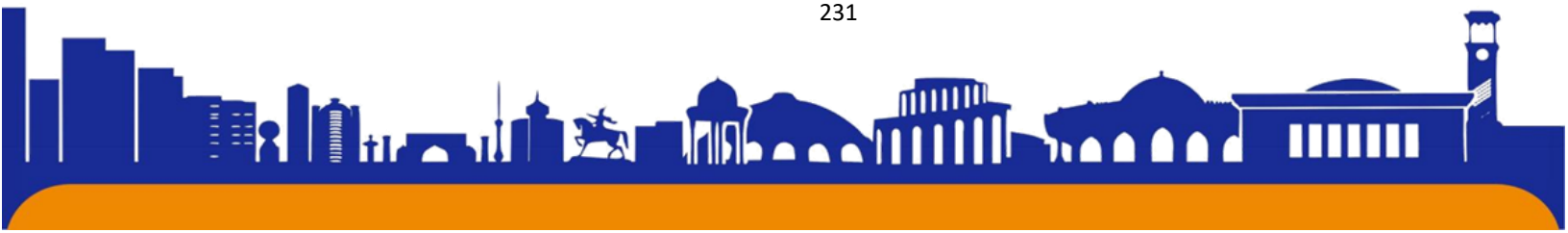


stimulating effect of the β 2-receptors of the sympathetic nervous system on the secretion of hydrochloric acid and pepsin. Acid production in patients with GUD was often insufficient (42.3%).

Patients with sympathicotonia showed pathological changes across all scales more frequently than patients with vagotonia and eptonia. 61.1% of patients with DUD and 80% of patients with GUD had pathological deviations on the scale of vegetative disorders of the questionnaire, which can be used to differentiate the features of normal functioning of the ANS and its painful changes requiring treatment. Pathological changes on all three scales were most pronounced in patients with GUD.

Discussion. The ANS status in patients with UD differs significantly from that in healthy individuals. In the period of exacerbation of UD and in individuals with a short history of the disease, there is an increase in the tone of the sympathetic nervous system with normal or hypersympathetic reactivity, which is a prognostically favorable sign and reflects the sufficient activity of the adaptive and compensatory mechanisms of the body. Under the influence of ANS dysfunction, ulcerative factors such as regional blood flow disorders, motor activity, and acid formation in the gastroduodenal zone arise, creating conditions for the persistence of HP.

In GUD, in addition to HP infection, there are pronounced disorders in ANS. Thus, the simpatoadrenal type of ANS is more common (65%), which according to LDF, disrupts the microcirculation of the mucous membrane to a greater extent. Sympatoadrenal type of ANS is more often observed in exacerbation of UD (85% in GUD, 83,3% in DUD). Acid production in patients with GUD is often insufficient (42.3%). Therefore, the factors contributing to gastric ulcer formation are, to a greater extent, the sympathoadrenal type of vegetative regulation and hypersympathetic vegetative reactivity, which worsen the processes of microcirculation and lead to gastric hypothermia, which creates conditions for acid-peptic damage to the mucous membrane and HP infection. Increased gastric juice acidity with the greatest changes was found in vagotonic patients (91.6% in patients with DUD, 80% in patients with GUD).





In DUD, parasympathetic ANS is more common (33.3%), especially in patients with a long history of the disease and complicated course (75%), indicating a disruption in the body's adaptive capabilities. There is a noticeable increase in acidity and stomach motility. Patients with a short history of the disease exhibit sympathicotonia without complications (with GUD 80%, DUD 83,3%). With a favorable course of the disease, the sympathetic imbalance quickly became eutonic, and the ulcers quickly became scarring, indicating the body's adequate adaptive capabilities. HP and microcirculation disorders play an important role here.

When adaptive abilities decrease, persistent sympathicotonia and hypersympathicotonic vegetative reactivity develop, which compensately replace systemic vagotonia. When there is an excess of sympathetic influences, the efferent effects of the vagus nerve become more compensatory. Secondary vagotonia develops. Therefore, parasympathicotonia is more characteristic of patients with a more severe ulcerative history with a more complicated course of the disease (in patients with GUD 53.3%, DUD 75%).

Therefore, vegetative imbalance and a decrease in the body's adaptive reserves play a significant role in the development of peptic ulcer disease. Chronic and acute stresses, as causes of decreased adaptation, contribute to the disruption of vegetative tone. Vegetative tone disorders in combination with microcirculation disorders, HP infection, motor disorders and digestive secretion reduce the effectiveness of protective factors and contribute to ulceration. HP infection appears to act as a local factor affecting the mucous membrane and activating aggression factors. The research results showed that any type of vegetative imbalance can affect the course of UD. The diversity of vegetative reactions indicates the pathogenetic role of ANS in UD, which determines a differentiated pathogenetic approach to the treatment of UD, including the correction of vegetative disorders.

Conclusions. The conducted research allows us to conclude that GUD and DUD are different nosological forms. Vegetative imbalance is a risk factor for peptic ulcer disease. Comprehensive assessment of vegetative status, detection of Helicobacter

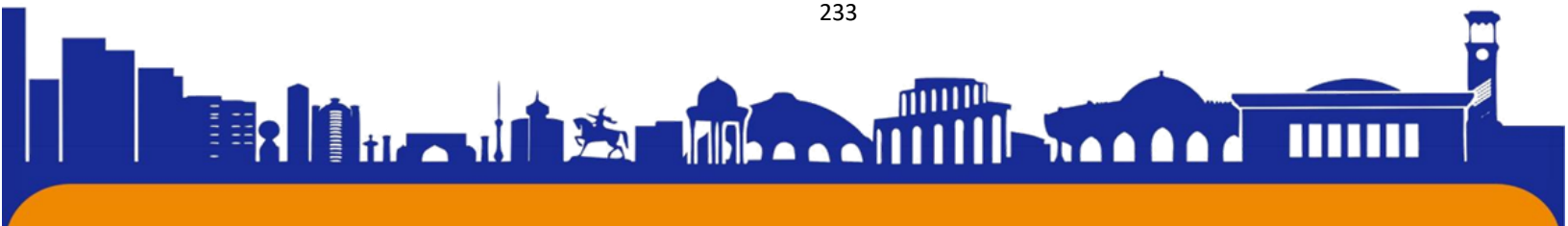




pylori, PH-metry, LDF, detection of neurotic states allows for adequate assessment of UD symptoms and correction of treatment taking into account ANS tone disorders.

References:

1. B.Kadirov, F. Xamrabayeva. Helicobacter pylori and peptic ulcer disease, as well as views on eradication therapy//New day in medicine. – 2022. – V 1, No. 39. – P. 195–200.
2. KB Saidovich. Autonomic dystonia syndrome as one of the etiofactors in the development of peptic ulcer// Journal of Universal Science Research. - 2023 Volume 1, No.12. – P.810-818.
3. KB Saidovich. The State of the Autonomic Nervous System in Patients Suffering From Peptic Ulcer Autonomic Dystonia// International journal of health systems and medical sciences. - 2023. – Vol. 2 No. 5. – P289-292.
4. Khamrabaeva Feruza Ibragimovna, Kadirov Bekhruzбек Saidovich. Вегетативные расстройства и её роль в развитии язвенной болезни желудка и двенадцатиперстной кишки//Проблемы биологии и медицины. – 2021. No. 3 (136). P – 239-243.
5. Abdullayev RB, Makhmudova LI Features of Chemical Elements in Various Forms of Irritable Bowel Syndrome // Annals of RSCB, ISSN:1583-6258, Vol. 25, Issue 2, 2021, Pages. 2993 - 3000.
6. Makhmudova LI, Akhmedova N.Sh., Ergashov BB Clinical manifestation of irritable bowel syndrome. Art of medicine. International medical scientific journal. Vol. 1, Issue 2. 2021:24-33.
7. KB Saidovich. Probiotics and their role in inflammatory diseases of the intestinal tract//Thematics Journal of Microbiology. – 2023. -V 7, No 1.
8. KB Saidovich. Clinical features of autonomic disorders in gastric and duodenal ulcers//Barqarorlik va yetakchi tadqiqotlar.- 2023. V 3, No 12. – P. 352-357.
9. KB Saidovich. State of the psychoemotional sphere in patients with peptic ulcer of the stomach and duodenum// European journal of modern medicine and practice. – 2023. – V 3, No 12. – P. 248-254.





VOLUME-2, ISSUE-12

10. Волкова Т.А., Захарченко Д.И., Влияние типа вегетативного реагирования на характер гастродуоденальной патологии // Вопросы педиатрии. – Ярославль, 2015. – С. 74.
11. Григорьев П.Я., Яковенко Э.П. Клиническая гастроэнтерология // М.: МИА., 2011. – 647 с.
12. Гриневич В.Б., Успенский Ю.П., Шабанова Г.Ж. Особенности язвенной болезни, не связанной с *Helicobacter pylori* // Тер. архив. – 2012. – № 2. – С. 24-27.
13. Лазебник Л.Б., Арбузова В.Г., Соколова Г.Н. Роль стресса в этиопатогенезе язвенной болезни двенадцатиперстной кишки у больных молодого возраста // Экспериментальная и клиническая гастроэнтерология. – 2012. – № 4. – С. 30-33.
14. Мальцев С.В., Волгина С.Я. Особенности психовегетативного состояния при хроническом гастродуодените у детей старшего возраста // Педиатрия. – 2016. – № 4. – С. 38-42.
15. Менделевич В.Д. Клиническая и медицинская психология – М.: Медпресс, 2010. – 592 с.

