

MORPHOFUNCTIONAL FEATURES IN PATIENTS WITH DUODENAL ULCER UNDER THE INFLUENCE OF PHYSICAL FACTORS



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ЖИСМОНИЙ ОМИЛЛАР ТАЪСИРИДА ЎН ИККИ БАРМОҚ ИЧАК ЯРАСИ БИЛАН ОҒРИГАН БЕМОРЛАРДА МОРФОФУНКЦИОНАЛ ХУСУСИЯТЛАР

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МОРФОФУНКЦИОНАЛЬНЫЕ ОСОБЕННОСТИ У БОЛЬНЫХ ЯЗВЕННОЙ БОЛЕЗНЬЮ ДВЕНАДЦАТИПЕРСТНОЙ КИШКИ ПОД ВЛИЯНИЕМ ФИЗИЧЕСКИХ ФАКТОРОВ

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Резюме. Ушбу тадқиқотда ўн икки бармоқли ичак яра касаллиги билан оғриган беморларда, хусусан, *Helicobacter pylori* инфекцияси ва физиотерапия усулларини қўллаш билан боғлиқ ўн икки бармоқли ичак (ЎБИЯК) ишлқ қаватидаги морфофункционал ўзгаришлар ўрганилди. 57 нафар бемор стандарт эрадикацион терапияга қўшимча равишда физиотерапиянинг турли комбинациялари - сантиметр тўлқинли (СМВ) терапия ва транскраниал электростимуляция (ТЕС) олган гуруҳларга бўлинган. Гистологик текширувда асосий эътибор эпителий бутунлиги, ворсинкалар тузилиши, ҳужайра инфильтрацияси ва строма ўзгаришларига қаратилди. Натижалар шуни кўрсатдики, физиотерапия ишлқ қават тузилишини сезиларли даражада яхшилашга, яллиғланиш инфильтрациясини камайтиришга ва эпителий регенерациясини яхшилашга ёрдам берди. СМВ ва ТЕС-терапиянинг қўшилиши стандарт даволаш билан таққослаганда терапевтик таъсирни кучайтирди, эҳтимол, иммун яллиғланиш реакцияларининг яхшироқ модуляцияси ва *H. pylori* нинг янада самарали эрадикацияси туфайли.

Калит сўзлар: ЎБИЯК, *Helicobacter pylori*, Физиотерапия, Морфологик ўзгаришлар

Abstract. This study investigates the morphofunctional changes in the duodenal mucosa in patients with duodenal ulcers (DU), particularly in relation to *Helicobacter pylori* infection and the use of physical therapy methods. A total of 57 patients were divided into groups receiving different combinations of physical therapies—centimeter-wave (CMW) therapy and transcranial electrical stimulation (TES)—in addition to standard eradication treatment. Histological examination focused on epithelial integrity, villous architecture, cellular infiltration, and stromal changes. Results showed that physical therapies contributed to significant improvements in mucosal structure, with reduced inflammatory infiltration and improved epithelial regeneration. The addition of CMW and TES therapy enhanced the therapeutic effect compared to standard treatment alone, likely due to better modulation of immune-inflammatory responses and more effective eradication of *H. pylori*.

Keywords: Duodenal ulcer, *Helicobacter pylori*, Physical therapy, Morphological changes.

Duodenal ulcer (DU) remains a significant medical problem worldwide due to its high prevalence, chronic course, and potential for serious complications. Despite advances in pharmacological treatment, the role of physical factors in the pathogenesis and healing process of duodenal ulcers is not fully understood. Morphofunctional changes at the cellular and tissue levels in patients with DU under

the influence of various physical factors, such as temperature, mechanical stress, and electromagnetic fields, require detailed investigation. Understanding these changes is crucial for developing more effective therapeutic and rehabilitation strategies. The study of morphofunctional features under physical influences can contribute to optimizing treatment protocols, reducing healing time, and preventing recurrence,

thereby improving the quality of life of patients with duodenal ulcer.

Purpose of the study - to study the state of changes in the mucous membrane of the edges of duodenal ulcers in conjunction with infection with *Helicobacter pylori*

Material and research methods. The studies were carried out in 57 patients with intestinal dysbiosis (ID). There were 22 women, 27 men. At the age of 18-65 years. All patients were diagnosed with DC. The patients were divided into 3 groups: 23 patients who received CMW therapy for the duodenal triangle area, 19 patients who received transcranial electrical stimulation (TES) therapy, 15 patients who received CMW therapy for the duodenal triangle and TES therapy. The control group consisted of patients (20 patients) who received standard eradication therapy according to the recommendations of the Maastricht V/Florence consensus for the *Helicobacter pylori* infection treatment (2017): PPI 2 times a day for 14 days; 2 antibiotics 2 times a day for 14 days; Bismuth tripotassium dicitrate 120 mg 4 times a day; Probiotic preparation in the appropriate daily dose for 14 days;

A comprehensive assessment of the general histological structure of the mucous membrane of the edges of duodenal ulcers was carried out after endoscopic examination with the taking of material for histological examination in 51 patients with localization of the ulcer in the duodenum. Histological preparations were assessed in accordance with the modern classification of chronic gastritis by M. Dixon (2006), recommendations by L.I. Aruina (2008) and V.Yu. Golofeevsky (2004).

Microscopy of histological preparations focused on the state of the epithelium and the height of the villi and crypts (enterocytes, goblet cells), the presence of dystrophy, atrophy and foci of gastric metaplasia, and assessed the condition of the Brunner glands.

In addition, the condition of the stroma (severity of neutrophilic, eosinophilic, lymphocytic and plasmacytic infiltration) was assessed qualitatively and semi-quantitatively (in 10 fields of view), which, as is known, is directly involved in the immune regulation of the processes of regeneration and differentiation of epitheliocytes, implements the mechanisms of immune defense, involved in the formation of acute and chronic inflammation.

Research results: In patients with peptic ulcer localized in the duodenal bulb, the main morphological features were pronounced dystrophy of villi enterocytes, a decrease in the number of goblet cells in the villi and crypts, a decrease in the height of the villi, as well as areas of gastric villus metaplasia.

In patients, a certain relationship of morphological changes with the fact of infection with *Helicobacter pylori* was also noticed. Thus, moderate and severe dystrophy was observed much more often in the presence of infection with *Helicobacter pylori* (44.7% of cases). In the absence of *Helicobacter pylori* infection, epithelial dystrophy was observed only in 8 patients, while the severity of dystrophic changes was minimal. However, the differences between the frequency of villous dystrophy and atrophy at the edges of duodenal bulb ulcers in the compared groups of patients were not significant.

Therefore, the known facts have been confirmed that dystrophy and atrophy in the mucous membrane of the duodenal bulb are regular morphological elements of duodenal ulcers, and even more so in its edges. Apparently, therefore, no fundamental connection between these changes and infection with *Helicobacter pylori* was found. Gastric metaplasia of villi enterocytes was detected in a total of 38 of 59 patients, but the frequency of detected infection with *Helicobacter pylori* had only a non-significant tendency to be higher than in patients without gastric metaplasia. Therefore, one should agree with the point of view that gastric metaplasia can be a compensatory morphological factor in conditions of inflammation and dystrophy of the bulbar mucosa in patients with duodenal ulcers.

In this regard, the results of the assessment of the stroma of the mucous membrane of the edges of ulcers of the duodenal bulb and morphometry are of the greatest interest. inflammatory infiltrate in the examined patients before treatment and after treatment (table 1).

From the tables and figures, it is obvious that against the background of the ongoing eradication therapy according to any schemes, a clear improvement in morphometric parameters characterizing the inflammatory process in the edges of ulcerative defects of the duodenal bulb was noted.

Table 1. Morphometric characteristics of the stroma of the mucous membrane of the edges ulcers of the duodenal bulb after treatment

	1 group n=20	2 group n=23	3 group n=19	4 group n=15
Neutrophil infiltration	212±62	177±5*	115±15**	110±18**
Lymphocytic infiltration	800±92**	904±69*	225±25**	189±92**
Plasma cell infiltration	2266±250	1922*237	1898±405	1723±214*

Note: * - $p < 0,05$; ** - $p < 0,001$.

At the same time, the most pronounced changes were related to a decrease in the density of neutrophilic and lymphocytic infiltration in almost all groups of patients.

At the same time, the data obtained allow us to state that the inclusion of physical factors in the treatment regimens leads to a more pronounced positive change in the cellular composition of the duodenal mucosa. Thus, the density of neutrophilic (from 401 ± 89 - 326 ± 89 to 115 ± 15 - 110 ± 18 , respectively, in the 3rd and 4th groups, $p < 0.001$) and lymphocytic (from 3025 ± 412 - 2689 ± 501 to 225 ± 25 - 189 ± 92 , respectively, in the 3rd and 4th groups, $p < 0.001$) of infiltration, which in turn may indicate a decrease in the activity of inflammatory and immunoinflammatory processes. In addition, it was noted that the inclusion of TES in eradication therapy significantly ($p < 0.05$) reduces the density of plasmacytic infiltration in the 4th group of patients (from 4123 ± 304 to 1723 ± 214).

The density of inflammatory infiltration is closely related to such morphological changes as microcirculation disorders (vasodilation, sludge, leukopenesis and erythrocytopenesis) and mucosal stromal edema. It is characteristic that in the 3rd and 4th groups these changes were almost completely stopped during the control histological examination.

Thus, the therapy regimens with the inclusion of physical factors, namely, CMW-therapy on the area of the duodenal triangle and TES therapy, in terms of their morphological effectiveness, significantly exceeded the similar direction of the effects of standard eradication therapy regimens. It is possible that the higher efficiency of schemes with the inclusion of physiotherapy is associated with a more positive dynamics of these schemes in relation to the elimination of *Helicobacter pylori* infection.

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МОРФОФУНКЦИОНАЛЬНЫЕ ОСОБЕННОСТИ У БОЛЬНЫХ ЯЗВЕННОЙ БОЛЕЗНЬЮ ДВЕНАДЦАТИПЕРСТНОЙ КИШКИ ПОД ВЛИЯНИЕМ ФИЗИЧЕСКИХ ФАКТОРОВ

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Резюме. В настоящем исследовании изучены морфофункциональные изменения слизистой оболочки двенадцатиперстной кишки (ДПК) у пациентов с язвенной болезнью двенадцатиперстной кишки (ЯБДПК), в частности, в связи с инфекцией *Helicobacter pylori* и применением методов физиотерапии. 57 пациентов были разделены на группы, получавшие различные комбинации физиотерапии — сантиметрово-волновую (СМВ) терапию и транскраниальную электростимуляцию (ТЭС) — в дополнение к стандартной эрадикационной терапии. Гистологическое исследование фокусировалось на целостности эпителия, структуре ворсинок, клеточной инфильтрации и изменениях стромы. Результаты показали, что физиотерапия способствовала значительному улучшению структуры слизистой оболочки, уменьшению воспалительной инфильтрации и улучшению регенерации эпителия. Добавление СМВ и ТЭС-терапии усиливало терапевтический эффект по сравнению со стандартным лечением, вероятно, за счет лучшей модуляции иммунновоспалительных реакций и более эффективной эрадикации *H. pylori*.

Ключевые слова: ЯБДПК, *Helicobacter pylori*, Физиотерапия, Морфологические изменения.