

UDC [616.3-008.1-009.7+616.34-008.7+613/614]-053.2
<https://doi.org/10.56871/CmN-W.2026.71.16.006>

Quality of life of children with functional abdominal pain disorders: a cross-sectional study

Nurali Z. Zokirov^{1, 2, 3}, Elmira I. Alieva^{1, 2, 3}, Arseniy V. Krasnov^{3, 4},
 Anatoly I. Khavkin^{5, 6}, Valentin V. Sytkov^{1, 7}

¹ Federal Scientific and Clinical Center for Children and Adolescents of the Federal Medical and Biological Agency of Russia, 20 Moskvorechye str., Moscow, 115409, Russian Federation

² State Scientific Center of the Russian Federation — A.I. Burnazyan Federal Medical Biophysical Center, 46 Bldg. 8, Zhivopisnaya str., Moscow, 123098, Russian Federation

³ Academy of Postgraduate Education of the Federal Scientific and Clinical Center of the Federal Medical and Biological Agency of Russia, 91 Volokolamskoe shosse, Moscow, 125371, Russian Federation

⁴ Dolgoprudny Central City Hospital, 2 Pavlova str., Dolgoprudny, Moscow Region, 141700, Russian Federation

⁵ Research Clinical Institute of Childhood, Ministry of Health of the Moscow Region, 62 Bolshaya Serpukhovskaya str., Moscow, 115093, Russian Federation

⁶ Belgorod State National Research University, 85 Pobeda str., Belgorod, 308015, Russian Federation

⁷ Russian University of Medicine, 4 Dolgorukovskaya str., Moscow, 127006, Russian Federation

For citation: Zokirov N.Z., Alieva E.I., Krasnov A.V., Khavkin A.I., Sytkov V.V. Quality of life of children with functional abdominal pain disorders: a cross-sectional study. *Children's Medicine of the North-West*. 2026;14(1):74–86. (In Russ.).
<https://doi.org/10.56871/CmN-W.2026.71.16.006>.

Received: 11.12.2025

Revised: 20.01.2026

Accepted: 20.03.2026

ABSTRACT. Introduction. Functional abdominal pain disorders are widespread in pediatric practice and have a significant impact on the quality of life of patients. **Aim** — to evaluate the quality of life of children aged 8–17 years with functional abdominal pain disorders compared to healthy peers. **Materials and methods.** A one-stage study was conducted with the participation of 193 children with functional abdominal pain disorders (functional dyspepsia, irritable bowel syndrome, functional abdominal pain, biliary dysfunction) aged 8–17 years and 183 healthy children (control group). The quality of life was assessed using the Russian version of the PedsQL 4.0 questionnaire. Nonparametric methods and a generalized linear model adjusted for age and gender were used for statistical analysis. **Results.** Children with functional abdominal pain disorders demonstrated a significantly lower overall quality of life compared to healthy peers (69.6 vs. 85.9; $p < 0.001$). A decrease in scores was observed in all quality of life domains: physical activity (71.9 vs. 87.5 in the control group) and psychosocial functioning (68.3 vs. 83.3) were significantly lower in the functional abdominal pain disorders group. The school functioning scale was the most significantly affected (65.0 vs. 80.0; $p < 0.001$). In the functional abdominal pain disorders group, lower quality of life scores were associated with female gender and adolescence (13–17 years). A generalized linear model confirmed that the presence of functional abdominal pain disorders was the most powerful independent predictor of lower quality of life. Healthy children had higher quality of life by 12.34 points ($B=12.34$, $p < 0.001$), after adjusting for gender and age. **Conclusion.** The presence of functional abdominal pain disorders is associated with a significant decrease in the quality of life in children. Adolescents and girls with functional abdominal pain disorders represent the most vulnerable groups. Comprehensive management of such patients should be aimed not only at relieving pain, but also at improving the quality of life.

KEYWORDS: functional gastrointestinal disorders, abdominal pain, functional dyspepsia, irritable bowel syndrome, biliary dysfunction, functional abdominal pain, quality of life, PedsQL

Funding. This study was not supported by any external sources of funding.

✉ Anatoly I. Khavkin. E-mail: khavkin@nikid.ru

© 2026 by the authors

Оригинальная статья

<https://doi.org/10.56871/CmN-W.2026.71.16.006>

Качество жизни детей с функциональными расстройствами органов пищеварения с абдоминальной болью: одномоментное исследование

Нурали Зоирович Зокиров^{1, 2, 3}, Эльмира Ибрагимовна Алиева^{1, 2, 3},
Арсений Викторович Краснов^{3, 4}, Анатолий Ильич Хавкин^{5, 6},
Валентин Вячеславович Сытьков^{1, 7}

¹ Федеральный научно-клинический центр детей и подростков Федерального медико-биологического агентства России, 115409, г. Москва, ул. Москворечье, д. 20, Российская Федерация

² Государственный научный центр Российской Федерации — Федеральный медицинский биофизический центр имени А.И. Бурназяна, 123098, г. Москва, ул. Живописная, д. 46, стр. 8, Российская Федерация

³ Академия постдипломного образования Федерального научно-клинического центра детей и подростков Федерального медико-биологического агентства России, 125371, г. Москва, Волоколамское шоссе, д. 91, Российская Федерация

⁴ Долгопрудненская центральная городская больница, 141700, г. Долгопрудный, Московская область, ул. Павлова, д. 2, Российская Федерация

⁵ Научно-исследовательский клинический институт детства Министерства здравоохранения Московской области, 115093, г. Москва, ул. Большая Серпуховская, д. 62, Российская Федерация

⁶ Белгородский государственный национальный исследовательский университет, 308015, г. Белгород, ул. Победы, д. 85, Российская Федерация

⁷ Российский университет медицины, 127006, г. Москва, ул. Долгоруковская, д. 4, Российская Федерация

Для цитирования: Зокиров Н.З., Алиева Э.И., Краснов А.В., Хавкин А.И., Сытьков В.В. Качество жизни детей с функциональными расстройствами органов пищеварения с абдоминальной болью: одномоментное исследование. *Children's Medicine of the North-West*. 2026;14(1):74–86. <https://doi.org/10.56871/CmN-W.2026.71.16.006>.

Поступила: 11.12.2025

Одобрена: 20.01.2026

Принята к печати: 20.03.2026

РЕЗЮМЕ. Введение. Функциональные расстройства органов пищеварения с абдоминальной болью широко распространены в педиатрической практике и оказывают значительное влияние на качество жизни пациентов. **Цель** — оценить качество жизни детей в возрасте 8–17 лет с функциональными расстройствами органов пищеварения с абдоминальной болью по сравнению со здоровыми сверстниками. **Материалы и методы.** Проведено одномоментное исследование с участием 193 детей с функциональными расстройствами органов пищеварения с абдоминальной болью (функциональная диспепсия, синдром раздраженного кишечника, функциональная абдоминальная боль, билиарная дисфункция) в возрасте 8–17 лет и 183 здоровых детей (контрольная группа). Качество жизни оценивалось с помощью русскоязычной версии опросника PedsQL 4.0. Для статистического анализа использовались непараметрические методы и обобщенная линейная модель с поправкой на возраст и пол. **Результаты.** Дети с функциональными расстройствами органов пищеварения с абдоминальной болью продемонстрировали значительно более низкое общее качество жизни по сравнению со здоровыми сверстниками (69,6 против 85,9; $p < 0,001$). Снижение показателей отмечено по всем доменам качества жизни: физическая активность (71,9 против 87,5 у контроля) и психосоциальное функционирование (68,3 против 83,3) были достоверно ниже в группе

✉ Анатолий Ильич Хавкин. E-mail: khavkin@nikid.ru

© Коллектив авторов, 2026

функциональных расстройств органов пищеварения с абдоминальной болью. Наиболее существенно страдала шкала школьного функционирования (65,0 против 80,0; $p < 0,001$). В группе функциональных расстройств органов пищеварения с абдоминальной болью более низкие показатели качества жизни были ассоциированы с женским полом и подростковым возрастом (13–17 лет). Обобщенная линейная модель подтвердила, что наличие функциональных расстройств органов пищеварения с абдоминальной болью является наиболее мощным независимым предиктором снижения качества жизни. У здоровых детей общий балл был на 12,34 пункта выше ($B=12,34$, $p < 0,001$) после коррекции на пол и возраст. **Заключение.** Функциональные расстройства органов пищеварения с абдоминальной болью ассоциированы со значительным снижением качества жизни у детей. Подростки и девочки с функциональными расстройствами органов пищеварения с абдоминальной болью представляют наиболее уязвимые группы. Комплексное ведение таких пациентов должно быть направлено не только на купирование боли, но и на улучшение качества жизни.

КЛЮЧЕВЫЕ СЛОВА: функциональные расстройства органов пищеварения, боль в животе, функциональная диспепсия, синдром раздраженного кишечника, билиарная дисфункция, функциональная абдоминальная боль, качество жизни, PedsQL

Источник финансирования. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

INTRODUCTION

In modern medicine, when conducting clinical trials designed to compare the effectiveness of different therapeutic approaches, particular attention is paid to a comprehensive assessment of treatment outcomes. Alongside traditional biomedical indicators, such as laboratory data and instrumental studies, the assessment of a patient's quality of life (QL) is becoming increasingly important. This indicator can serve both as a supplementary assessment tool and as a key criterion in analyzing the effectiveness of various treatment and monitoring regimens at different stages of clinical trials [1].

Special questionnaires have been developed for a comprehensive assessment of QL in children and adults with various diseases. An important advantage of these questionnaires is that they are universal and not tied to specific diseases, which allows for comparing results across different patient groups [2].

In pediatric practice, two versions of the questionnaire are often used. The first version is completed by the child, and the second by the parents. It is important to note that there is a significant discrepancy between the data provided by parents and the information provided by the children themselves. This discrepancy is due to a number of factors: differences in perception of the situation, varying levels of understanding of the phenomena being described, or insufficient awareness on the part of one of the respondents. Given the above, it is recommended to consider children's self-reports as more reliable [3, 4].

The most widely used QL questionnaire in pediatrics is the Pediatric Quality of Life Inventory 4.0 (PedsQL 4.0). The questionnaire was developed in 1998, and its adaptation for the Russian-speaking population was completed in 2005. It consists of 23 questions divided into four sections: physical functioning, emotional well-being, social functioning, and role or school functioning. Scores are transformed to a 0–100 scale, with higher scores indicating better quality of life. [4, 5].

The PedsQL 4.0 questionnaire has demonstrated high effectiveness as a tool for the comprehensive assessment of QL in children with inflammatory bowel disease. This questionnaire provides valuable information on the health status of children with Crohn's disease and ulcerative colitis, including their physical, psychological, and emotional well-being, and is recommended for use in

follow-up care and monitoring of disease activity [6–8].

In recent years, specialized programs have also been developed in Russia to monitor the condition of patients with GIT disorders, incorporating quality-of-life questionnaires [9].

Functional gastrointestinal disorders with abdominal pain (FGID-AB) in children significantly affect their quality of life. One study assessed the quality of life of children with FGID-AB using the PedsQL 4.0 questionnaire. The sample included patients with FGID-AB, organic GIT diseases, and healthy children. The results showed that children with FGID-AB had lower scores on all aspects of quality of life compared to healthy children and children with organic GIT diseases [10].

However, a review of the literature has revealed a number of significant gaps. First, although there are studies demonstrating a decline in quality of life among children with FGID-AB, data collected in outpatient settings that reflect Russian clinical practice remain limited. Second, a significant portion of the studies rely on the Rome criteria and, as a rule, do not consider patients with biliary dysfunction (BD), which frequently appears in Russian pediatric gastroenterology as a clinically significant diagnosis. Third, quality of life assessment is often conducted using specialized but more extensive questionnaires (KIDSCREEN, CHQ, KINDL), the use of which increases the burden on the respondent and makes them difficult to use for rapid assessment in the practice of a community pediatrician. Thus, there remains a lack of data obtained using a brief, universal tool for assessing quality of life in children with FGID-AB, covering the entire spectrum of nosological forms as defined in Russian guidelines.

This study assessed the quality of life of children aged 8–17 years with FGID-AB, including patients with BD, using the PedsQL 4.0 questionnaire (child self-report). The analysis covered key health-related quality-of-life components (physical, emotional, social, and school functioning), as well as summary measures. The results obtained can be used to optimize the referral process and follow-up of children with FGID-AB in outpatient settings.

AIM

To assess the quality of life of children aged 8 to 17 with functional gastrointestinal disorders and abdominal pain.

MATERIALS AND METHODS

Study design

A cross-sectional study was conducted to assess the quality of life of children aged 8 to 17 years with functional gastrointestinal disorders and abdominal pain, using the PedsQL 4.0 questionnaire.

Study setting

Our study included children aged 8 to 17 who were treated at the pediatric clinic of the Dolgoprudny Central City Hospital (DCCCH), a municipal healthcare institution in Dolgoprudny. The study began on February 18, 2025, and was completed on May 31, 2025.

Participants

The study included two groups of children aged 8 to 17 years: children with functional gastrointestinal disorders presenting with abdominal pain (the observation group) and healthy children (the control group). The observation group included children diagnosed with one of the following functional gastrointestinal disorders: functional dyspepsia, irritable bowel syndrome, functional abdominal pain, or biliary dysfunction, diagnosed in accordance with the recommendations of the Russian Society of Pediatric Gastroenterologists, Hepatologists, and Nutritionists [11–14]. The inclusion criterion for the study was the absence of organic gastrointestinal diseases and other chronic conditions that could affect quality of life. The control group consisted of essentially healthy children without any chronic diseases. A sample was selected from among all children in both groups.

Variables

The primary dependent variable is quality of life, which was assessed using the Russian-language version of the PedsQL 4.0 questionnaire, which includes an overall score and a score for each domain (physical, emotional, social, and school functioning). The independent variables include the following: the presence of a functional gastrointestinal disorder accompanied by abdominal pain, and the child's age and gender.

Data sources

Quality of life was assessed using standardized PedsQL 4.0 questionnaires designed for children aged 8 to 12 and 13 to 17. Based on these questionnaires, two electronic versions were developed and posted on the Yandex Forms platform. We contacted the children's legal guardians by phone and invited them to participate in the study. Upon receiving consent from the child's guardian, a link to the corresponding questionnaire was sent to them via messenger or email.

The observation group was created from a database of outpatient records that we compiled in a previous study [15].

The control group consisted of children who had undergone routine medical examinations and were classified as health groups I or II.

Systematic mistakes

For several reasons, the electronic medical records of the children who participated in the study may have lacked information regarding organic gastrointestinal disorders or any other chronic conditions. First, some of them may have received medical care at private clinics, regional referral centers, or other healthcare facilities. Second, some study participants may have recently been assigned to a pediatric clinic, and data on their medical conditions had not yet been entered into their electronic medical records. To avoid such errors, before sending the link to the questionnaire, we confirmed with the legal guardian during a phone call that the child did not have any chronic diseases.

Scope of the study

A preliminary calculation of the sample size for the observation group was performed using the classical formula, taking into account the prevalence of FGID-AB obtained in our study [15]:

$$n = t^2 \cdot P \cdot Q / \Delta^2,$$

where $P = 0.136$ (the prevalence of FGID-AB obtained in our previous study), $Q = 1 - P$, $t = 1.96$, $\Delta = 0.05$. The minimum required number of children with FGID-AB ($n=180$) was increased to 220 to account for possible refusals and incomplete questionnaires. A similar number of children ($n=220$) was selected for the control group.

Statistical methods

Statistical analysis was performed using IBM SPSS Statistics 26.0 (IBM Corp., USA) and Microsoft Excel 2021. Quantitative indicators are presented as the median (Me) and interquartile range (Q_1 – Q_3), since the data distribution deviated from the normal distribution (verified using the Shapiro–Wilk test). The Mann–Whitney U test was used for pairwise comparisons of two independent groups. Statistical significance of differences was determined at a significance level of $p < 0.05$.

To assess the independent contribution of factors to the overall quality-of-life score, we used a generalized linear model (GLM) for a continuous dependent variable, which was the total PedsQL 4.0 score. The model included the presence of FGID-AB (healthy vs. children with FGID-AB), gender (girls vs. boys), and age group (8–12 vs. 13–17 years). Comparison categories were defined using reference values (boys, FGID-AB, 13–17 years). The regression coefficient B reflected the difference in the expected mean total QL score (in PedsQL points) between the compared categories while holding the other covariates constant; 95% confidence intervals and p-values were calculated using standard model methods. The level of statistical significance was set at 0.05.

RESULTS

Participants

The sample was selected in stages. In the first stage, 220 children with FGID-AB and 220 apparently healthy children for the control group, who met the selection criteria, were selected from the population of children aged 8 to 17. The parents of the children participating in the study received verbal information over the phone about the study's objectives, confidentiality, and anonymity, after which they gave verbal informed consent for their child's participation in the survey. After consent to participate in the study was obtained, parents were sent a link to a questionnaire on Yandex Forms, which the child was required to complete themselves.

Of the 440 invited participants (220 children with FGID-AB and 220 healthy children), 376 completed the questionnaire in full – 193 children with FGID-AB and 183 healthy children, who constituted the control group. The dropout rate was 14.5% (27 children with FGID-AB and 37 healthy children), which was due to subsequent withdrawal from the study.

The median age of the children in the observation group was $Me=12.00$ [10.0–13.0] years, and in the control group, $Me=13.00$ [10.0–14.0] years. The groups were comparable in terms of age ($U=18039.5$; $p=0.717$). The gender distribution was

Table 1. Comparison of quality of life scores between children with functional abdominal pain disorders and healthy controls

Таблица 1. Сравнение показателей качества жизни детей с функциональными расстройствами органов пищеварения с абдоминальной болью и здоровых

Показатель качества жизни Quality of life indicator	Дети с ФРОП-АБ Children with FAPD Me [Q_1 – Q_3]	Здоровые дети Healthy children Me [Q_1 – Q_3]	U	p
Общий балл качества жизни Overall quality of life score	69,6 [62,0–79,3]	85,9 [73,4–90,2]	8016,5	<0,001
Физическое функционирование Physical functioning	71,9 [62,5–81,3]	87,5 [76,6–93,8]	7990,0	<0,001
Психосоциальное функционирование Psychosocial functioning	68,3 [58,3–78,3]	83,3 [70,8–90,0]	8826,0	<0,001
Эмоциональное функционирование Emotional functioning	70,0 [55,0–80,0]	80,0 [65,0–90,0]	12076,5	<0,001
Социальное функционирование Social functioning	75,0 [65,0–85,0]	85,0 [77,5–95,0]	8707,0	<0,001
Школьное функционирование School functioning	65,0 [50,0–75,0]	80,0 [70,0–85,0]	7746,5	<0,001

The table is prepared by the authors using their own data

Таблица составлена авторами по собственным данным

Note: FAPD – functional abdominal pain disorders (here and further in tables).

Примечание: ФРОП-АБ – функциональное расстройство органов пищеварения с абдоминальной болью (здесь и далее в таблицах).

as follows: in the observation group, there were 109 girls (56.5%) and 84 boys (43.5%), and in the control group, there were 96 girls (52.5%) and 87 boys

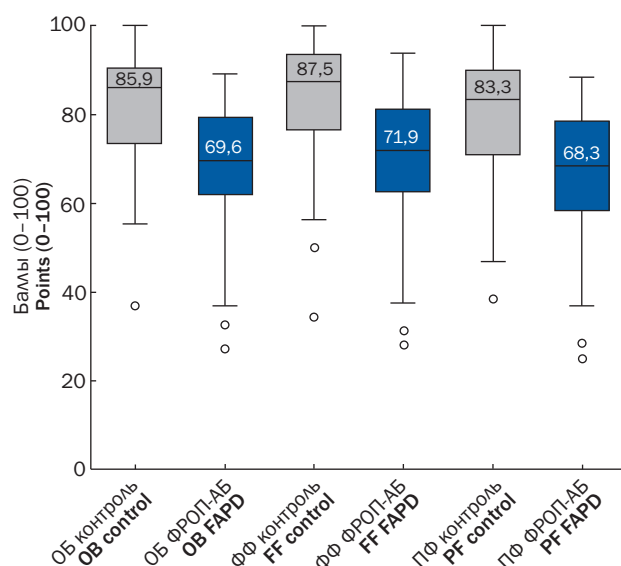


Fig. 1. Comparison of the main indicators of the quality of life of children with functional abdominal pain disorders (FAPD) and healthy children: OB — overall quality of life score; PF — psychosocial functioning; FF — physical functioning (the figure is prepared by the authors)

Рис. 1. Сравнение основных показателей качества жизни детей с функциональными расстройствами органов пищеварения с абдоминальной болью (ФРОП-АБ) и здоровых: ОБ — общий балл качества жизни; ПФ — психосоциальное функционирование; ФФ — физическое функционирование (рисунок подготовлен авторами)

(47.5%). The groups were comparable in terms of gender ($\chi^2=0.46$; $p=0.498$).

The study group consisted of 67 children (34.7%) with functional dyspepsia, 30 children (15.5%) with irritable bowel syndrome, 31 children (16.1%) with functional abdominal pain, and 65 children (33.7%) with biliary dysfunction.

Children with FGID-AB had lower quality-of-life scores on all scales of the PedsQL questionnaire compared with healthy children (Mann-Whitney U test; $p < 0.001$ for all comparisons).

The median values of quality-of-life scores are presented in Table 1 and Figure 1. The most pronounced differences were observed on the “School Functioning” and “Physical Functioning” scales.

When comparing quality-of-life indicators among children with FGID-AB (the main group) by gender, statistically significant differences were found on several scales. The median total QL score for boys was higher than for girls — 75.0 [65.2–81.2] versus 67.4 [58.7–78.8] ($U=5597.5$; $p=0.008$).

The most pronounced differences were observed on the physical functioning scale — 78.1 [66.4–84.4] for boys versus 68.8 [59.4–79.7] for girls ($U=5979.0$; $p < 0.001$). Differences in indicators of psychosocial, emotional, social and school functioning did not reach statistical significance ($p > 0.05$).

Thus, boys with FGID-AB have a higher quality of life, primarily due to the physical component (Table 2).

Table 2. Comparison of quality of life scores between children with functional abdominal pain disorders, depending on their gender

Таблица 2. Сравнение показателей качества жизни детей с функциональными расстройствами органов пищеварения с абдоминальной болью в зависимости от пола

Показатель качества жизни Quality of life indicator	Девочки Girls Me [Q ₁ –Q ₃]	Мальчики Boys Me [Q ₁ –Q ₃]	U	p
Общий балл качества жизни Overall quality of life score	67,4 [58,7–78,8]	75,0 [65,2–81,2]	5597,5	0,008
Физическое функционирование Physical functioning	68,8 [59,4–79,7]	78,1 [66,4–84,4]	5979,0	<0,001
Психосоциальное функционирование Psychosocial functioning	66,7 [55,0–78,3]	73,3 [61,7–78,3]	5258,5	0,077
Эмоциональное функционирование Emotional functioning	65,0 [50,0–80,0]	75,0 [60,0–83,8]	5242,0	0,083
Социальное функционирование Social functioning	75,0 [65,0–82,5]	75,0 [70,0–85,0]	5183,0	0,113
Школьное функционирование School functioning	60,0 [50,0–75,0]	65,0 [55,0–75,0]	5111,0	0,164

The table is prepared by the authors using their own data
Таблица составлена авторами по собственным данным

When comparing quality of life indicators among children with FGID-AB by age group, statistically significant differences were found across all scales of the PedsQL questionnaire. The median total quality of life scores for younger schoolchildren were higher than those for adolescents – 76.1 [66.9–82.6] versus 65.2 [56.8–75.0] ($p < 0.001$). A similar trend was observed for physical, psychosocial, emotional, social, and school functioning (Table 3).

Thus, younger schoolchildren with FGID-AB have a higher quality of life than adolescents, reflecting the age-related intensification of the influence of

psychoemotional factors, academic workload, and social stress.

A generalized linear model was constructed to assess the independent contributions of FGID-AB status, gender, and age to quality of life. The following were selected as reference categories: FGID-AB status, male gender, and the older age group (13–17 years). The model showed that membership in the FGID-AB group was associated with the most pronounced differences in quality of life scores after adjusting for gender and age. Thus, in healthy children, the total quality of life score was

Table 3. Comparison of quality of life scores between children with functional abdominal pain disorders, depending on their age group

Таблица 3. Сравнение показателей качества жизни детей с функциональными расстройствами органов пищеварения с абдоминальной болью в зависимости от возрастной группы

Показатель качества жизни Quality of life indicator	Дети 8–12 лет Children 8–12 years old Me [Q ₁ –Q ₃]	Дети 13–17 лет Children 13–17 years old Me [Q ₁ –Q ₃]	U	p
Общий балл качества жизни Overall quality of life score	76,1 [66,9–82,6]	65,3 [56,8–75,0]	2802,0	<0,001
Физическое функционирование Physical functioning	78,1 [68,8–87,5]	65,6 [59,4–77,3]	2534,5	<0,001
Психосоциальное функционирование Psychosocial functioning	75,0 [63,3–81,7]	63,3 [52,1–75,0]	2945,5	<0,001
Эмоциональное функционирование Emotional functioning	75,0 [65,0–85,0]	65,0 [45,0–75,0]	2817,5	<0,001
Социальное функционирование Social functioning	75,0 [70,0–85,0]	70,0 [65,0–80,0]	3790,0	0,026
Школьное функционирование School functioning	70,0 [55,0–75,0]	60,0 [45,0–70,0]	2881,0	<0,001

The table is prepared by the authors using their own data
Таблица составлена авторами по собственным данным

Table 4. Factors associated with the overall quality of life score: results of the generalized linear model

Таблица 4. Влияние различных факторов на общий балл качества жизни по данным обобщенной линейной модели

Фактор Factor	Категория сравнения Comparison category	B	95% ДИ 95% CI	p
ФРОП-АБ FAPD	Здоровые (референс: ФРОП-АБ) Healthy (reference: FAPD)	+12,34	10,07–14,61	<0,001
Возрастная группа Age group	8–12 лет (референс: 13–17 лет) 8–12 years (reference: 13–17 years)	+8,22	5,96–10,49	<0,001
Пол Sex	Девочки (референс: мальчики) Girls (reference: boys)	–3,69	–5,97...–1,41)	0,001
Константа Constant	–	67,16	64,78–69,54	<0,001

The table is prepared by the authors using their own data
Таблица составлена авторами по собственным данным

Note: CI — confidence interval; FAPD — functional abdominal pain disorders; B — regression coefficient showing the change in the quality of life score, a positive B value indicates a higher quality of life in the first comparison group.

Примечание: ДИ — доверительный интервал; ФРОП-АБ — функциональное расстройство органов пищеварения с абдоминальной болью; B — коэффициент регрессии, показывающий изменение балла качества жизни, положительное значение B указывает на более высокое качество жизни в первой группе сравнения.

12.34 points higher than in patients with FGID-AB ($B=12.336$; 95% CI 10.068–14.605; $p<0.001$).

Age also had a significant independent effect: among younger schoolchildren (8–12 years), quality of life was 8.22 points higher than among adolescents (13–17 years) ($B=8.224$; 95% CI 5.957–10.491; $p<0.001$).

The child's gender had a statistically significant but less pronounced effect: girls had a quality of life score that was 3.69 points lower than that of boys ($B=-3.691$; 95% CI $-5.968\ldots-1.414$; $p=0.001$).

Thus, the generalized linear model showed that differences in the total quality of life score between the groups of healthy children and patients with FGID-AB persist after adjusting for age and gender (Table 4).

DISCUSSION

Key findings

The results of our cross-sectional study demonstrate that the presence of FGID-AB is an independent factor associated with a significant reduction in QL among children aged 8–17 years. The most pronounced differences compared to the group of healthy peers were observed in the areas of academic and psychosocial functioning. Within the group of children with FGID-AB, lower QL scores were found among girls and adolescents.

LIMITATIONS

The main limitation of this study is its cross-sectional design, which does not allow for conclusions regarding causal relationships between the presence of functional gastrointestinal disorders with abdominal pain (FGID-AB) and reduced QL.

Furthermore, the assessment was based on children's self-reports, which could potentially lead to subjective distortions in the perception of symptoms and overall condition. Nevertheless, the use of the standardized and validated PedsQL instrument, adapted for the pediatric population, ensures sufficient reliability and reproducibility of the data obtained.

Another limitation is that the survey was conducted during a period of seasonal increase in the incidence of acute respiratory infections, which may have temporarily affected self-reported quality of life, particularly on the school functioning scale, which reflects a child's attendance and participation in the educational process.

Limitations of the study include the lack of an assessment of the current severity of clinical symptoms at the time the questionnaire was completed, as well as information on ongoing treatment (pharmacological and non-pharmacological) during the survey period. Given the possible variability of symptoms in FGID-AB, these factors could have influenced quality-of-life indicators and partially accounted for the observed differences.

Interpretation of the results

Our findings regarding a significant reduction in QL among children with FGID-AB are fully consistent with the results of major international and Russian studies. Our key observation that children with FGID-AB have significantly lower QL scores compared to healthy peers not only replicates the findings of H. Karami et al. (2022), but also confirms the data from a larger study by J.W. Varni et al. (2015), which also demonstrated that children with functional gastrointestinal disorders have lower QOL scores compared to healthy peers [10, 16].

Similar results were obtained in the Russian population: in a study by T.V. Polivanova et al. (2023), which included school-aged children, a significant decrease in QL was also noted in the presence of abdominal pain, with the children themselves reporting deterioration across a greater number of parameters compared to their parents' assessments [17]. The data obtained confirm the validity of our methodological approach, according to which priority in assessing QL is given to the children's own reports, since their perception of the illness may differ significantly from their parents' perspective.

Our study provides a detailed breakdown of this decline: the most pronounced differences were found in the areas of school and psychosocial functioning. This focus on school maladjustment complements the findings of T.V. Polivanova et al., who also identified behavioral problems and reduced family cohesion in children, and expands upon the conclusions of H. Karami et al. (2022), where the greatest differences concerned social and emotional aspects.

In contrast to the work by T.V. Polivanova et al. [17], where gender differences did not reach statistical significance, our study revealed lower QL scores among girls and adolescents with FGID-AB.

A key methodological strength of our study is the regression analysis we conducted, which confirmed that the negative impact of FGID-AB on quality of life is independent and remains significant after ad-

justing for gender and age. Thus, our study not only confirms the findings of international and domestic authors regarding reduced quality of life in children with FGID-AB but also expands upon them, demonstrating the independent contribution of the core symptoms of these disorders to reduced QL.

The significant reduction in the total quality of life score in children with FGID-AB identified in our study is consistent with the biopsychosocial model of these disorders, within which chronic abdominal pain acts not merely as an isolated symptom, but as a constant stressor that triggers a cascade of inter-related physical and psychoemotional disturbances.

The most pronounced decline was observed in academic performance. This key finding has a logical pathophysiological basis. Chronic pain, acting as a constant distraction, directly disrupts the cognitive processes necessary for successful learning. A vicious cycle develops: against a backdrop of missed classes and declining academic performance, academic debt accumulates, which in itself becomes a powerful source of chronic stress and anxiety. These negative emotions, in turn, through the gut-brain axis mechanisms, potentiate visceral hypersensitivity and intensify pain perception, closing the vicious cycle.

A decline in physical functioning scores may be associated with a direct limitation of activity caused by chronic abdominal pain. Children often consciously avoid games, sports, and other physical activities for fear of triggering pain or other symptoms of FGID-AB, which leads to physical inactivity and, in the long term, to reduced exercise tolerance and a deterioration in overall physical condition.

The decline in emotional well-being is a direct consequence of constant psychological and emotional stress. Living with the unpredictability of FGID-AB symptoms contributes to the development of anxiety and impairments in social functioning.

The identified intra-group differences – namely, a more significant decline in QL among girls and adolescents – can also be explained. Adolescence is characterized by a sharp increase in academic workload, more complex social relationships, and hormonal changes, all of which increase the nervous system's vulnerability to chronic stress. Gender imbalance, in turn, may be associated with a higher prevalence of anxiety and depression among girls, which are closely linked to FGID-AB and exacerbate the subjective perception of the illness.

The findings have direct practical implications for improving care for children with FGID-AB. They clearly demonstrate that the goal of treatment for

FGID-AB should be not only to relieve abdominal pain but also to comprehensively improve the patient's quality of life. Standardized assessment of QL using questionnaires such as the PedsQL should be considered an integral part of dynamic monitoring, allowing for the identification of the areas of the child's life most affected and the quantitative evaluation of treatment effectiveness.

Generalizability

Despite these limitations, the findings have important practical implications. They not only confirm the significant negative impact of FGID-AB on children's quality of life, but also help identify the most vulnerable groups (adolescents and girls) that require special attention.

The data obtained indicate the need for a comprehensive approach to the management of patients with FGID-AB. Treatment strategies should be aimed not only at relieving abdominal pain but also at actively improving quality of life. To develop and validate such strategies, prospective studies are needed in which the comparative assessment of the effectiveness of various treatment methods will be conducted using validated instruments, such as the PedsQL questionnaire, as a key objective outcome measure.

CONCLUSION

Functional gastrointestinal disorders accompanied by abdominal pain are an independent factor contributing to a significant decline in quality of life among children aged 8–17, particularly in school and psychosocial settings, with girls and adolescents being the most vulnerable. The results obtained support the need for a comprehensive therapeutic approach aimed not only at pain relief but also at improving quality of life.

ADDITIONAL INFORMATION

Author contribution. N.Z. Zokirov – study conception and design, analysis of results, manuscript writing; E.I. Alieva – study design, participation in discussion of the results, manuscript editing; A.V. Krasnov – organization of questionnaire administration, data analysis and processing, statistical analysis, participation in discussion of the results; A.I. Khavkin – study conception, final manuscript editing, approval of the final version;

V.V. Sytkov – data analysis and processing, statistical analysis, manuscript writing.

All authors read and approved the final version before publication.

Competing interests. The authors declare that they have no competing interests.

Ethical aspects. The study protocol was reviewed and approved by the local ethics committee. Participation of children and their parents was voluntary. Before completing the questionnaire, parents were given verbal information about the study's objectives, confidentiality, and anonymity, and then provided verbal informed consent for their child to participate. The questionnaire did not contain personal data and did not allow for the identification of respondents. The study was observational and did not involve any interventions in the participants' health.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. Н.З. Зокиров – разработка концепции и дизайна исследования, анализ результатов, написание текста рукописи; Э.И. Алиева – разработка дизайна исследования, участие в обсуждении результатов, редактирование текста; А.В. Краснов – организация анкетирова-

вания, анализ и обработка данных, статистический анализ, участие в обсуждении результатов; А.И. Хавкин – разработка концепции исследования, окончательное редактирование рукописи, утверждение финальной версии; В.В. Сытков – анализ и обработка данных, статистическая обработка, написание текста рукописи.

Все авторы прочли и одобрили финальную версию перед публикацией.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Этические аспекты. Протокол исследования был рассмотрен и одобрен локальным этическим комитетом. Участие детей и их родителей было добровольным. Перед заполнением анкеты родители получили устную информацию о целях исследования, принципах конфиденциальности и анонимности, после чего дали устное информированное согласие на участие ребенка в опросе. Анкета не содержала персональных данных и не позволяла идентифицировать респондентов. Исследование носило наблюдательный характер и не включало вмешательств в здоровье участников.

REFERENCES

- Novik A.A., Ionova T.I. Handbook of quality of life research in medicine. Yu.A. Shevchenko, ed. 4th edition, revised and enlarged. Moscow: National Medical and Surgical Center named after N.I. Pirogov; 2021. (In Russ.).
- Agrba A.V., Ildarova A.A., Stetsenko M.S. The importance of using quality of life questionnaires in assessing the effectiveness of therapy for children with chronic gastroduodenal pathology. In: Modern animal husbandry and innovations in food production technology, aspects of environmental, industrial and hygienic safety. Proceedings of the international scientific and practical conference. Persianovsky, November 22, 2024. Persianovsky: Don State Agrarian University; 2024. P. 472–478. EDN: WFKXUC.
- Rajmil L., López A.R., López-Aguilà S., Alonso J. Parent-child agreement on health-related quality of life (HRQL): a longitudinal study. *Health Qual Life Outcomes*. 2013;11:1–10. <https://doi.org/10.1186/1477-7525-11-101>.
- Arsiwala T., Afroz N., Kordy K., Naujoks C., Patalano F. Measuring what matters for children: a systematic review of frequently used pediatric generic PRO instruments. *Ther Innov Regul Sci*. 2021;55(5):1082–1095. <https://doi.org/10.1007/s43441-021-00311-x>.
- Varni J.W., Seid M., Rode C.A. The PedsQL™: measurement model for the pediatric quality of life inventory. *Med Care*. 1999;37(2):126–139.
- Silonyan A.L., Surkov A.N., Chernikov V.V. Quality of life of children with inflammatory bowel diseases. *Russian Pediatric Journal*. 2021;24(S):55–56. (In Russ.). EDN: OMDRWB.
- Arakelian L., Surkov A.N., Namazova-Baranova L.S. et al. Assessment of the quality of life of children with inflammatory bowel diseases. *University Therapeutic Journal*. 2024;6(S2):9–10. (In Russ.). EDN: IAKZIA.
- Tagirova A.R. Quality of life in children with inflammatory bowel diseases. PhD dissertation. Moscow; 2021. 177 p. (In Russ.). EDN: PRFIQL.
- Certificate of state registration of computer program No. 2024615192 Russian Federation. Namazova-Baranova L.S., Surkov A.N., Bessonov E.E. et al. Program for monitoring the condition of pediatric patients with gastrointestinal tract pathology: No. 2024613598: declared. 20.02.2024; published. 04.03.2024; applicant Federal State Budgetary Scientific Institution "Russian Scientific

- Center of Surgery named after Academician B.V. Petrovsky". (In Russ.). EDN: IKNWLL.
10. Varni J.W., Bendo C.B., Denham J. et al. PedsQL™ Gastrointestinal Symptoms Scales and Gastrointestinal Worry Scales in pediatric patients with functional and organic gastrointestinal diseases in comparison to healthy controls. *Qual Life Res.* 2015;24(2):363–378. <https://doi.org/10.1007/s11136-014-0781-x>.
 11. Belmer S.V., Volynets G.V., Gorelov A.V., Gurova M.M., Zvyagin A.A. et al. Functional digestive disorders in children. Guidelines of Society of Pediatric Gastroenterologists, Hepatologists and Nutritionists. Part 1. *Russian Bulletin of Perinatology and Pediatrics.* 2020;65(4):150–161. (In Russ.). <https://doi.org/10.21508/1027-4065-2020-65-4-150-161>.
 12. Belmer S.V., Volynets G.V., Gorelov A.V., Gurova M.M., Zvyagin A.A. et al. Functional digestive disorders in children. Guidelines of the Society of Pediatric Gastroenterologists, Hepatologists and Nutritionists. Part 2. *Russian Bulletin of Perinatology and Pediatrics.* 2020;65(5):100–111. (In Russ.). <https://doi.org/10.21508/1027-4065-2020-65-5-100-111>.
 13. Belmer S.V., Volynets G.V., Gorelov A.V., Gurova M.M., Zvyagin A.A. et al. functional disorders of digestive system in children. Guidelines of Society of Pediatric Gastroenterology, Hepatology and Nutrition. Part 3. *Russian Bulletin of Perinatology and Pediatrics.* 2020;65(6):133–144. (In Russ.). <https://doi.org/10.21508/1027-4065-2020-65-6-133-144>.
 14. Pediatric Gastroenterology. National Guidelines. Belmer S.V., Razumovsky A.Yu., eds. Moscow: GEOTAR-Media; 2022. 864 p.
 15. Zokirov N.Z., Alieva E.I., Krasnov A.V., Sytkov V.V., Yablokova E.A. Prevalence of functional gastrointestinal disorders with abdominal pain in children aged 8–17 years: cross-sectional study. *Pediatric pharmacology.* 2025;22(6):655–662. (In Russ.). <https://doi.org/10.15690/pf.v22i6.2991>.
 16. Karami H., Charati J.Ya., Aghaee B.L. et al. Quality of life for children with functional abdominal pain and their parents compared to healthy individuals. *J Ped Rev.* 2022;10(3):267–272. <https://doi.org/10.32598/jpr.10.3.1018.1>.
 17. Polivanova T.V., Kasparov E.V., Vshivkov V.A. Indicators of quality of life in schoolchildren with abdominal pain. *Experimental and Clinical Gastroenterology.* 2023;1(209):158–164. (In Russ.). <https://doi.org/10.31146/1682-8658-ecg-209-1-158-164>. EDN: TLQTGP.
 - оценке эффективности терапии детей с хронической гастродуоденальной патологией. В кн.: Современное животноводство и инновации в технологии производства продуктов питания, аспекты экологической, производственной и гигиенической безопасности. Материалы международной научно-практической конференции. Персиановский, 22 ноября 2024 года. Персиановский: Донской государственный аграрный университет; 2024. С. 472–478. EDN: WFKXUC.
 3. Rajmil L., López A.R., López-Aguilá S., Alonso J. Parent-child agreement on health-related quality of life (HRQOL): a longitudinal study. *Health Qual Life Outcomes.* 2013;11:1–10. <https://doi.org/10.1186/1477-7525-11-101>.
 4. Arsiwala T., Afroz N., Kordy K., Naujoks C., Patalano F. Measuring what matters for children: a systematic review of frequently used pediatric generic PRO instruments. *Ther Innov Regul Sci.* 2021;55(5):1082–1095. <https://doi.org/10.1007/s43441-021-00311-x>.
 5. Varni J.W., Seid M., Rode C.A. The PedsQL™: measurement model for the pediatric quality of life inventory. *Med Care.* 1999;37(2):126–139.
 6. Силонян А.Л., Сурков А.Н., Черников В.В. Качество жизни детей с воспалительными заболеваниями кишечника. *Российский педиатрический журнал.* 2021;24(S):55–56. EDN: OMDRWB.
 7. Аракелян Л., Сурков А.Н., Намазова-Баранова Л.С. и др. Оценка качества жизни детей с воспалительными заболеваниями кишечника. *University Therapeutic Journal.* 2024;6(S2):9–10. EDN: IAKZIA.
 8. Тагирова А.Р. Качество жизни у детей с воспалительными заболеваниями кишечника. Дис. ... канд. мед. наук. М.; 2021. 177 с. EDN: PRFIQL.
 9. Свидетельство о государственной регистрации программы для ЭВМ № 2024615192 Российская Федерация. Намазова-Баранова Л.С., Сурков А.Н., Бессонов Е.Е. и др. Программа для мониторинга состояния пациентов детского возраста с патологией органов желудочно-кишечного тракта: № 2024613598: заявл. 20.02.2024; опубл. 04.03.2024; заявитель Федеральное государственное бюджетное научное учреждение «Российский научный центр хирургии имени академика Б.В. Петровского». EDN: IKNWLL.
 10. Varni J.W., Bendo C.B., Denham J. et al. PedsQL™ Gastrointestinal Symptoms Scales and Gastrointestinal Worry Scales in pediatric patients with functional and organic gastrointestinal diseases in comparison to healthy controls. *Qual Life Res.* 2015;24(2):363–378. <https://doi.org/10.1007/s11136-014-0781-x>.
 11. Бельмер С.В., Волынец Г.В., Горелов А.В., Гурова М.М., Звягин А.А. и др. Функциональные расстройства органов пищеварения у детей. Рекомендации

ЛИТЕРАТУРА

1. Новик А.А., Ионова Т.И. Руководство по исследованию качества жизни в медицине. Ю.А. Шевченко, ред. 4-е изд., перераб. и доп. М.: Изд-во НМХЦ им Н.И. Пирогова; 2021.
2. Агрба А.В., Ильдарова А.А., Стеценко М.С. Значение использования опросников качества жизни при

- Общества детских гастроэнтерологов, гепатологов и нутрициологов. Часть 1. Российский вестник перинатологии и педиатрии. 2020;65(4):150–161. <https://doi.org/10.21508/1027-4065-2020-65-4-150-161>.
12. Бельмер С.В., Волынец Г.В., Горелов А.В., Гурова М.М., Звягин А.А. и др. Функциональные расстройства органов пищеварения у детей. Рекомендации Общества детских гастроэнтерологов, гепатологов и нутрициологов. Часть 2. Российский вестник перинатологии и педиатрии. 2020;65(5):100–111. <https://doi.org/10.21508/1027-4065-2020-65-5-100-111>.
 13. Бельмер С.В., Волынец Г.В., Горелов А.В., Гурова М.М., Звягин А.А. и др. Функциональные расстройства органов пищеварения у детей. Рекомендации Общества детских гастроэнтерологов, гепатологов и нутрициологов. Часть 3. Российский вестник перинатологии и педиатрии. 2020;65(6):133–144. <https://doi.org/10.21508/1027-4065-2020-65-6-133-144>.
 14. Детская гастроэнтерология. Национальное руководство. Бельмер С.В., Разумовский А.Ю., ред. М.: ГЭОТАР-Медиа; 2022. 864 с.
 15. Зокиров Н.З., Алиева Э.И., Краснов А.В., Сытьков В.В., Яблокова Е.А. Распространенность функциональных расстройств органов пищеварения с абдоминальной болью у детей в возрасте 8–17 лет: поперечное исследование. *Педиатрическая фармакология*. 2025;22(6):655–662. <https://doi.org/10.15690/pf.v22i6.2991>.
 16. Karami H., Charati J.Ya., Aghaee B.L. et al. Quality of life for children with functional abdominal pain and their parents compared to healthy individuals. *JPed Rev*. 2022;10(3):267–272. <https://doi.org/10.32598/jpr.10.3.1018.1>.
 17. Поливанова Т.В., Каспаров Э.В., Вшивков В.А. Показатели качества жизни школьников с болями в животе. *Экспериментальная и клиническая гастроэнтерология*. 2023;1(209):158–164. <https://doi.org/10.31146/1682-8658-ecg-209-1-158-164>. EDN: TLQTGP.

Authors' info

Nurali Z. Zokirov — Dr. Sci. (Med.), Professor, Head of the Nephrology Department; Professor, Head of the Department of Pediatrics, Academy of Postgraduate Education, Federal Scientific and Clinical Center for Children and Adolescents, Federal Medical and Biological Agency of Russia; Professor, Department of Pediatrics, State Scientific Center of the Russian Federation — A.I. Burnazyan Federal Medical Biophysical Center, Federal Medical and Biological Agency of Russia. E-mail: nuraliz@mail.ru; <https://orcid.org/0000-0002-1928-749X>; SPIN: 9161-8502

Elmira I. Alieva — Dr. Sci. (Med.), Professor, Department of Pediatrics, Federal Scientific and Clinical Center for Children and Adolescents, Federal Medical and Biological Agency of Russia; Professor, Department of Pediatrics, State Scientific Center of the Russian Federation — A.I. Burnazyan Federal Medical Biophysical Center, Federal Medical and Biological Agency of Russia. E-mail: el-alieva@yandex.ru; <https://orcid.org/0009-0001-5863-1556>; SPIN: 7773-3520

Arseniy V. Krasnov — Postgraduate Student, Department of Pediatrics, Federal Scientific and Clinical Center for Children and Adolescents, Federal Medical and Biological Agency of Russia; District Pediatrician, Dolgoprudny Clinical Hospital, Moscow Region. E-mail: arskrasnov@mail.ru; <https://orcid.org/0009-0001-4112-9244>; SPIN: 4575-7610

Anatoly I. Khavkin — Dr. Sci. (Med.), Professor, Head of the Moscow Regional Center of Pediatric Gastroenterology and Hepatology of the Research Clinical Institute of Childhood; Professor, Department of Pediatrics with a Course in Pediatric Surgical Diseases of the Medical Institute of the Belgorod National Research University. E-mail: khavkin@nikid.ru; <https://orcid.org/0000-0001-7308-7280>; SPIN: 6070-9473

Valentin V. Sytkov — Cand. Sci. (Med.), Associate Professor, Department of Pediatric Surgery. E-mail: doc-sytkov@yandex.ru; <https://orcid.org/0000-0001-6152-5693>; SPIN: 2792-6214

Об авторах

Нурали Зокирович Зокиров — д.м.н., профессор, заведующий нефрологическим отделением; профессор, заведующий кафедрой педиатрии, Академия постдипломного образования, Федеральный научно-клинический центр детей и подростков Федерального медико-биологического агентства России; профессор, кафедра педиатрии, Федеральный медицинский биофизический центр имени А.И. Бурназяна Федерального медико-биологического агентства России. E-mail: nuraliz@mail.ru; <https://orcid.org/0000-0002-1928-749X>; SPIN: 9161-8502

Эльмира Ибрагимовна Алиева — д.м.н., профессор, кафедра педиатрии, Федеральный научно-клинический центр детей и подростков Федерального медико-биологического агентства России; профессор, кафедра педиатрии, Федеральный медицинский биофизический центр имени А.И. Бурназяна Федерального медико-биологического агентства России. E-mail: el-alieva@yandex.ru; <https://orcid.org/0009-0001-5863-1556>; SPIN: 7773-3520

Арсений Викторович Краснов — аспирант, кафедра педиатрии, Федеральный научно-клинический центр детей и подростков Федерального медико-биологического агентства России; участковый педиатр, Долгопрудненская клиническая больница. E-mail: arskrasnov@mail.ru; <https://orcid.org/0009-0001-4112-9244>; SPIN: 4575-7610

Анатолий Ильич Хавкин — д.м.н., профессор, руководитель Московского областного центра гастроэнтерологии и гепатологии, Научно-исследовательский клинический институт детства Министерства здравоохранения Московской области; профессор, кафедра педиатрии с курсом детских хирургических болезней медицинского института, Белгородский государственный исследовательский университет. E-mail: khavkin@nikid.ru; <https://orcid.org/0000-0001-7308-7280>; SPIN: 6070-9473

Валентин Вячеславович Сытьков — к.м.н., доцент, кафедра детской хирургии. E-mail: doc-sytkov@yandex.ru; <https://orcid.org/0000-0001-6152-5693>; SPIN: 2792-6214