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An assessment of knowledge about celiac disease based on an anonymous survey among first- and sixth-year medical students at Saint Petersburg State Pediatric Medical University, as well as Medical College students

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ABSTRACT. Introduction. Celiac disease is currently one of the most common chronic immune-mediated diseases, characterized by polymorphism of clinical manifestations and the complexity of early diagnosis. Despite improvements in diagnostic methods, the disease often remains unrecognized, largely due to insufficient awareness among healthcare professionals and future doctors. **The aim** of the study was to assess the level of knowledge about celiac disease among 6th-year, 1st-year students, and medical college students. **Materials and methods.** An anonymous online survey was conducted, consisting of 19 questions grouped into 7 thematic blocks. A total of 1261 participants took part in the survey, including: 6th-year students – 418 people, medical college students – 69, 1st-year students – 774. Statistical data processing was performed using SPSS for Windows 13.0 and Microsoft Excel 2019 software. **Results.** The study revealed an unsatisfactory level of knowledge among medical students. Students primarily made errors in questions related to clinical presentation, specific serological diagnosis, diseases associated with celiac disease, genetic markers, and complications. The data indicate an insufficient understanding of the topic and the need to develop methods to increase knowledge and interest among students. **Conclusions.** The obtained results highlight the relevance of implementing additional educational activities. Effective measures may include: conducting additional lecture courses, scientific conferences, utilizing clinical case discussions in student practice, and disseminating reliable informational materials through university resources. A comprehensive educational approach and student discipline will improve the quality of training and enhance early diagnosis of the disease.

KEYWORDS: celiac disease, student awareness, anonymous online survey

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Знание о целиакии на основании анонимного опроса студентов 6-го и 1-го курсов Санкт-Петербургского государственного педиатрического медицинского университета и медицинского колледжа

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РЕЗЮМЕ. Введение. В настоящее время целиакия является одним из наиболее распространенных хронических иммуноопосредованных заболеваний, которое характеризуется полиморфизмом клинических проявлений и сложностью ранней диагностики. Несмотря на совершенствование методов диагностики, заболевание нередко остается нераспознанным, что во многом связано с недостаточной осведомленностью медицинских работников и будущих врачей. **Цель исследования** — оценить уровень знаний о целиакии среди студентов 6-го и 1-го курсов Санкт-Петербургского государственного педиатрического медицинского университета и медицинского колледжа. **Материалы и методы.** Проведено анонимное онлайн-тестирование, включавшее 19 вопросов, сгруппированных в 7 тематических блоков. В анкетировании принимал участие 1261 человек, из них 6-й курс — 418 человек, медицинский колледж — 69, 1-й курс — 774 обучающихся. Статистическая обработка данных выполнена с помощью программного обеспечения SPSS for Windows 13.0 и Microsoft Excel 2019. **Результаты.** Исследование выявило неудовлетворительный уровень знаний среди студентов-медиков. В основном студенты допускают ошибки в вопросах клинической картины, специфической серологической диагностики, заболеваний, связанных с целиакией, генетических маркеров и осложнений. Данные свидетельствуют о недостаточном понимании темы и необходимости разработки методов повышения знаний и интереса среди студентов. **Выводы.** Полученные результаты подчеркивают актуальность внедрения дополнительных образовательных мероприятий. Эффективными мерами могут быть: проведение дополнительных лекционных курсов, научных конференций, разборы клинических случаев в практике студентов, распространение достоверных информационных материалов через университетские ресурсы. Комплексный образовательный подход и дисциплина обучающихся позволяют повысить качество подготовки и улучшить раннюю диагностику заболевания.

КЛЮЧЕВЫЕ СЛОВА: целиакия, осведомленность студентов, анонимный онлайн-опрос

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

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INTRODUCTION

Currently, celiac disease is one of the most pressing issues in pediatrics and gastroenterology. Over the past few years, its prevalence has increased significantly [1]. Increased awareness of celiac disease among physicians of various specialties (including dentists, gynecologists, dermatologists, and others), screening of children in high-risk groups, and public education through the media have contributed to increased numbers of diagnosed cases. The public organization "Emilia," which supports people with celiac disease, is actively involved in this educational work. According to the World Gastroenterology Organization, the prevalence of celiac disease in various populations ranges from 1 in 100 to 1 in 300 [1, 2]. Long-term studies indicate that gluten enteropathy occurs in 0.5–2% of the population, with an average prevalence of about 1% [3].

Celiac disease can develop at any age; the clinical picture is characterized by polymorphism and includes both intestinal symptoms (abdominal pain, loose stools, bloating) and extraintestinal symptoms (including failure to thrive, anemia, osteopenia, dermatitis herpetiformis, peripheral neuropathy, and others) [4, 5], which is why timely diagnosis is often difficult. The symptoms are so diverse that the disease has been dubbed the "Great Mimic."

Currently, serological tests are used for celiac disease screening: detection of specific antibodies to tissue transglutaminase (tTG) in serum samples [6, 7]. A major advantage of mass screening is the identification of mild and asymptomatic cases of celiac disease. Celiac disease is diagnosed through esophagogastroduodenoscopy (EGD) with a biopsy of the small intestine mucosa [8], and treatment consists of strict, lifelong adherence to a gluten-free diet [4, 9].

The percentage of diagnosed cases of celiac disease varies significantly from country to country, which is associated with both genetic factors and the level of awareness among physicians and the availability of diagnostic testing. In Finland, it ranges from 60–80%, in Italy from 30–40%, in the U.S. from 17–30%, in Germany from 10–20%, and in Russia from 5–10% [1, 10]. Scandinavian countries have the highest detection rates due to active population-based screening. Countries in Western Europe and North America are improving their diagnostic capabilities, but a significant proportion

of cases (50–80%) still go undiagnosed [11]. In Asian, African, and Eastern European countries, the percentage of diagnosed cases is extremely low, which is associated with low public awareness and limited access to diagnostic tests (serology, biopsy) [12].

Thus, celiac disease remains a significant medical problem worldwide, affecting people of all age groups. Given the high prevalence and difficulties in timely diagnosis, studying this topic is vitally important for physicians and medical students, as it forms the foundation of their clinical experience, enhances their knowledge, and guides further scientific research in this field.

AIM

The aim of this study was to assess students' knowledge of celiac disease among first- and sixth-year students in the Faculty of Pediatrics and the Medical College of St. Petersburg State Pediatric Medical University (SPbSPMU) based on an anonymous online survey.

MATERIALS AND METHODS

This study was conducted among medical students in an anonymous online survey using Yandex Forms during lectures. Respondents were informed about the purpose of the survey, confidentiality, and the non-disclosure of individual results.

There were 19 questions in total, divided into seven thematic sections. The first section contained questions about the basics and general information regarding the disease, including its definition, duration, and age-related characteristics. In the second section, respondents were asked to identify the clinical manifestations of celiac disease and its complications. The third section focused on testing knowledge of diseases and conditions associated with an increased risk of developing celiac disease, as well as understanding of genotypes associated with it. The fourth extensive section assessed students' awareness of high-quality and timely diagnosis of celiac disease, including laboratory and imaging tests. The fifth section included questions on treatment, namely dietary therapy. It was important to assess whether students understood which foods can be consumed by patients with this diagnosis without harming their health, and

which must be completely excluded. The sixth section addressed the topic of follow-up care and treatment monitoring: how often patients should be monitored and whether a follow-up biopsy is necessary. In the final, seventh section, we analyzed the prevalence of celiac disease among respondents, their close and distant relatives, to compare it with statistics in Russia, and also identified the sources of information used by students at SPSPMU.

A total of 1,261 people participated in the survey, including 418 sixth-year medical students, 69 medical college students, and 774 first-year students.

Statistical analysis was performed using SPSS for Windows 13.0 and Microsoft Excel 2019. The means of independent sample populations were compared using the Wilcoxon p-test. Changes were considered statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION

The study revealed an insufficient level of knowledge among medical students. Figure 1 shows the difference in correct answers among students in different years.

The following percentages of students answered all questions correctly: 56.6% (237) – 6th year; 45.1% (31) – Medical College (M/C); 46.9% (363) – 1st year. The difference between the students' answers is as follows: 6th year and M/C – 11.5% ($p < 0.05$); 6th and 1st years – 9.7% ($p < 0.05$); 1st year and M/C – 1.8% ($p > 0.05$). The data are presented in Figure 2.

When comparing results among students from different years, we can say that the difference between the 1st year, M/C, and the 6th year is quite small and amounts to approximately 10%. The level of knowledge increases as students' progress toward graduation; however, even among upperclassmen, there remains a significant number of gaps. Lower-year students demonstrate lower scores in understanding this topic.

Difficulties with answers mainly arise in questions regarding clinical manifestations. Most respondents are unaware that celiac disease manifests not only with intestinal but also with extraintestinal symptoms [13–16], and may also be asymptomatic [17]. According to the survey results, the following percentages of students selected intestinal symptoms: 6th year – 62% (259), M/C – 47% (32), 1st year – 50% (387); and extraintestinal symptoms: 6th year – 34% (142), M/C – 31% (21), 1st year – 29% (224). The difference is: 6th year – $p < 0.05$; M/C – $p > 0.05$; 1st year – $p < 0.05$.

Students know significantly less about complications of celiac disease. The percentage of students who answered correctly was: 6th year – 11.2% (47), M/C – 4.5% (3), 1st year – 4.3% (33) (6th year and M/C: $p < 0.05$; 6th and 1st years: $p < 0.05$; M/C and 1st year: $p > 0.05$).

In addition, students have low awareness of risk groups. Autoimmune thyroiditis, atopic dermatitis, first-degree relatives with celiac disease, type 1 diabetes, Down syndrome, Turner syndrome, Williams syndrome, and total immunoglobulin A deficiency [13, 18] represent an increased risk of developing celiac disease. Identifying risk

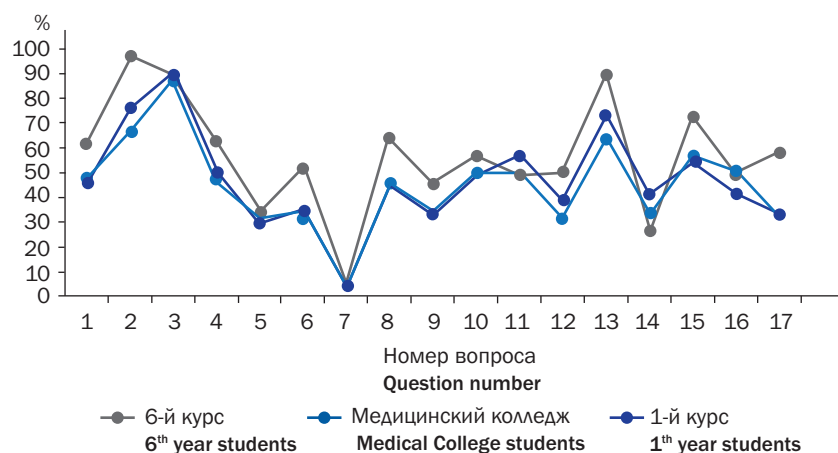


Fig. 1. Proportion of correct answers among students (the figure is prepared by the authors)

Рис. 1. Соотношение правильных ответов между студентами (рисунок подготовлен авторами)

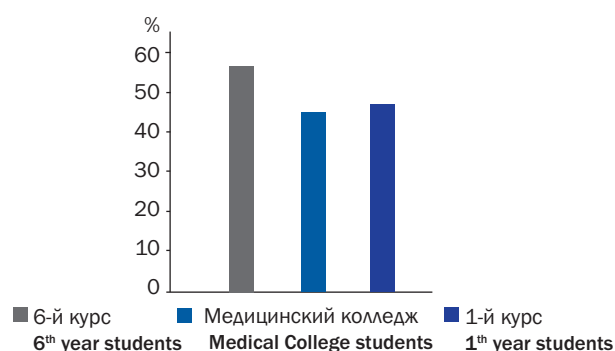


Fig. 2. Comparison of students achieving perfect scores across different courses, % (the figure is prepared by the authors)

Рис. 2. Сравнение студентов, правильно ответивших на все вопросы, среди разных курсов, % (рисунок подготовлен авторами)

groups can significantly aid in diagnosis, so this information should be relevant to medical students. More than half of the 6th-year students are aware of this (52% (217)), while students in lower years are less familiar with this information (M/C – 32% (22), 1st year – 35% (271)) (6th year and M/C: $p < 0.05$; 6th and 1st years: $p < 0.05$; M/C and 1st year: $p > 0.05$).

Questions regarding genetic markers for celiac disease also posed a challenge. A high prevalence of celiac disease has been demonstrated in families with the presence of the HLA DQ2 and DQ8 haplotypes [8, 19–21]. The correct answer was given by students: 6th year – 50% (208), M/C – 32% (22), 1st year – 39% (305) (6th year and M/C: $p < 0.05$; 6th and 1st years: $p < 0.05$; M/C and 1st year: $p > 0.05$).

In addition, students found it difficult to answer the question regarding diagnosis, which indicates an insufficient understanding of the complete diagnostic algorithm. The diagnosis of celiac disease is based on data from laboratory and instrumental studies. The most informative methods are serological and specific genetic tests [20, 22]. This option was chosen by: 6th-year students – 46% (192), M/C – 35% (24), 1st-year students – 33% (255) (6th-year students and M/C: $p > 0.05$; 6th-year and 1st-year students: $p < 0.05$; M/C and 1st year: $p > 0.05$). The “gold standard” for definitive confirmation in patients with positive immunological tests is small bowel biopsy followed by histopathological examination [16, 23–25]. The students demonstrated the best knowledge on this question: 6th year – 65% (272), M/C – 46% (32),

1st year – 48% (371) (6th year and M/C: $p < 0.05$; 6th and 1st years: $p < 0.05$; M/C and 1st year: $p > 0.05$).

The study allowed us to estimate the prevalence of celiac disease at our university. It turned out that in the 6th year, 5 out of 418 students (1.2%) had celiac disease, which almost corresponds to the estimated prevalence of the disease in Russia – 1:100 [1]. However, based on the responses of first-year medical students, 3 out of 69 students were found to have celiac disease (4.3%), and in the first year, 41 out of 774 students (5.3%). These figures already differ significantly from the aforementioned data for our country and lead to the conclusion that either the prevalence of celiac disease has indeed increased substantially, or the students’ responses simply do not reflect reality. In total, 49 (3.9%) out of 1,261 people have the disease – a ratio of 1:25.

To learn about celiac disease, most students use online resources (86% (1,089)), as this method offers a vast amount of information nowadays and is also more accessible and user-friendly for the younger generation. However, the abundance of information and the prevalence of unofficial data lead to unreliable, incorrect, and outdated knowledge about the disease. Fortunately, there are still those who use books and medical journals (37% (469) and 24% (299), respectively), distance learning (12% (150)), and brochures (7% (94)), but the percentage of such students is significantly lower than those using the internet. One of the most prioritized and reliable sources is information from the St. Petersburg Celiac Disease Society “Emilia,” but, unfortunately, our study’s data showed that only a small number of students (7.5% (95)) are aware of this disease.

Thus, these results indicate a lack of understanding and the need to develop methods to increase knowledge and interest among students, as well as to implement additional educational initiatives.

CONCLUSION

In conclusion, we would like to note that celiac disease has a significant impact on people’s health and quality of life. Every year, more and more cases of the disease are identified. Therefore, it is very important to raise public awareness and vigilance regarding celiac disease. Based on the results of our study, it is clear that not only

underclassmen but also graduates are insufficiently aware of celiac disease. To address this issue, it is necessary to improve the professional training of future physicians. Holding additional classes, lectures, and scientific conferences on this topic helps increase knowledge. In addition, real clinical cases and interaction with patients contribute to better retention of information, the acquisition of valuable experience, and increased interest in the disease. An important way to improve awareness is to disseminate reliable information about celiac disease: posters in universities and hospitals, educational videos, and sections on the university's website with a library of materials for self-study. May 16 is World Celiac Disease Day. Thematic events and quizzes held on this day will also help broaden students' horizons and increase their interest in the disease. The prevalence of celiac disease is high, so knowledge of this condition will help in making an accurate diagnosis in a timely and effective manner, differentiating it from other diseases associated with malabsorption syndrome, and immediately prescribing targeted treatment.

ADDITIONAL INFORMATION

Authors' contribution. A.A. Kalinina – formulating the idea, research goals, and objectives; M.O. Revnova – preparing and creating the manuscript, commenting on or revising it; V.P. Novikova – editing the manuscript, providing commentary, and preparing it for publication; L.V. Sakhno – commenting on or revising the manuscript, including the stages before or after publication; E.V. Sousova – formulating the research idea, assisting in conducting testing among medical college students; P.V. Kan – formulating research goals,

and objectives, conducting the research process; Kh.M. Khamchieva – creating a Yandex Form, conducting testing and analyzing the obtained data.

All authors read and approved the final version before publication.

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

Consent for publication. The authors received written consent from the respondents to publish the data.

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