

ANALYSIS OF STUDENTS' AWARENESS OF MEASURES TO PREVENT INFECTIONS WITH FECAL-ORAL AND HEMATOGENIC TRANSMISSION MECHANISMS

Solovieva YuV¹, Paunova SS¹, Markelova SV¹ ✉, Kirillova AV¹, Skobolina NA¹, Tseplyaeva KV², Sapunova NO²

¹ Pirogov Russian National Research Medical University, Moscow, Russia

² Dolgoprudny Gymnasium, Dolgoprudny, Russia

Great attention is traditionally paid to prevention of infectious diseases in pediatric population. Along with the institutional, therapeutic and preventive measures, it is necessary to control public awareness of such issues. The study was aimed to analyze awareness of primary school, high school, and senior school students, college and university students of the issues related to prevention of infections with fecal-oral and hematogenic transmission mechanisms. The study was carried out using the private online questionnaire consisting of three items (personal information, questions regarding awareness of the infections with fecal-oral and hematogenic transmission mechanisms). The properly filled questionnaires of the respondents, who had given to consent to participation in the study, were analyzed. It was found that schoolchildren aged 12–15 years were the least informed about the issues related to prevention of infections with fecal-oral and hematogenic transmission mechanisms, while the group of students aged 18–30 years was the most informed. It was hypothesized that parents influenced the choice of answer made by schoolchildren aged 6–11 during the online survey. It has been proposed to ensure raising of the 6–15-year-old students' awareness of the issues related to prevention of infectious diseases, including by means of hygienic education when mastering such school curriculum subjects, as Biology and Human Life Safety.

Keywords: risk factors, prevention, infectious diseases, fecal-oral transmission mechanism, hematogenic transmission mechanisms, students, hygienic education

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Compliance with ethical standards: the study was approved by the Ethics Committee of the Pirogov Russian National Research Medical University (protocol No. 159 dated 21 November 2016). The informed consent was obtained for all study participants. The study was in line with the principles of biomedical ethics and did not endanger the subjects.

✉ **Correspondence should be addressed:** Svetlana V. Markelova
Ostrovityanov, 1, Moscow, 117997, Russia; markelova.sve@yandex.ru

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АНАЛИЗ ИНФОРМИРОВАННОСТИ ОБУЧАЮЩИХСЯ О МЕРАХ ПРОФИЛАКТИКИ ИНФЕКЦИЙ, ИМЕЮЩИХ ФЕКАЛЬНО-ОРАЛЬНЫЙ И ТРАНСМИССИВНЫЙ МЕХАНИЗМ ПЕРЕДАЧИ

Ю. В. Соловьева¹, С. С. Паунова¹, С. В. Маркелова¹ ✉, А. В. Кириллова¹, Н. А. Скоблина¹, К. В. Цепляева², Н. О. Сапунова²

¹ Российский национальный исследовательский медицинский университет имени Н. И. Пирогова, Москва, Россия

² Долгопрудненская гимназия, Долгопрудный, Россия

Профилактике инфекционных заболеваний среди детского населения традиционно уделяют большое внимание. Наряду с мерами организационного, лечебно-профилактического направления необходимо контролировать уровень информированности населения по этим вопросам. Целью проведенного исследования был анализ информированности обучающихся начальных, средних и старших классов, студентов колледжей и вузов по вопросам профилактики инфекций, имеющих фекально-оральный и трансмиссивный механизм передачи. Исследование выполняли с использованием анонимной онлайн-анкеты, состоящей из трех блоков вопросов (паспортная часть, вопросы, касающиеся информированности о мерах профилактики инфекций, имеющих фекально-оральный и трансмиссивный механизм передачи). Анализировали корректно заполненные анкеты респондентов, давших согласие на участие в исследовании. Установлено, что наименее информированными в вопросах профилактики инфекций, имеющих фекально-оральный и трансмиссивный механизм передачи, являются школьники 12–15 лет, а наиболее информированными — группа обучающихся 18–30 лет. Выдвинуто предположение о том, что на выбор ответа школьниками 6–11 лет в ходе онлайн-анкетирования повлияли родители. Предложено обеспечить повышение информированности обучающихся 6–15 лет в вопросах профилактики инфекционных заболеваний, в том числе формами и средствами гигиенического воспитания в ходе освоения предметов школьной программы «Биология», «Основы безопасности жизнедеятельности».

Ключевые слова: факторы риска, профилактика, инфекционные заболевания, фекально-оральный механизм передачи, трансмиссивный механизм передачи, обучающиеся, гигиеническое воспитание

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✉ **Для корреспонденции:** Светлана Валерьевна Маркелова
ул. Островитянова, д. 1, г. Москва, 117997, Россия; markelova.sve@yandex.ru

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Consumption of substandard food and water, safety of which depends on the epidemiological well-being of the environment and is determined by changes in climatic parameters, is the most common cause of infectious diseases in children. According to the World Health Organization (WHO), the above factors affect the prevalence of 31 infectious diseases. Higher rate of the infectious diseases (including fatal cases) caused by substandard drinking water is reported in the medium and low-income countries, for example in Africa and Asia. Natural disasters (floods, mudflows, landslides, etc.), along with the extreme climate change and the associated water pollution, also increase the risk of parasitic diseases [1].

Diarrhea and acute respiratory infections are the leading causes of morbidity and mortality among children under the age of 5 years all over the world. There is evidence that breastfeeding reduces the risk of gastrointestinal and respiratory infections. The review prepared using the Medline, Embase and Scopus databases for the years 2010–2022 reports the analysis of 70 studies, of which 60 have confirmed a positive correlation between breastfeeding only and the reduced risk of some gastrointestinal, respiratory, and other infections in both low-income and high-income countries. The researchers have confirmed that the more prolonged breastfeeding protects against many infectious diseases [2].

The analysis of epidemiological situation for certain groups of infectious diseases in Poland has shown that gastrointestinal infections are among the most prevalent in the population. Furthermore, rotavirus infections predominate among children, while the infections caused by *Clostridium difficile* predominate among adults. The increase in the rate of intestinal infections caused by persistence of this anaerobic Gram-positive rod-shaped bacterium in the body represents a serious problem largely associated with the use of broad spectrum antibiotics. The spread of hepatitis A transformed into epidemic in 2017 [3].

According to the data provided by the researchers, the total share of the infectious diseases associated with climatic factors varies between 9.0 and 18.0%. It has been shown that socio-economic status and anthropometric parameters can modify the effects of climate on pediatric morbidity. Children suffering from growth retardation, exhaustion, and underweight are most susceptible to infectious diseases [4].

In a community of individuals, human is the main source of the spread of infectious diseases. Huang Y. et al performed a questionnaire survey in the populations of three Chinese cities in winter and summer. The study involved polling of 5818 participants, during which a total of 35,542 contacts were reported. The average number of contacts, including occupational ones, per individual per day was 16.7. Daily contacts, the average duration of which exceeded 4 h, occurred mostly at home and were most often physical. The number of physical contacts in winter was higher than that reported for summer months [5].

Great attention is paid to the prevalence of encephalitis in pediatric population. According to retrospective analysis of outpatient medical records in the city of Houston (USA), encephalitis can not only facilitate the development of neurological symptoms, but also lead to death, in both urban and rural populations [6]. Considering the possibility of infectious brain injury after the bite of the tick infected with the tick-borne encephalitis virus, prevention of this disorder in the population is relevant.

Timely vaccination in accordance with the national immunization schedule, affordable competent medical care represent effective methods to prevent infectious diseases in children and adolescents, as well as in adults. Assessment

of awareness of students at different levels of training of the risk factors and effective measures to prevent infectious diseases is relevant in terms of the search for and development of the most effective preventive programs and activities.

The study was aimed to analyze the students' awareness of the measures to prevent infections with fecal-oral and hematogenic transmission mechanisms.

METHODS

In 2023, we performed a random online questionnaire survey of students attending educational institutions of various levels of training: 322 primary school students, 238 high school students, 75 senior school students, as well as 76 students attending colleges and universities of various profiles.

The anonymous online questionnaire survey was performed using the questionnaire developed by experts of Rospotrebnadzor for the All-Russian Dictation on Public Health in autumn 2023 [7]. The questionnaire consisted of 21 questions. The questionnaire included personal information and the questions regarding the respondents' awareness of the measures to prevent infections with fecal-oral and hematogenic transmission mechanisms. The first item was focused on assessing awareness of the measures to prevent infections with fecal-oral transmission mechanism. The questionnaire contained questions, whether it is reasonable for several people to use the same glass for drinking; whether it is enough to use antiseptic instead of hand washing with soap; about the need to wash hands with soap before eating, after the use of the toilet, to wash fruits in the peel (such as bananas, oranges, tangerines) and eggs before cooking; about the sources of infections, modes of transmission and groups at risk of intestinal infection; what kind of water can be used for drinking while traveling; whether it is true that food that has fallen on the floor can be eaten without concerns about its safety if it has been on the floor for less than 5 s.

The second item focused on prevention of diseases with hematogenic transmission mechanism consisted of the following questions: how to dress properly before going to the forest in spring and summer; where the ticks most often wait for their victims; what to do if you find a tick on yourself; whether it is possible to get infected with malaria through mosquito bite; why you can't swim in the water bodies where there is a sign saying "Swimming is prohibited"; what are the main signs that a person has lice.

The questionnaires were divided into groups based on the surveyed students' age (6–11 years, 12–15 years, 16–17 years, 18–30 years). The properly filled questionnaires were included in the analysis.

Statistical data processing was performed using descriptive statistics. The analysis involved the use of parametric statistical methods; the mean (M) and error of the mean (m) were calculated. Student's t -test was used to assess significance of differences between mean values. The differences in the results were considered significant at $p < 0.05$.

RESULTS

Among surveyed students, nobody was there to give correct answers to the questions of the questionnaire about prevention of infections with fecal-oral and hematogenic transmission mechanisms. The mean share ($M \pm m$) of correct answers given by students was $88.9 \pm 1.8\%$.

The largest share of incorrect answers was reported for students aged 12–15 years (high school students).

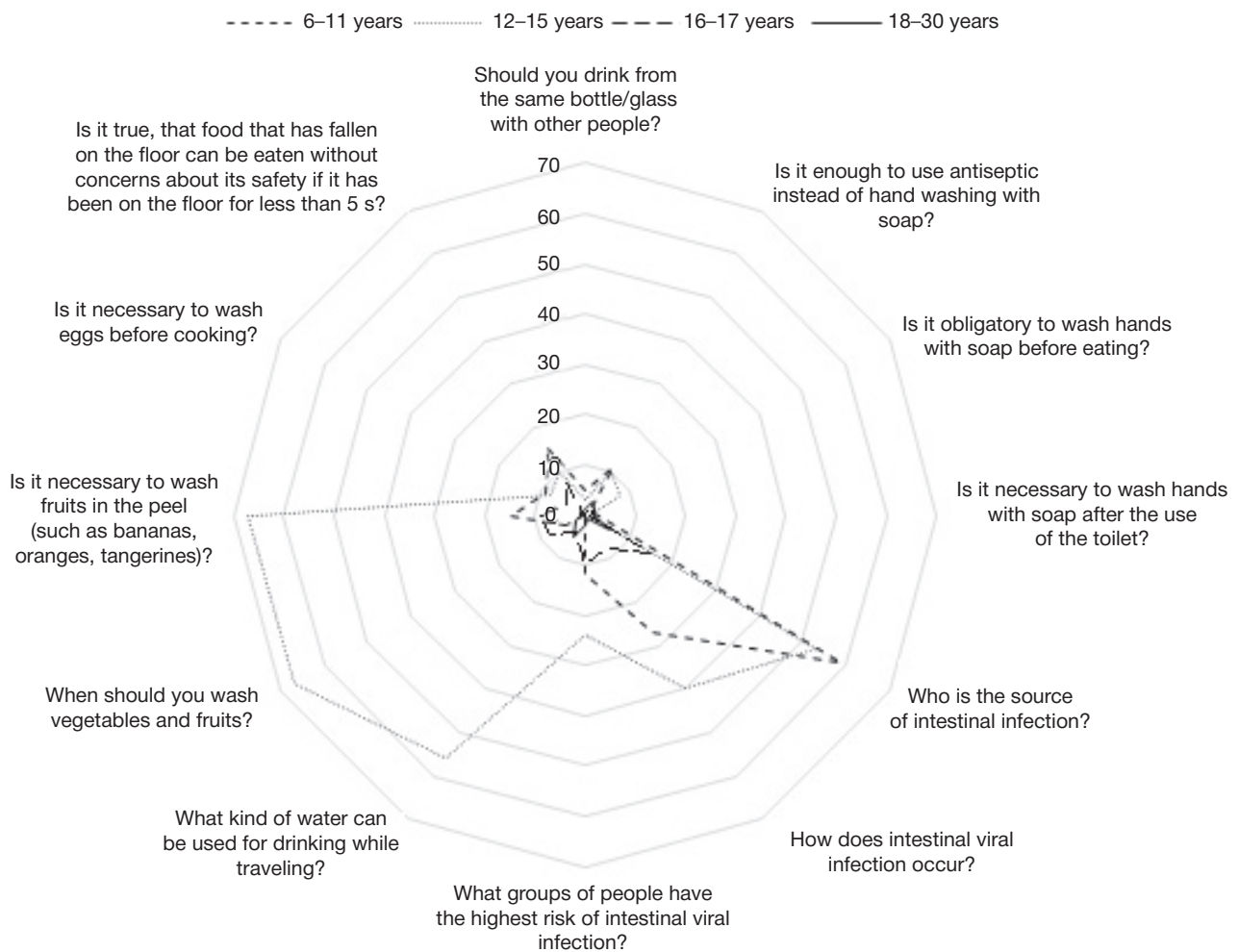


Fig. 1. The share of incorrect answers to the questions about the infections with fecal-oral transmission mechanism given by the respondents (%)

The questions that were given incorrect answers, compared to the answers given by the respondents from other groups ($p < 0.05$), were as follows: "Is it necessary to wash fruits in the peel?" (incorrect answer was given in 67.0% of cases); "When should you wash vegetables and fruits?" (67.0% of cases); "What kind of water can be used for drinking while traveling?" (56.0% of cases); "Who is the source of intestinal infection?" (53.0% of cases) (Fig. 1).

The question "Who is the source of intestinal infection?" also troubled primary school students (in 59.0% of cases) ($p < 0.05$) (Fig. 1).

Every fifth high school student gave a wrong answer to the question about the group at risk of getting infected with intestinal infection (Fig. 1).

The share of incorrect answers to the questions, whether it is reasonable for several people to use the same glass for drinking; whether it is enough to use antiseptic instead of hand washing with soap; about the need to wash hands with soap before eating, after the use of the toilet; about the need to wash eggs before cooking; whether it is reasonable to eat food that has fallen on the floor if it has been there for less than 5 s, among students of all age groups, including college and university students, was comparable and did not exceed 10%.

The smallest share of incorrect answers to the questions about the infections with fecal-oral transmission mechanism was reported for the respondents aged 18–30 years (Fig. 1).

The vast majority of high school students gave incorrect answers to the questions "What are the main signs that a person has lice?" (in 80.0% of cases) and "Is it possible

to get infected with malaria through mosquito bite?" (in 46.0% of cases) ($p < 0.05$) (Fig. 2).

The question "Is it possible to get infected with malaria through mosquito bite?" also troubled primary school students (in 57.0% of cases) ($p < 0.05$) (Fig. 2).

Every fifth high school student gave a wrong answer to the question "Why can't you swim in the water bodies where there is a sign saying "Swimming is prohibited"?" (Fig. 2).

The smallest share of incorrect answers to the questions about the infections with hematogenic transmission mechanism was reported for the respondents aged 18–30 years (Fig. 2).

DISCUSSION

The study showed that the group of students aged 12–15 years was the least informed about the issues related to prevention of infections with fecal-oral and hematogenic transmission mechanisms. The 18–30-year-old students were the most informed.

The results of the questionnaire survey of students aged 6–11 years, based on the main answers to the questions about prevention of infections with fecal-oral and hematogenic transmission mechanisms, were comparable with the answers of students aged 18–30 years, except for answers to the questions about the source of intestinal infection and the possibility of getting infected with malaria through mosquito bite. Such results were likely to be obtained due to the fact that parents controlled and corrected the answers given by students during the questionnaire survey.

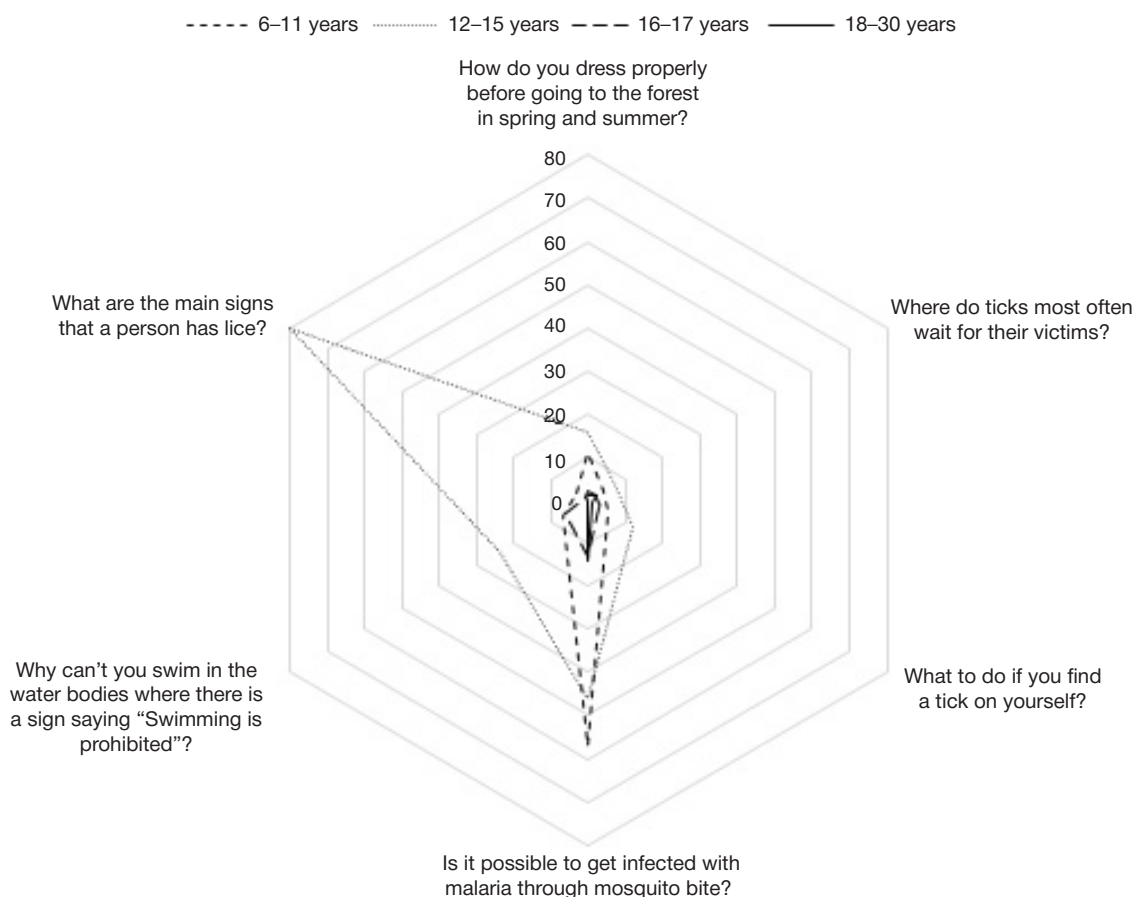


Fig. 2. The share of incorrect answers to the questions about the infections with hematogenic transmission mechanism given by the respondents (%)

Summarizing the data obtained, it can be concluded that schoolchildren aged 6–15 years are the least informed about the issues related to prevention of infections with fecal-oral and hematogenic transmission mechanisms. In our opinion, raising awareness of this category of students, including using the hygienic training forms and means, seems to be the most topical.

The data from social media and mass media is usually the main source of information about prevention of infectious diseases for children and parents. Such data often have low reliability [8].

To prevent infections with fecal-oral and hematogenic transmission mechanisms, such hygienic training means, as lectures, seminars, webinars, preparation of memos and booklets, presentations (including by students themselves) can be used that can be implemented within the framework of school curriculum when mastering such subjects, as Biology and Human Life Safety. This will make it possible to increase the students' motivation to learn about the principles of healthy

lifestyle as the measure to prevent diseases, including infectious ones [9–11].

The findings suggest the need to encourage medical professionals (pediatricians, family doctors, etc.) to take part in realization of educational programs for schoolchildren and their parents focused on prevention of infectious diseases in the form of lessons and training webinars or extracurriculars on the issue, which would contribute to reduction of the rate of infectious diseases among both schoolchildren and parents.

CONCLUSIONS

Thus, it has been shown that the knowledge of students aged 6–11 years and 12–15 years about prevention of infections with fecal-oral and hematogenic transmission mechanisms is insufficient, which requires developing effective hygienic training forms and means that can be implemented in educational institutions.

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